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Road Safety Audit and a Case Study of SH-26 & SH-27 from Khandwa to Sanawad (M.P.) India

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Abstract: ***Transportation plays a key role in the development of an area, but it happens only when the transportation is safe, rapid, comfortable and economy. A road is considered safe when only a few, or no accidents occur. Road and its surroundings, road users and vehicles are the elements contributing to road accidents. Pedestrians, bicyclists and two-wheeler motorized riders are the vulnerable road users. The loss of human life due to accident is to be avoided. Road safety audit (RSA) is a formal procedure for assessing accident potential and safety performance in the provision of new road schemes and schemes for the improvement and maintenance of existing roads The selected area is from khandwa to sanawad(Bhairaw mandir square of khandwa to bridge of sanawad).The road length is of 56 Kilo meters. As it is a busy road connecting the industrial, commercial, educational areas, and tourism place, has a mixed traffic which leading to the accidents. The identification of the critical section has been taken place on it. The study will be identifying the defects of the roads and will give the better idea about the defects.***
Keywords: Road Safety Audit, Safety, Sign boards, Accidents, Self- explaining roads, Road safety improvement

I. 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. It will be noted that in 2018 a total of 4,67,044 road accidents were reported by States and Union Territories (UTs) killing 1,51,417 people and causing injury to 4,69,418 persons. Road accidents in 2018 compared to the previous year i.e. 2017, increased by 0.46 percent, the number of persons killed increased by 2.37 percent and the number injured decreased by 0.33 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.

	Total Number of Road Accidents(In numbers)	%Change	Total Number of Person Killed(In numbers)	%Change	Total Number of Person Injured(In numbers)	%Change
2014	4,89,400		1,39,671		4,93,474	
2015	5,01,423	2.46	1,46,133	4.63	5,00,279	1.38
2016	4,80,652	-4.14	1,50,785	3.18	4,94,624	-1.13
2017	4,64,910	-3.8	1,47,913	-1.9	4,70,975	-4.78
2018	4,67,044	0.46	1,51,417	2.37	4,69,418	-0.33

II. OBJECTIVE OF THE STUDY

A. To examine safety features adopted in the selected section of Two Lane State Highway-26 and State Highway-27 and find out defects in the road network which led to safety hazards to road users.
B. To develop a methodology for Road Safety Audit for Two-Lane State Highways.
C. To minimize the accident risk on the road network
D. This research was to identify the safety deficiencies and accident potential and recommend the cost effective appropriate remedial measures for the overall safety improvement of highway.
E. To promote the safety to all road users

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III.NEED OF THE STUDY

A. The State Highway-26 and State Highway-27 is two –lane highway but with the requirement of time and increasing in the capacity of traffic it should be converted into Four-lane or Six-lane Highway.

B. Railway track between Indore and khandwa has been converted from meter gauge to broad gauge. Then khandwa route face trouble as the railway connectivity is blocked for more than four years for gauge conversion because of blocked railway the capacity of traffic increases on highway and it becomes more sensitive.

C. The jams occur only when a truck or any other heavy vehicle breaks down in the mid of the road. As the stretch is narrow, it becomes difficult for other vehicles to pass on it. Thereafter, a large number of vehicles start crawling on the road.

D. Road Safety Audit is to be done on the stretch from khandwa to Sanawad (SH26 & SH27) which connects four cities Khandwa, Burhanpur, Khargone and Indore. Many heavy vehicles are transporting the road construction materials as well as Fly ash from Sant Singaji thermal power plant and the highway serves an enormous number of heavy vehicles, lorries for the transport of cotten,soyabean, wheat,sugarcane and a variety of sesonal fruits and vegitables to the other parts of state and the country. There is heavy transport due to various factories, mills and plant located near khandwa to Chhegaon makhan stretch.

