

# REVIEW ON ROAD SAFETY AUDIT AND A CASE STUDY OF SH26 & SH27 FROM KHANDWA TO SANAWAD (M.P.) INDIA

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**Abstract** -Road Accidents are global phenomenon which is occurring all over the world but are very severe in mixed traffic conditions as prevailing in Indian road conditions. Many lives are lost and huge amount of property damage occurs due to accidents. Road safety audit is formal procedure for assessing potential and safety performance in the provision of new road schemes, the improvement and rehabilitation of existing road and in maintenance of roads. The role of auditor is to provide independent advice in the form of recommendation. It is proved that RSA has the potential to save lives. RSA appears to be an ideal tool for improving road safety. Transportation through road networks satisfies the basic need of people. Many lives are lost and huge amount of property damage occurs due to accidents.

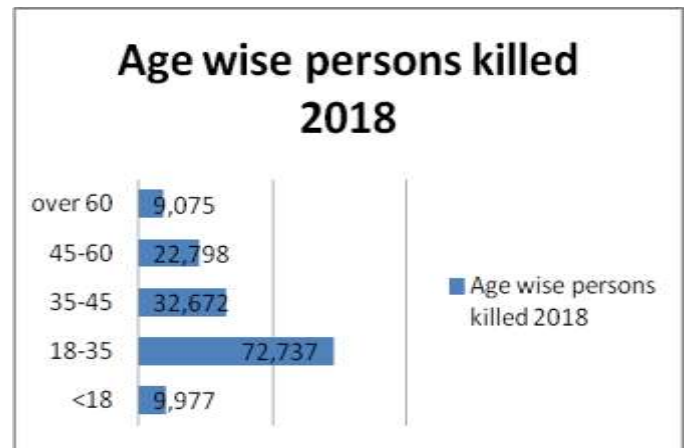
**Key Words:** Road safety audit, Safety Issues, Geometric Features, Crash reduction factor, Black spots, Road accident analysis

## 1. INTRODUCTION

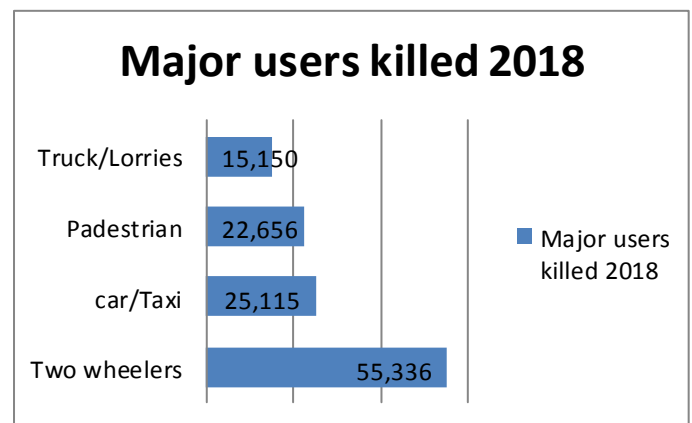
The number of persons killed in road crashes in India touched all time high in 2018 registering over 1.51 lakh fatalities, an increase of nearly 3,500 more people losing their lives as compared to 2017.

State	Deaths in 2018	Deaths in 2017	Deaths in 2016
Uttar Pradesh	22,256	20,124	19,320
Maharashtra	13,261	12,264	12,935
Tamil Nadu	12,216	16,157	17,218
Karnataka	10,990	10,609	11,133
Madhya Pradesh	10,706	10,706	9,646
<b>All States</b>	<b>1,51,417</b>	<b>1,47,913</b>	<b>1,50,785</b>

The road transport ministry uploaded the accident data of 2018. As per the report, while the number of accidents increased by less than half a percent in 2018 the number of persons killed increased by 2.4% over that of the previous year. It said that the road accident severity measured by the number of persons killed per 100 accidents, has seen an increase little over half a percent.



