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Analysis of Black Spots and Its Rectification - A Review

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Abstract: ***India is one of the countries having high rate of road accidents and fatalities. National Highways accounts for a substantial proportion of these accidents leading to huge economical loss and affected the growth of the country. Main aim of this paper to provide methodology and detailed studies for Analysis of Black Spots and its Rectification. In this literature review, the techniques and methods that are used for Selection of project study stretch (where high accidents occurred), accident data collection system, Bifurcation of data for better observation, analysis of black spots and black zones are included. Identification of black spot on the basis of several identification methods which are concluded in this paper. Also, it includes some techniques that are used to profile these accident locations and the use of before and after studies to estimate the effect of treatment on the Black spots zone. Methodology of rectification on the basis of short term measures, long term measures, mitigation measure, or improvement of geometric design which is depended on existing road condition are concluded in this paper.***
Keywords: Accidents, Accident Causes, Black spot Identification, Black spot Analysis, Black spot Rectification

I. INTRODUCTION

Main veins for the development of states in the country are Expressways and National highways. The current road safety situation on road network of National Highway in particular areas with high rate of accidents levees much to be desired through the road specially national highway where expected to be developed adopting all safety engineering measures including design stage and road safety audit. It also reflects in the survey which concludes that more than 13 people are dying per hour all over the world. A significant no. of locations even on NHs have remained prone to accidents on the road network in the country including NH network which has already been developed and maintenance for improvement of such locations, a systematic approach is required. Thus identification of such black spots and the rectification of the same is being detailed in this paper. First, we will outline the methodology which is described in literature for site selection on the basis of highest number of accidents weighing high severity and exposure, and introduced sources of data collection for identification of accident zone. Further bifurcations of accident data according to daily variation of accidents, timely variation of accidents, gender wise analysis, vehicle wise distribution, age limit variation of accidents, and monthly variation of accidents for analysis of the top ranked accidental spots (black zone) and causes of accidents. In this paper, we have step forward in the procedure of identification and analysis of black spots on the basis of GIS.

1) *Introduction of Black Spot:* The Road Accident Black Spot is a stretch of National Highway of about 500m in length in which either 5 road accident (in all three years put together involving fatalities/grievous injuries) took place during the last 3 calendar years or 10 fatalities took place the last 3 calendar years. (MoRTH,).

The paper presents various methodologies for identification of black spots and analysis of identified black spots. Based on the detailed analysis, the improvement measures and necessary modifications of black spots have been recommended in order to have a road safety. In this study, it also includes the information about how to implement road geometry, remedial measures, mitigation measures and long term measures for rectification of black spots.

II. OBJECTIVES

The objectives of this paper is to verify the implementation of directions issued on the Road Safety and the same is being stated here under:

A. Improvements of techniques for accident data collection system.
B. Improvements of studies on analysis and method of identification of Black Spots.
C. Improvements in methodology of rectification on the basis of short term measures, long term measures, mitigation measure, and improvement of geometric design which is depended on existing road condition.
D. Comprehensive knowledge regarding Monitoring of the black spot.
E. Our aim is to provide a necessary and consolidated data which will act as a reference for future studies to develop a robust institutional mechanism for road safety.

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III. LITERATURE REVIEW

Myriam Marie Delcasse in year (2017) observed that for Title Black Spot Study: In this paper author suggested the selection of zone/area for Black Spot study, Physical and Non-physical accidents are two type of accidents. Accident prevention program was recommended and Comparison if IRC standards within site Conditions.

Dinesh Mohan in year (2009) observed that for The Road Accident in India: The objective of this paper was the data of traffic fatalities rate in cities with population and motor vehicle registration in India. Author suggested as Official road traffic crash data do not include fatalities road user category in India.

Snehal U Bobade et al. in year (2015) observed that for Identification of Accidental Black spots on National Highways and Expressways: This Paper hinted that locations of accident-prone zone can be identified by ranking of the parameters based on their severity and calculating the severity index. Physical survey was carried out at the actual location for selected stretches of Expressway and Highway. The consideration of parameters which caused maximum number of accidents were assigned maximum weightage and top rank. Total severity index are calculated on the basis of summation of weightages. Accident Severity index was calculated by the addition of Weightages value for each parameters present divided by the total severity. The reading taken on the selected strech and Analyzed by method of ranking and According to importance of the parameter. The minimum rank are most important parameter. After giving rank the percentages were calculated and on the basis of value of percentage the accidental black spot was identified. The separate and particularly spot investigation is necessary to nullify the effect of these parameters so as to reduce the severity of accidental black spots.

P. Puvanachandra et al. in year (2011) observed that for Road Traffic Injuries & Data System in Egypt: Addressing the Challenges: In this paper Author recommended to health & transport professionals must work together to prevent RTIs (Road Traffic Injuries) in vulnerable populations. Author suggested to improving Standardizing data collection system, educating young drivers and improving road designs as well as offering frequent medical screening.