E. On this stretch between khandwa to Chhegaon makhan many private school (Vidhyakunj international school, Sophia convent school etc.) the government school is also situated and college (shree dadaji institute of technology & science and AISECT college) from this the road becomes more sensitive near 6:30 am to 9:00 am in morning, near 12:30 pm to 2:00 pm in afternoon and near 3-5 O' clock in evening.

IV.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) (Bhairaw mandir square of khandwa to bridge of sanawad). which covers the length 56 km. This is the road connecting 4 major towns Khandwa,Indore,Khargone and Burhanpur in Madhya Pradesh state, India.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.

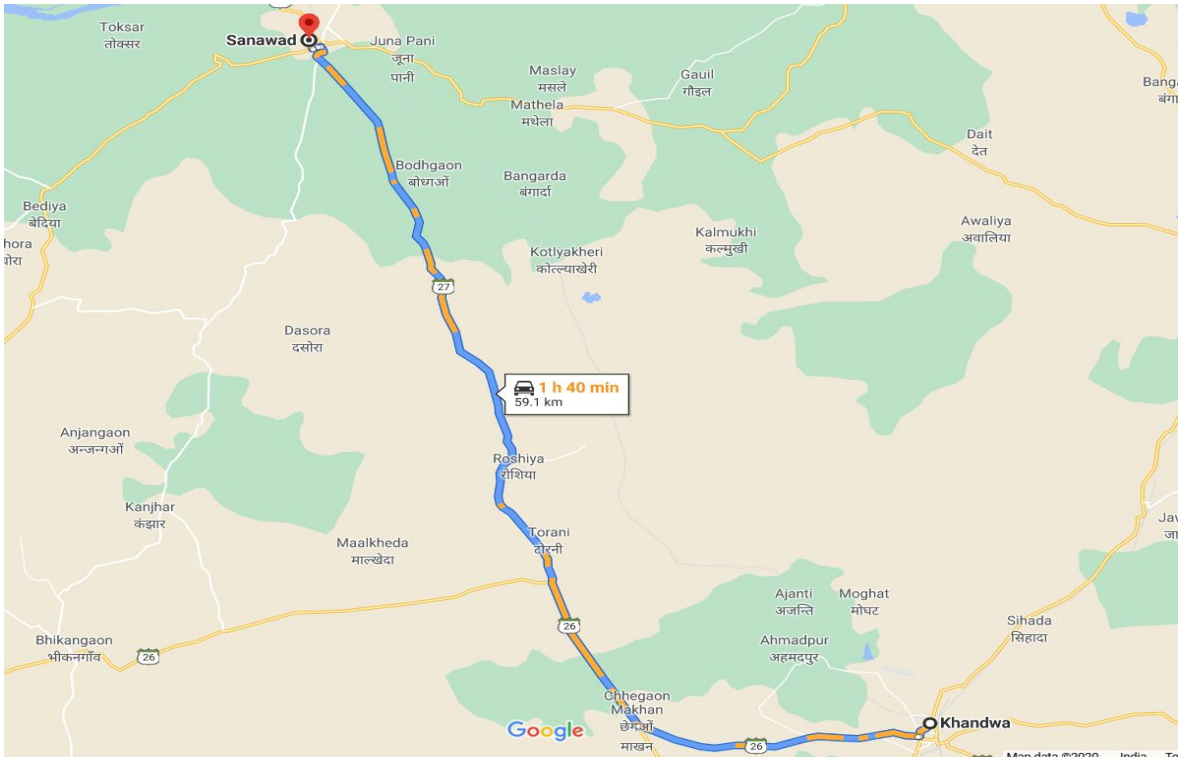

Figure 1:- khandwa to sanawad

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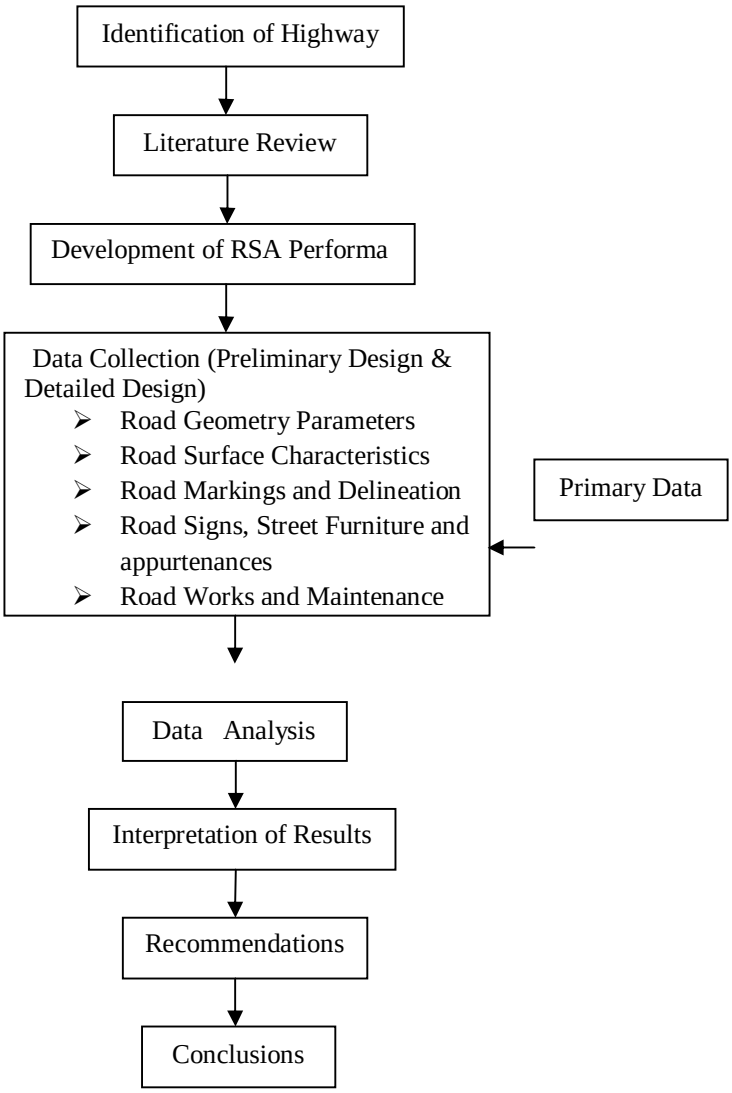
V. METHODOLOGY FOR ROAD SAFETY AUDIT

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



VI. GENERAL OBSERVATIONS AND SAFETY RECOMMENDATIONS

Road Deficiencies Analysis As per the guidelines given in the standard checklist (IRC: SP: 80:2010) the following major road deficiencies were observed at the identified road stretch.

Figure 2:- uncontrolled intersection at bhairaw mandir square

A. Figure 2 showed that in this intersection road user not doesn't follow the rules and regulation and turn their vehicle on the wrong Side for saving their fuel and time. There are more chances of head on collision of vehicles Absence of appropriate sign and road marking.

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Figure 3:- Sight distance, Faded marking and Non-engineered speed breaker in front of Sophia convent school

B. Figure 3 showed that the obstruction to line of sight insufficient sight distance due to occupation of tress. The sight distance along the road is inadequate or restricted when plantation on the edges of embankments. Obstruct the sightlines to stationary objects or oncoming vehicles. Although zebra marking for Pedestrian crossing was present at the site but due to poor maintenance it was faded and was not clearly visible No proper sign board for Pedestrian crossing was present near the zebra crossing. Presence of speed-breakers indicates that these places are hazardous and lacks appropriate engineering measures. In Front of Sophia Convent School & Kishore Kumar Samarak and Crematorium Khandwa speed-breaker are not marked or poorly marked and contributing to accidents of different natures. Speed-breakers and raised pedestrian crossings are either not painted or poorly painted with white colour, thus posing surprise situations to drivers at night.

