ROAD SAFETY AUDIT OF NH-60 BY USING ARC-GIS

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Abstract: The road safety audit of National Highway 60 (NH-60) using ArcGIS focuses on identifying and mitigating potential safety hazards to enhance overall road safety. This study employs Geographic Information System (GIS) technology, particularly ArcGIS, to systematically analyze and map traffic patterns, accident hotspots, and road conditions. By integrating spatial data with accident reports and traffic flow information, the audit provides a comprehensive assessment of high-risk areas. The findings suggest that leveraging GIS technology in road safety audits can significantly improve the effectiveness of safety measures, thereby reducing accident rates and enhancing the safety of road users on NH-60. The study underscores the importance of incorporating advanced geospatial tools in road safety management to achieve sustainable and safer road infrastructure**.**

Keywords: Road Safety Audit, National Highway 60 (NH-60), ArcGIS, Geographic Information System (GIS), Traffic Patterns, Accident Hotspots, Spatial Analysis, Road Conditions, Safety Interventions.

I. INTRODUCTION

The Road Safety Audit (RSA) of National Highway 60 (NH-60) utilizing ArcGIS technology represents a critical endeavor to enhance the safety and efficiency of one of India's vital transportation arteries. NH-60, a major highway that facilitates significant vehicular movement, has been subjected to increasing traffic volumes, leading to a rise in accident rates and safety concerns. The application of ArcGIS, a powerful geographic information system, enables a comprehensive spatial analysis of the highway's current conditions, identifying high-risk areas and potential hazards[1]. By integrating spatial data with road safety principles, this audit aims to pinpoint critical safety issues, recommend targeted improvements, and ultimately reduce the incidence of accidents. The objective of the driver safety audit procedure is to continuously enhance pedestrian safety by formal, objective examination of approved traffic road programs and monitoring of existing and newly constructed road conditions operating plans[2].In current history, network operators throughout the globe have increasingly acknowledged driver safety audits as an efficient technique of avoiding incidents or lowering their incidence (Transport Research Centre, 2008)[3].

II. TYPE ROAD SAFETY AUDIT

"Road Safety Audit (RSA) is a formal examination of an existing or a new road or a traffic project in which an independent RSA team reports on the accident potential and safety performance." According to the American Affiliation of Government Federal Highway Administration Administrators (AASTHO) standard, a Driver Safety Investigation (RSA) is the comprehensive, multifunctional study of the safety practices of a contemporary or proposed road or junction. It provides qualitative assessments and observations on possible driver safety hazards, as well as highlights possibilities for improving the safety of all vehicular traffic[7].

III. GIS ANALYSIS OF ACCIDENT DATA

To identify the accident-prone stretch to take into consideration for the road safety audit, the traffic data was gathered from police stations from the year 2018 to June 2021. Additionally, the data was examined using GIS to identify the PCMC locations that were most likely to experience accidents.3. 1 Year Wise Accident Data (%).
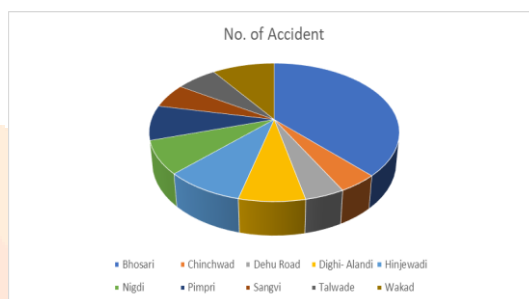
Year Wise Accident Data for PCMC in percentage is given in Table 3.1 below.

Table. 1 Year Wise Accident Data (%)

Row Labels	Count of Year
2018	16.27%
2019	42.11%
2020	38.28%
June 2021	3.35%
Grand Total	**100.00%**
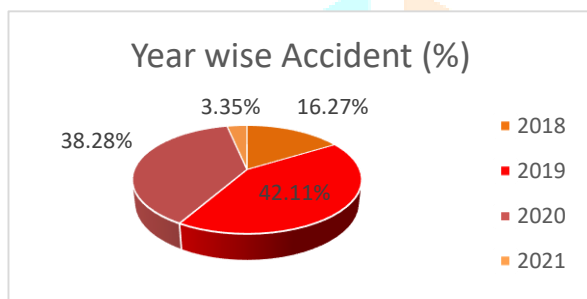
Graph 1. Year Wise Accident Data (%)

Graph 2. Area Wise Accident Data

Year Wise Accident Data shows that each passing year accidents are increasing. There has been drastic change in accident from year 2018 to 2019. In 2020 & 2021 accident rate is less due to the cities were shut down during covid.

Table 2 show that Bhosari division is leading in an accidents followed by Wakad, Hinjewadi, etc.

3.2 Area Wise Accident Data:

Error! Reference source not found. gives the distribution of total no. of accident in PCMC area-wise.