Apparao G. P. Malikarjun Reddy et al. in year (2013) observed that for Identification of accident Black Spots for National Highway Using GIS: In this paper author suggested the methodology of identification of accident prone location and ground control points (GCP) are collected with the help of GPS. The advancement in GIS & GPS can be put to effective use of accident analysis.

Huayun Chen in year (2012) observed that for Black Spot Determination of Traffic Accident Locations and Its Spatial Association Characteristic Analysis Based on GIS: The objective of this paper is utilization of the VRS-GPS positioning technology and geocoding technology to record the traffic accidents with Geo-spatial information. On the basis of spatial relationship between road net-work elements and traffic accidents, two-way association relationship is defined by spatial relationship computation. This paper includes the method which take prospective of reducing accident as an index to rectify the black spots. Lastly, concluded in the suggestion of relationship between black spots and traffic attributes was used to analyse the factors that ensuing in traffic accident. Road accidents are amusing with spatial information and network elements, traffic accident objects are recorded with their subordinate relations and quantity relationship in non-spatial attributes. Black spot identification are most important factors for road traffic safety analysis. The paper adopt the methodology of prospective of reducing accidents as an index to rectify the black spots and improving the conditions of traffic facilities and traffic safety.

Kiran Avhad et al. in year (2017) observed that for Accident Causes, Black Spot Identification & Geometric Design on NH-3: In this paper observed that few work are carried out in the basis of statically analysis of accidents particularly on two –lane national highway. Three years accidents data was collected from their sources of police stations. Author Suggested methodology of identification of accidental black spots, problem solving technique, statistical methods, collection of data method, behavior of driver and other subjects fundamental to highway engineering. The study methodology involves verification of the various road safety implementation status at State level by using well designed and focussed questionnaires. These questionnaires are designed keeping in view the scope of the audit verification points.

1) To select Project Study Area Profile (Strech).
2) To collect accident data (Select site highway) from National Highway Authority of India & State government of India.
3) Comparison of real time data with records.
4) To identify various traffic and road related factors causing accidents.

R.R. sorate et al. in year (2015) observed that for Identification of accident black spots on NH4 (New Katraj Tunnel to Chandani Chowk): Author used the concept in which the accidents was classified based on the severity of injuries and nature of accident. Main objectives of this paper are methods adopted mainly includes collection of existing data, bifurcation of accident data and analysis of collected existing accident data. Existing accident data was collected from Police station and NHAI. Existing data i.e. primary and secondary data of physical survey from the concern department was collected and the same was analyzed by following

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three methods i.e. Method of Ranking, Accident Density Method and Weighted Severity Index Method. Further, a physical survey was conducted to investigate the current condition of site. Accident black spots were identified by analyzing and correlating the accident data of physical survey with existing data. The locations along with causes of accidents was found out by investigating the identified black spot. By referring the above international journal papers, preliminary survey data and interviewing local commuters, we have concluded the parameters which causes accidents. The analysis of primary survey data and secondary existing data was analyzed by method of ranking and severity index. The secondary data was analyzed by method of weighted severity index and Accident Density Method. Further, by identifying the black spots, remedial measures for improvement and rectification of black spots were suggested. Naidu V.M. Venkat L. et al. in year (2011) observed that for Identification and Analysis of Black Spots on NH-5 – Vishakhapatnam (India): In this paper a study of locations, spot speed study has been conducted, based on the detailed analysis and the improvement measures have been recommended.

a) Methods to separate out year wise Accident data, bifurcated according to Nature of accident, Causes of accident, Type of Injury (Fatal, Grievous, and Minor).
b) Authors are recommended important factor consideration of analysis daily variation of accidents, gender wise analysis & monthly variation of accident.
c) The most important parameter because of which more number of accidents is occurred had given top rank and maximum weightage.
d) Analysis of the top ranked accidental spots.
e) The percentages after giving rank and weightage were calculated and on the basis of Accident Severity Index the accidental black spots were identified.
f) To carry out analysis of black spots by using statistical models.

Maen Ghadi et al. in year (2017) observed that for Comparison Different Black Spot Methods: The main objective of this paper is announced identification of black spots, analysis of black spots by different type of methods. This paper author suggested three type of black spot identification methods i.e. screening method, Cluster method & Crash prediction method.

Srinivasan et al. in year (1987) observed that for Identification of Accident Black Spot on National Highway in Kerela: In this paper author suggested those scientific methods which can be used namely as Quantum of accident method, Accident prone index method & Severity Index Method and it was concluded that severity index method are found to be most appropriate. Dr. Wichuda Kowtanapanich originate both public participation method and conventional method were used to identify the locations of black spot. The methods used for identification of black spots are Number of Accidents Method, Accident Density Method, Accident Rate Method, Quality Control Method, Severity Index Method and Combined Method.