Figure 4:- No signs boards, road markings and speed breaker In Front of Govt.School Takali Mori (Chhegaon Devi)

C. Figure 4 showed that there is a school on the right side of the highway near Takali mori (Chhegaon Devi). It is approximately outside the nearby village, and it appears most of the young children attending the school walk along the edge of the highway from the village. This exposes them to a risk of a collision with fast-moving traffic. Young children who attend the school cross the highway. This location is identified as hazardous locations during safety audit. Appropriate crossing sites are not found with proper signs, marking, delineations and speed reducing devices and proper engineered speed-breakers are also not found at this place.

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Figure 5:- Passenger boarding and alighting, bus stops on the carriageway of the highway at chhegaon Makhan (kherda village)

D. Figure 5 showed that road markings missing and Passenger boarding and alighting, bus stops placed exactly at the carriageway of the highway. Stoppage makes movement of through vehicles unsafe and on the highway congestion and compels through vehicles to use opposite lane on the highway. Further, people also waited for public transport System on road side and created lot of congestion problems on road side. Bus stops causes' traffic jams on the highway and even accidents.

Figure 6:- Heavy trucks do not follow diversion road and rule & regulations and potholes at ghat section between Chhegoan Makhan (Kherda village) To Roshiya

E. Figure 6 showed that due to speed difference, heavy vehicles need to have a special lane for it not only to improve the traffic performance but also for safety purpose. To avoid the steep gradient for heavy vehicle diversions are given as shown in photo but the heavy trucks not follow the rule & regulation and go straight on steep gradient which results in a higher crash risk. Heavy vehicle (i.e. trucks) need more space due to their large dimensions but the diversions which are given have not proper width. It shows the speed of the heavy vehicle in the uphill grade is slower than passenger cars .This speed difference created delays and reduce the traffic performance of the road. Road traffic accidents increases due to potholes on the road cause the traumatic spinal injuries, bones injuries, etc. The continuous contact with potholes present on the road leads to major effects on the human health like back pain, etc. No. of accidents are increases day by day. Potholes damage to human body and vehicles.

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Figure 7:-Improper shoulders at ghat section between Chhegoan Makhan (Kherda village) To Roshiya

F. Figure 7 showed that shoulders are not trafficable for vehicles and road users due to the damage caused by poor drainage and soil erosion Edge drop observed which may be fatal for high-speed vehicles and motorcyclist .Level difference may cause accidents.

Figure8:- Bus stops on the shoulders of the highway at Deshgaon

G. Figure 8 showed that due to lack of availability of Bus-Stops, Roadways Buses as well as private Buses stopped randomly. Stoppage makes movement of through vehicles unsafe and on the highway congestion and compels through vehicles to use opposite lane on the highway.

Figure 9:-Formation width is eroded due to excess rainfall.

H. Figure 9 showed that formation width is eroded due to excess rainfall. Chance of vehicle to fall into drain at night and also it has insufficient berm width. Shoulders are not there on both this place should be declared as non-over taking zone because chance of vehicle to fall into valley at nights Diver may not know the situation of the road ahead, moves with the same speed. This causes the vehicle to lose the control and may be a chance of overturning and after few days the construction of new retaining wall is started.

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Figure 10:-Sign board direction changed due to wind force or hit by any vehicle

I. Figure 10 showed that Sign board direction changed due to wind force or hit by any vehicle. Improper directional signs create confusion to the drivers and they mislead the travel time. Sharp curves lessen the sight distance and create tension to the drivers.