Table. 2. Area Wise Accident Data

Division	No. of Accident
Bhosari	79
Chinchwad	9
Dehu Road	9
Dighi- Alandi	15
Hinjewadi	18
Nigdi	16

3.3 PCMC Accident Data Base on Mode of Travel:

Table.3 PCMC Accident Data Base on Mode of Travel

Row Labels	Count of 2W
2W	101
3W	1
4W	5
Bicycle	1
Cycle	1
Pedestrian	1
Pedestrian	1
Pedestrian	76
Pedestrian	6
Tempo	3
Truck	2
Unknown	2
Grand Total	**200**

Pimpri	17
Sangvi	12
Talwade	13
Wakad	20

GIS representation of Fatal Crash Classification Based Upon Traffic Police Division:

As shown in **Error! Reference source not found.** 5. have collected data from traffic police division from PCMC Road. Bhosari accounts of 38% of accidents followed by Wakad, Hinjewadi, etc.
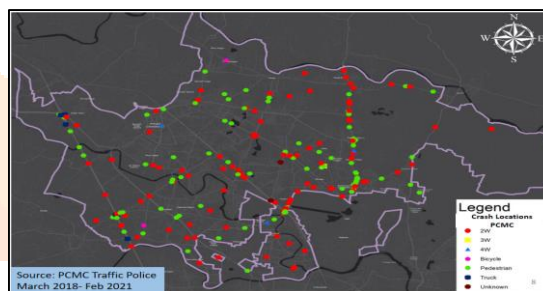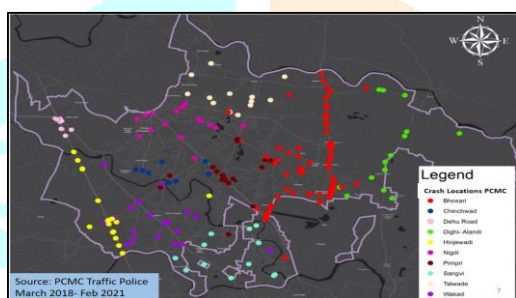
GIS representation of Fatal Crash Classification Based Upon Mode of Travel:

As shown in Figure 6. have collected data from traffic police division from PCMC Road. Maximum Fatal crash 2W is 50% in PCMC Area. As well as fatal crash pedestrian is 42% in PCMC Area, And Minimum fatal crash 3W, Bicycle is 1% in PCMC Area.

5. Fatal Crash Classification Based Upon Traffic Police Division

6. Fatal crash classification Based Upon Traffic Police Division

Fig. 6 Fatal Crash Classification Based Upon Traffic Police Division
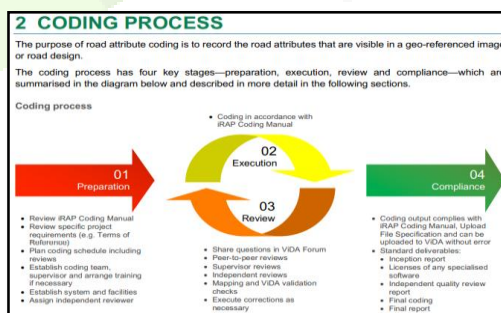
3.4 iRAP Coding Process:

Fig 7. iRAP Coding Process

3.5 iRAP Results:

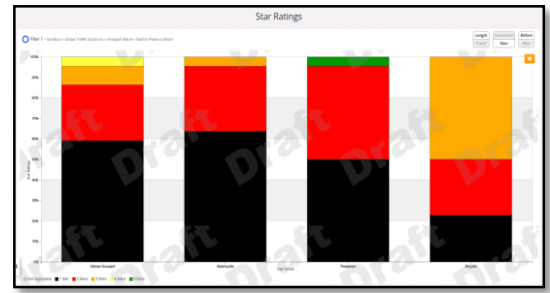Following are the results of the iRAP of Nashik Phata to Moshi Road.

Fig 8. iRAP Detailed Star Rating   Fig 9. iRAP Star Rating

The **Error! Reference source not found.** Re-presents that the 50% of road is 1 star for all the road users. Not one percent of the route has a rating of five stars.

IV. CONCLUSION

This study demonstrates how Black spots can be located using an Arc-GIS tool. It can be used as a methodology to identify a stretch for the Road Safety Audit. The choice of a route or the priority placed on the major routes for the audit will be advantageous to road auditors. The result of a road safety audit is the discovery of any deficiencies in road safety and the creation of suggestions intended to eliminate or reduce the deficiencies. This study gives the detail information about the issues on Nashik Phata to Moshi road and required safety recommendations. Curves and intersections are the main elements that cause crashes, according to the data. A crucial requirement at intersections is visibility. In order to prevent crashes, it is crucial that there be enough sight distance along intersecting roads and any incorporated corners to allow drivers of cars that are concurrently approaching the intersection to see one another in time. The report makes an effort to identify the accident's contributing factors and offers recommendations for future accident prevention measures.

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