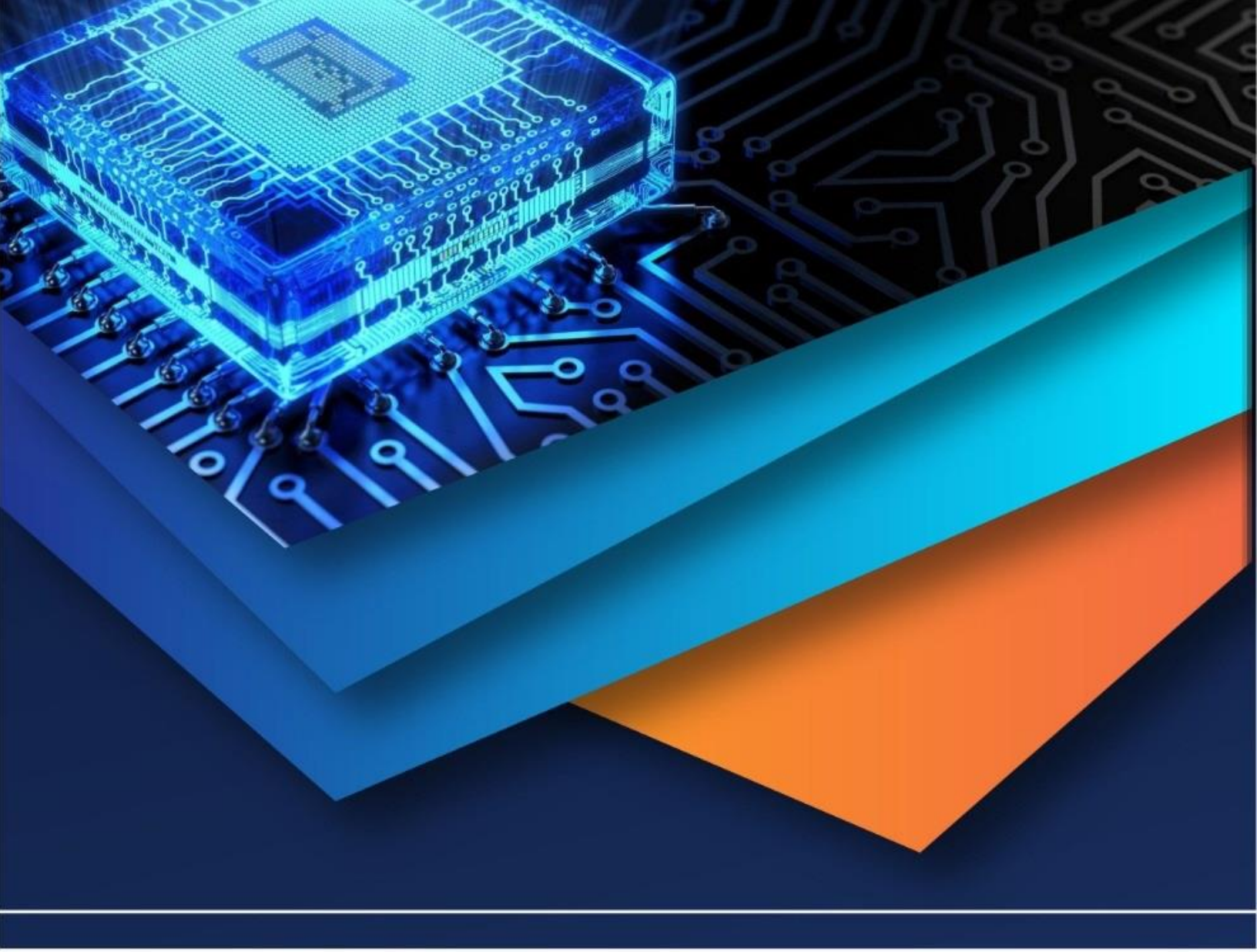
IV. CONCLUSION

Various studies have been conducted on identification of blackspots and its analysis. After reviewing various literatures mentioned in this paper, it can be concluded that the new techniques adopted for identification and economically feasibility in rectification of black spot. India's proliferating economy has accounted in drastic increase in traffic density. Quick movement of people, goods and services is the necessity of time. In India, several black spot have been identified, but rectification of the same is difficult. For minimizing the adverse effect of black spots, advanced technology for identification, analysis and geometric correction shall be adopted. Thus the low cost mitigation measure should be provided and their feasibility and results shall be long lasting. It has been concluded that the up-gradation of advance methodology and progression for identification of black spot is necessary. Low cost mitigation measures and rectification of black spot method shall be adopted.

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