Figure 11:-Provision for Heavy Vehicles

J. Figure 11 showed that there is no waiting area for trucks waiting. As a result, trucks wait occupying walkway and shoulder Illegal parking/ stoppage makes movement of through vehicles unsafe. Parking of trucks on the shoulder creates congestion and compels through vehicles to use opposite lane on the highway. Parking vehicles can create a blind spot and they will be as an accident causing elements on roads

Figure 12:-Unguarded deep valley

K. Figure 12 showed that deep valley Unguarded deep valley adjacent to road. Hazard for a vehicle to ran into the valley during poor visibility and rains. Guard rails are to be provided to prevent the vehicle from falling and rumble strips are to be provided to alert the driver near the valley. Due to damaged shoulder makes movement of through vehicles unsafe. Vehicles may be fall into the valley during night.

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Figure 13:- Shoulder, carriageway width & sight distance due to occupation of wall at dhangoan

L. Figure 13 showed that the obstruction to line of sight insufficient sight distance due to occupation of wall the sight distance along the road is inadequate or restricted when wall is on the edges of carriageway. Obstruct the sightlines to stationary objects or oncoming vehicles. Inadequate sight distance results in a shorter reaction and response time available to the driver when the change is sighted which results in a higher crash risk. Besides, due to obstructed longitudinal sight distance drivers assume continuation of the present conditions, though alignment changes or traffic hazards suddenly appear. Highway required wide shoulders on each side. Shoulder width and condition is absent at near Dhangoan village on highway (SH 27).It is observed that at this area with high concentration of vehicles and pedestrian such as bazaar, village, bus-stands etc. The jams occur only when a truck or any other heavy vehicle breaks down in the mid of the road. As the stretch is narrow, it becomes difficult for other vehicles to pass on it

Figure 14:- By having construction of bridge and broad gauge railway on these path problems of traffic jams is raised frequently

M. Figure 14 showed that by having construction of bridge and broad gauge railway on these path problems of traffic jams is raised frequently. By having construction of bridge and broad gauge railway creates congestion. Waiting or stoppage of vehicles can create a blind spot and they will be as an accident causing elements on roads. The road becomes unsafe and pedestrians are unable to use shoulders.

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Figure 15:- Guardrails are broken at Sanawad Bridge

N. Figure 15 showed that guard rails are not there to prevent the vehicle from falling and to alert the driver near the river. Hazard for a vehicle to ran into the valley during poor visibility and rains. During night Vehicle may fall into the valley.

O. Figure 16 showed that signs board are not at all visible due to vegetation this board also not visible from a distance due to vegetation. During day time due to the shadow of vegetation sign board is not visible.

VII. RECOMMENDATIONS

A. At Bhairaw mandir square necessary regulatory and warning signs with clear visibility and retro-reflective markings on pavement. There should be properly marking on speed breaker with sign board. The Road user must follow rules and regulation. Retro-reflective materials or paintings to be used at all speed reducing devices. Lane marking, stop line marking, directional arrows, pedestrian markings etc, have to be done in this junction. As per IRC, it is necessary to provide road hump on minor arms at a distance of 10m from edge of project road to regulate the speed of vehicles entering the project road. Stop signs are to be properly installed on minor arms and shall be located at a distance of 3m from stop line and aligned perpendicular to face the oncoming traffic.

B. Tree branches need to trim at regular intervals to maintain visibility. Adequate sight distance and visibility is to be provided. Pedestrian crossing markings, speed breaker markings should be regularly maintained.

C. Pedestrian crossing markings, speed breaker on both side (enter& exist of school zone) with markings should be provided and speed limit sign board to control the speed of the vehicle. Appropriate speed reducing devices prior to the locations are to be provided. Crosswalks with appropriate marking and delineations should be placed. Appropriate signs should be erected to warn through traffics about school zones.