The number of 4,67,044 accidents and 1,51,417 deaths in 2018 translates into an average of 1,280 accidents and 415 deaths every day and nearly 53 accidents and 17 deaths every hour,” the report said highlighting the alarming number of fatalities. It said the share of two-wheeler involved in fatal accidents was maximum at 31.4% followed by car and jeeps riders. Two-wheeler riders were the most vulnerable lot as 35.2% of those killed were two-wheeler riders. Cyclists, pedestrians and two-wheeler riders had 54% share of all dead in road accidents during last year.



The report also said that speeding was the biggest reason of road fatalities accounting for 64.4% of the persons killed followed by driving on the wrong side of the road which accounted for 5.8% of the accident related deaths. “Use of mobile phones accounted for 2.4% of the deaths with drunken driving accounting for 2.8% of the persons killed.

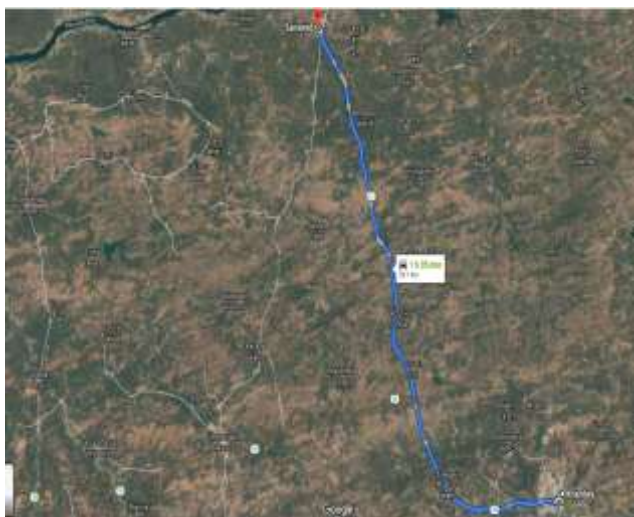
India is a vast country; highway plays an important role in development of nation's progress. As national highways are the veins of transportation system within the country so they have to be safe against accidents. National highways carry humans and materials from one place to another at greater speed. Increase in number of vehicles on roads has increase the possibility of accidents.

**2. STUDY AREA**

The State Highway 26 originates from Chipli (Chhattisgarh) passes through Khandwa (Madhya Pradesh) and ends at Baroda (Gujarat) and covers the length of 692.20 km.

The State Highway 27 originates from Jhalawar (Rajasthan) passes through Indore (Madhya Pradesh) and ends at Malkapur (Maharashtra) and covers the length of 386.60 km.

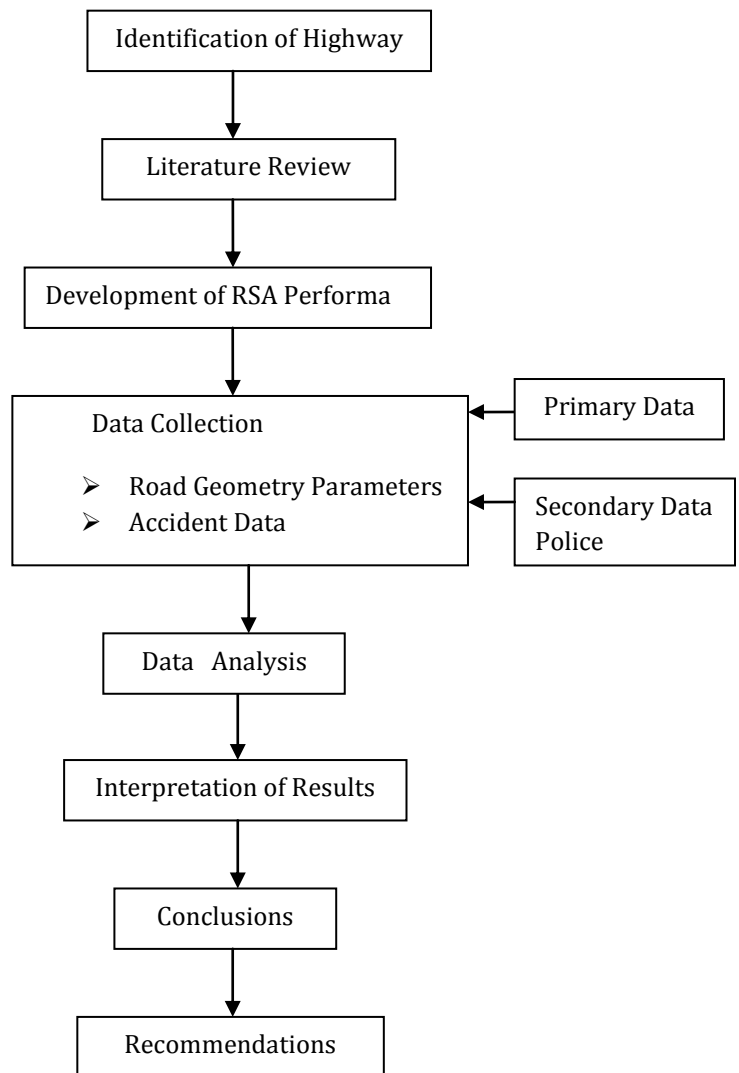
The road selected for this study is existing road from Khandwa to Sanawad ( Madhya Pradesh) which covers the length 59 km. This is the road connecting 4 major towns Khandwa,Indore,Khargone and Burhanpur in Madhya Pradesh state, India. The District road serves an enormous number of heavy vehicles, lorries for the transport of wheat,sugarcane,fly ash and cement materials to the other parts of state and the country. This national highway is maintained and operated by National Highway Authority of India (NHAI) and Madhya Pradesh Road Development Corporation (MPRDC). The identification of the critical section has been taken place on it.



**Satellite view of study area**

**3. METHODOLOGY FOR ROAD SAFETY AUDIT**

Methodology has been developed for road safety audit of state highway which is shown



**3. Literature Review**

**1. Road Safety Audit of NH-3 Section from Rau Circle to Manpur – A Case Study**

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1 Associate Professor 2 Assistant Professor 3 ME student  
1,2,3 CEAMD SGSITS Indore, India)

In this case study it focuses on the identification of existing and potential safety hazards to the road users of an existing road NH-3 Section from Rau-Circle to Manpur. The study helped in gaining knowledge about the designing of safety devices and methods through which risk of an accident can be reduced and identifies the conflict point and provide measures to reduce the severity of such accident at these conflict points, In the analysis of the study is that unauthorized median openings and poor visibility at curves, embankments and intersections were the major cause for accident and a service lane from Rau-Circle junction to mhow bypass and the data of the study shows that manpur, pigdamber and banjari are the Major conflict points of the study section where most number of accidents which are fatal, grievous, minor have occurred. This study shows that large number of illegal median openings at 11 places cause

accident and excessive growth of vegetation and animal danger was affecting the traffic movement, Most of the curves were found not delineated either with chevron and traffic at Rau-Circle junction had frequent stopping condition at rotary section due to the encroachment around junction area.

## 2. Road Safety Audit

(Omkar Gholap<sup>1</sup>, Nikita Shinde<sup>2</sup>, Vaishnavi Shelke<sup>3</sup>, Navnath Navale<sup>4</sup>, Kuldeepak Deshmukh<sup>5</sup> Diploma Students, Department of Civil Engineering, A.T.E.S. Faculty of Polytechnic, Akole, Ahemadnagar, 422 601, Maharashtra, India<sup>1,2,3,4,5</sup>)