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D. Proper road markings should be given on the road. Zebra crossing and Stoppage of vehicle on the carriageway is to be strictly prohibited. Stoppage of passenger bus should be on bus stand only.
E. Carry out regular or needy maintenance and markings of road safety signs. Required improvement in the form of proper width at diversion roads. Heavy trucks must follow diversion road with rule & regulations.
F. Shoulders shall maintain to the level of the carriageway.
G. Buses stopped randomly are to be strictly prohibited.
H. Retaining wall to be constructed to increase formation width. If the side hill is cut then the formation width and shoulder width is increased. There should be proper marking and sign board to warn the vehicles.
I. Proper maintenance of the sign board needs to be done at regular intervals. Sign boards and markings need to be checked once in six months.
J. Designated waiting areas for trucks are to be provided. Stoppage of vehicle on the shoulders is to be strictly prohibited.
K. Guard rails are to be provided to prevent the vehicle from falling and to alert the driver near the valley. Rumble strips are to be provided to alert the driver near the valley.
L. The wall should shift at some distance to clear the line of sight. In order to improve pedestrian safety, raised shoulder is recommended. Shoulder should be maintained by increasing width.
M. Due to speed difference, light vehicles need to have a diversion for it not only to improve the traffic performance but also for safety purpose
N. Guard rails are to be provided to prevent the vehicle from falling and to alert the driver near the river. Rumble strips are to be provided to alert the driver near the river.
O. Tree branches need to trim at regular intervals to maintain visibility.

VIII. CONCLUSIONS

This paper presented a Road Safety Audit that highlighted issues in safety management .The major objective of the RSA is to minimize the risk of accidents occurring in the future. The present study focused on the investigation of road safety deficiencies identified road stretch khandwa to sanawad. It suggested the various recommendations which are easy to do and at low cost. In this study an uncontrolled intersection at bhairaw mandir square and in front of In Front of Sophia Convent School the sight distance along the road is inadequate or restricted and also Pedestrian crossing was present at the site but due to poor maintenance it was faded and was not clearly visible. There are no signs boards, road markings and speed breaker In Front of Govt.School Takali Mori (Chhegaon Devi) and also Passenger boarding and alighting on the highway and at ghat section Heavy trucks do not follow diversion road and rule & regulations and there are many potholes on highway. On this highway the shoulders are improper. The formation width is eroded due to excess rainfall and also Sign board direction changed due to wind force or hit by any vehicle. In this study the we saw that there is no Provision for Heavy Vehicles and some places there are Unguarded deep valley and at dhangaon the sight distance due to occupation of wall and By having construction of bridge and conversion of meter gauge to broad gauge railway these path having problems of traffic jams. It was observed that at some places board also not visible due to vegetation.

IX. ACKNOWLEDGE

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REFERENCES

[1] IRC: SP: 88-2010 “Road Safety Audit Manual” Indian Roads Congress (IRC), New Delhi Pg. 24
[2] MoRT&H, Ministry of Road Transport and Highways Statistics of Road Accidents in India–2017 pg.
[3] Road Safety Audit of an Existing Road, From Ashram Chowk to CRRI N. Naveen1,2, Dr. S. Velmurugan3 1(Assistant Professor, K G Reddy College of Engineering and Traffic & Safety Division, CRRI, New Delhi, India)International Journal of Latest Engineering Research and Applications (IJLERA) ISSN: 2455-7137 Volume – 02, Issue – 08, August – 2017, PP – 134-142
[4] Omkar Gholap (2018) “Road Safety Audit” International Journal of Engineering Research & Technology ISSN: 2278-0181 Vol. 7 Issue 04, April-2018.
[5] Jacobs, G. D. & Palmer, C. J. (1996), “Road Safety in the Emerging Nations,” Intertraffic Middle East “96 Safety Symposium, Dubai, 24-25 November 1996.
[6] N. Naveen (2019)- “ ROAD SAFETY AUDIT OF THE NOIDA – GREATER NOIDA EXPRESSWAY”-International Journal of Research and Analytical Reviews-February 2019, Volume 6, Issue 1(E-ISSN 2348-1269, P- ISSN 2349-5138)
[7] Abdul Rahoof, et al (2017), Road Safety and Road Safety Audit in India: A Review, IJTRE