In this report shows that road taken having traffic during day time and some black spots on the road where accidents takes place continuously. On the basis of data collection like traffic volume study, accidental data collection, potholes on road data collection, road safety signs and symbols, questionnaire survey of public, etc. They inspected the road in the terms of the safety measures, road scenario, any type of flaws and to suggest the mitigative and preventive measures for the selected section of road for audit. The analysis of collected data continuous contact with potholes present on the road leads to major effects on the human health like back pain, It found that Road Markings, Condition of Shoulder, Traffic Volume, Spot Speed, improper drainage arrangement were main parameters for causing accidents. Absence of road informatory signs, regulatory signs boards, and road markings adds into seriousness of the problem for given chainage of the road. Hence, as a cumulative impact of conditions, the road users safety is compromised and may points leads to accident prone areas like Navalewadi Phata, Pravara Corner, Agasti High school, Shampro office, Sheakaiwadi and there is no utilization of road efficiency.

## 3. "Road Safety Audit: Challenges and Remedies"

(Hetram Sharma\*, Dr Sheetal Agarwal, Assistant Professor Department of Civil Engg. JECRC Foundation, Sitapura, Jaipur \*\* (Associate Professor Department of Civil Engg. KITE Sitapura, Jaipur Corresponding Author: Hetram Sharma)

In the study the aim is to evaluate the Road Safety deficiencies and improvements on existing road network. NH-12 Durgapura Bus Stand to India Gate, and the accident data were collected at identified road stretch and black spots namely India Gate, Haldighati Marg and Pinjrapole Goshala were indentified. The road safety deficiencies such as improper intersection designing's width of carriage way low maintenance of road markings, road sign, unauthorized median openings, unavailability of Bus-Stops, confusing behavior of Pedestrian etc., were observed at identified location. It was found that the public transport system including mini bus and low floor bus shared a major part of carriageway width and creating the traffic hazards to the other fast moving vehicles. Further, Improper vehicle tuning movements and unauthorized median openings at road intersections, were also responsible for accidental crash and

the objective of study is to Identify the black-spots and road safety deficiencies and also the performance Indicators at road section. They have been got the result that sign post related with speed, gap in median, narrow bridge, fly over, pedestrian crossing at mid-block crossings, delineation installed lane markings, guide posts, chevrons lines, median barriers, edge barriers, at turning roads and refuse island, parking area are not present at many location. non vending marked at road side, barriers installed pedestrian pathway marked to avoid conflict points, unauthorized median opening closed and at institutional & Industrial area, the footpath provided 2.5m wide and zebra crossing 3m-5m wide for safe pedestrian crossing. They have been concluded that they focused on the investigation of road safety deficiencies and level of service on an identified road stretch durgapura bus stand to India Gate and the area was by mixed land use showed drastic increase of vehicular traffic as well as road accident during last five years, availability of bus shelter was very poor, due to lack of road markings and traffic signs on selected road sketch the, turning behavior of vehicles was also very irregular and confusing, which was very much prone to road accidents. To avoid the conflicts points, detailed Bus-Shelter designing was proposed, which is incorporating the turning movements of the vehicles. It was observed that by improving the road infrastructure, the not only the conflict points can be reduced, but the road can be improved which directly improved the road safety conditions on the selected road stretch, as well.

## 4. Research Paper on the Road Safety Audit and a Case Study on Kaithal-Kurukshetra Road Haryana, India

(Hitesh kumar<sup>1</sup>, Mrs. Monika<sup>2</sup> 1Postgraduate Student Department of Civil Engineering, Sat Priya Group of Institution, Rohtak, Haryana 2Asst. Professor, Department of Civil Engineering, Sat Priya Group of Institution, Rohtak, Haryana)

The objective of the study in the identification of accident prone areas on the road from FIR, to study the effect of roadway geometrics and traffic conditions on the road and development of statistical relationship between accident and various factors causing accidents. In this study specify more objective is to help produce designs and roads that reduce the number and severity of crashes, road elements with an increased risk potential are removed or that measures are identified to reduce the risk, likelihoods of accidents, possibility of the scheme giving rise to accidents elsewhere in the road network. In this paper real practices of road safety audit on existing roads in different countries were summarized. By taking account these different opinions and auditing procedures into account a case study has been performed for road safety auditing on existing road on Indian highway. Some safety defects observed Guardrails are should be at appropriate positions, Slopes are steep and cannot be considered as gentle regarding road safety, pavement damages such as potholes and pavement edge deterioration should be checked considerably remarkable,



shoulders are insufficient, narrow and are not paved at most locations.