©IJRASET: All Rights are Reserved

[8] Hitesh Kumar (2017)- " Research Paper on the Road Safety Audit and a Case Study on Kaithal-Kurukshetra Road Haryana, India" International Journal of All Research Education and Scientific Methods (IJARESM) ISSN: 2455-6211, Volume 5, Issue 5, May- 2017
[9] ROAD TRAFFIC ACCIDENTS IN INDIA: AN OVERVIEW Thokchom Shantajit1, Chirom Ranjeev Kumar1, Quazi Syed Zahiruddin2 1Resident, 2Professor & Head, Department of Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi Meghe, Wardha, Maharashtra, India
[10] Chetna Bist (2018) "Road Safety Audit of NH-3 Section From Rau Circle To Manpur – A Case Study" International Journal of Creative Research Thoughts- Volume 6, Issue 1 March 2018,ISSN: 2320-2882
[11] N. Naveen,(2017)- Road Safety Audit of RBVRR TSPA Junction – Moinabad Town- International Journal of Creative Research Thoughts- ISSN: 2320-2882
[12] Shalini Kanuganti, et al, (2016), Road Safety Analysis Using Multi Criteria Approach: A Case Study in India, Elsevier
[13] Devang G Patel (2013)" Road Safety Audit of Selected Stretch from Umreth Junction to Vasad Junction" International Journal of Science and Modern Engineering (IJISME) ISSN: 2319-6386, Volume-1, Issue-6, May 2013
[14] Road Safety Audit of Delhi – Mathura Road N. Naveen 1, 2,Dr. T. Ilango3,Dr. Abdhesh Kumar Sinha4 1(Assistant Professor, K G Reddy college of Engineering and Technology, Hyderabad, India) 2(Research scholar, VELS University, Chennai, India) International Journal of Engineering Science Invention ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org ||Volume 6 Issue 9|| September 2017 || PP. 28-35
[15] Hetram Sharma (2018) "Road Safety Audit: Challenges And Remedies" Int. Journal of Engineering Research and ISSN : 2248-9622, Vol. 8, Issue 1, (Part –III) January 2018, pp.05-09
[16] ROAD SAFETY MANUALS FOR AFRICA New Roads and Schemes: Road Safety Audit
[17] ROSEBUD - Road Safety and Environmental Benefit-Cost and Cost-Effectiveness Analysis for Use in Decision-Making Examples of assessed road safety measures - a short handbook –
[18] Identification and Analysis of Accidental Blackspots on NH-48 Pritam Kashid1, Yugandhar Shinde 2, Siddhant Dhavare 3, Hrishikesh Pokharkar4 1,2,3,4Student, Department of Civil Engineering, JSPM's Rajarshi Shau College of Engineering, Pune, Maharashtra, India. International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 06 | June 2019 p-ISSN: 2395-0072
[19] REVIEW ON ROAD ACCIDENTS ANALYSIS AND ROAD SAFETY AUDIT 1Solanki Pradipsinh A., 2Sanket Bagadia 1M-Tech Student, 2Assistant Professor 1Civil Engineering Department, 1Parul University, Vadodara, India. 2018 IJRAR January 2019, Volume 6, Issue 1 www.ijrar.org (E-ISSN 2348-1269, P- ISSN 2349-5138)
[20] Accident Analysis on National Highway-3 Between Indore to Dhamnod Kundan Meshram1 and H.S. Goliya2 1Research Scholar, Deptt. of Civil Engg., M.A.N.I.T. Bhopal-462051 India 2Associate Professor, Deptt. of Civil Engg. & Applied Mechanics, S.G.S.I.T.S. Indore-452003 India international Journal of Application or Innovation in Engineering & Management (IJAIEM) Volume 2, Issue 7, July 2013 ISSN 2319 – 4847
[21] anellaiddis G (1999). "Aspects of Road Safety Audit", Journal of Transportation Engineering, ASCE, Nov/Dec1999/481-485.