### **5. Road Safety Audit of the Noida – Greater Noida Expressway**

(S SanMithra<sup>1</sup>, N. Naveen<sup>2</sup>, M S Renuka<sup>3</sup> Assistant Professor 1,3, Research Scholar 2 KG Reddy College of Engineering and Technology, Hyderabad, India 1,3 Vel's Institute of Science, Technology & Advanced Studies (VISTAS), Chennai, India 2)

This paper represented a audit had conducted following the guidelines of, IRC: SP: 88, IRC: 67-2012, IRC: 35-1997. Based on the requirements correction of road signs, markings, message signs, hazard markers, traffic safety barriers, identification of blackspots, delineators had done. This paper explores the hazards of the roads and the confusing factors of the drivers. In that significant measures need to take on Road Safety aspects to mitigate the accidents and ensure the safety to vehicular traffic, with a theme of self explaining roads, forgiving roads. The audit conducted for the Existing stage and deficiencies have noticed which should consider for the improvement of safety. This Audit had presented and highlighted issues in safety engineering, showing the good and bad practices in Road safety maintenance like Route Signs, Interchange signs, Exit signs, Miscellaneous information signs, Road Markings etc. Self-Explaining Roads and Forgiving Roads can save the lives of driver and Passenger. The audit had applied to the risks outside the framework of standards and codes, to ensure safety. Therefore, suggested measures need to be implemented to ensure safety to the vehicles.

### **6. Road Safety Audit of RBVRR TSPA Junction – Moinabad Town**

(1,2N. Naveen, 3Dinesh Kumar Yadav 1Assistant Professor, K G Reddy College of Engineering and Technology, Hyderabad, India 2(Research scholar, VELS University, Chennai, India) 3(CEO, Texture Engineering Blueprints LLP, Nagpur, India)

In this paper audit had conducted following the guidelines of IRC: SP: 88. Correction of Road signs, markings, message signs, delineators, hazard markers, traffic safety barriers had done based on the requirements. This paper worked for Safe roads, Self-Explaining roads, Forgiving roads& defensive driving. In conclusion that significant measure should be taken on Road Safety aspects to mitigate the accidents and ensure the safety to pedestrians and vehicular traffic. In this paper observed that chevron sign placed at the roundabout were faded. Direction sign board placed at the shoulder is very near to the carriageway, Illegal median opening on the straight road for personal purpose likely to result in serious accidents, Electrical post placed near the carriageway. Absence of the illumination and chevron sign board at a busy intersection, extra lane is provided at curve with good road markings, Road markings missing. Lack of pedestrian facilities and bus stops placed exactly at the junction, Median height level is at the carriageway height. This is insufficient or deficient treatment of the median opening at the sharp

curve creating confusion to the highway drivers. This is incorrect or misplaced treatment. Uncontrolled access to premises abutting a main road can substantially impede traffic flows and create severe road safety hazards as vehicles tempt to leave, merge with cross traffic streams. This paper presented a Road Safety Audit of Day and Night that highlighted issues in safety management showing the contents like observation, reason for concern, recommendation and priority of the issue. It examined the defects in the road safety in relation to motorized traffic and pedestrian safety. It suggested the various recommendations which are easy to do and at low cost. The audit is applied to the risks outside the framework of standards and codes. A person who understands road user behaviour and human perception is also likely to be able to develop road safety audit skills.

### **7. Road Safety Audit of Selected Stretch from Umreth Junction to Vasad Junction**

(Devang G Patel, F.S. Umrigar, C.B. Mishra, Amit A Vankar)

In this paper many heavy vehicles are transporting the road construction materials from various quarries of Sevalia to the cities of Anand and Baroda. There is heavy goods transport due to various chemical factories and GIDC zones located near by the stretch. The objective behind the study is to identify accident prone locations on the study area stretch and to give Road Safety measures at black spots, land use pattern along the study area corridor. The number of vehicles on road shows that the dominance of two wheelers is clearly evident with the share of about 29.83%. Among the other vehicles, the cars, three wheelers, jeep are witnessed as 26.62%. the significance of personalized transport on the stretch of the road calls for the demand of careful consideration of movements on roads They got the accident Data from Police Stations Accident data are collected from various police stations near the study area corridor, the whole and sole custodians of the record. In the khatiyani register, accident data is recorded as FIR as IPC 279, IPC 327/328/304a, M V Act 177/188. The author has got conclusion from the accident analysis, it can be during day time the accidents are occurring more in number compared to night hours. This may be attributed due to poor road geometry and environment, lack of traffic sense and enforcement measures. Policies during rush hours need to be there. There have been new licensing system incorporating the points allotted for the penalties to driver's for violation and the limit of points should be there after which the license should be cancelled and the driver should again appeared for driver testing for new license. This will reduce the accidents on black spots considerably.

### **8. Road Safety and Audit: An Accident Studies of selected Stretch Road**

(Chetan R. Mankar PG Student, Civil Engineering Department, G. H. Raisoni College of Engineering, Nagpur, India N.

H. Pitale Assistant Professor, Civil Engineering Department, G. H. Rasoni College of Engineering, Nagpur, India)

This paper presents the Road safety Audit on the basis of vehicular communication, design, construction, operation, maintenance and analysis of various accidents occur in the road. In the future development providing safety to road

User is very essential. The objective of this paper are reducing the risk of accidents occurring in the future as a result of unintended effects of the design of road schemes, the long-term costs associated with a planning decision or a road scheme, the awareness of road safety needs among policy-makers and scheme designers. The road standards have been suddenly raised. But other related factors are not brought to this level such as road user prevailing surrounding conditions, etc. The road standards are permitting high speeds, but prevailing traffic conditions are not conducive to such speeds. Earlier the average speed of vehicles was 30-40 Km/h and now 60-70 Km/h where as design speed is 100 Km/h which is very high. From simulation data, it found that Road Markings, Condition of Shoulder, Spot Speed, Traffic Volume, median Opening and Carriageway condition were main parameters for causing accidents. It was seen that slow moving traffics were creating hazards for fast moving traffic as it always occupied the innermost lane of highway. This paper concluded that to reduce congestion all the heavy traffic from MIDC area (Buti Bori) should be diverted Nagpur to wardha road, there should be a provision of fly over, Road widths should be increase to avoid congestion, Signals should be provided, Parking must be provided in market area, Speed of vehicles must be reduced, condition of street lightning should be improved and for minimizing accidents. Conducting traffic safety program, Travel time studies need to be repeated Periodically, Traffic management and traffic operation schemes should be adopted.

#### 4. CONCLUSION

This paper presented literature review on road accidents are more serious and fatal injurious and it's more done on SH and NH in all study accident done more at evening time and day time. On highways the heavy vehicle's rush is more so that in most of case the heavy vehicle's are majorly involved in the highway's accidents. Some case the unauthorized median openings and poor visibility at curves, embankments and intersections were the major cause for accident geometry of road, guardrails, slopes are steep and cannot be considered as gentle regarding road safety, pavement damages such as potholes and pavement edge and road widths should be increase to avoid congestion, poor lighting, Route Signs, Interchange signs, Exit signs, Miscellaneous information signs, Road Markings and Forgiving Roads, signs board, improper drainage condition etc was play the role but in most case of accidents the main reason is "over speed". In night and early morning time the accident done and reason were drink & drive, over speed, loss of control on vehicle etc.

With the use of model we minimize the road accidents and save the number of life's and control the damage of property.

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