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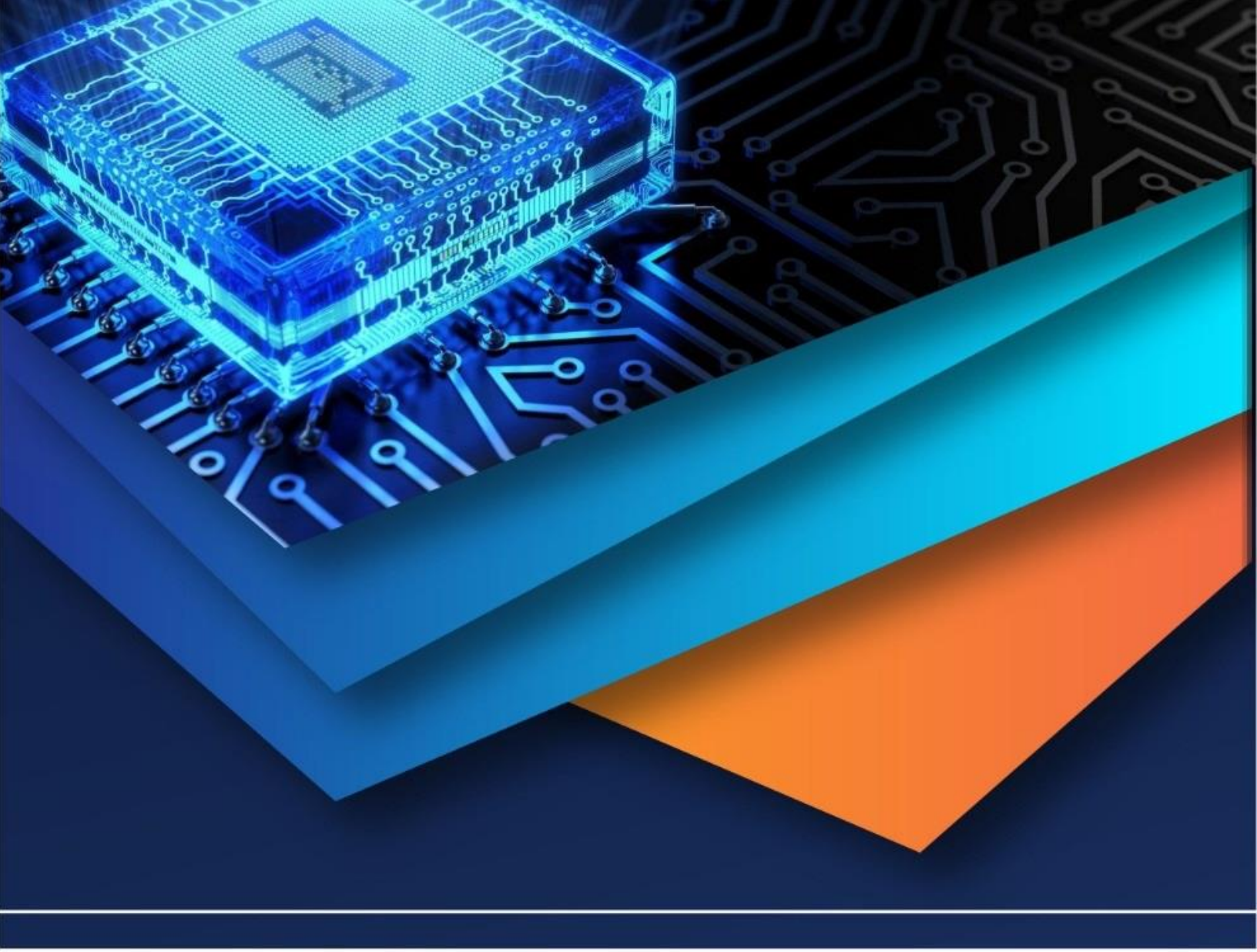

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