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"IDENTIFICATION OF ACCIDENT-PRONE ZONE AT KATRAJ TO KHADI MACHINE ROAD USING THE WEIGHTED SEVERITY INDEX METHOD."

[1]Rathod Pankaj A ,[2]Rathod Chetan D,[3]Yeola Sagar S,[4]Randave Shrikrishan M.
Students of Civil Engineering Department.

Under The Guidance of

Prof.Amit G.Kale.

Sinhgad Academy of Engineering Kondhwa, Pune- 411048.

Abstract - The Development of a country is depended on the development of a Road Transportation network. As Road transportation provide door-to-door transportation facilities for goods, products and peoples. The road network in India is continuously growing, and the number of road users of different types of vehicles such as two-wheelers, four-wheelers, heavy-duty vehicles, etc is increasing day by day. The increasing number of vehicles on the road gives rise to traffic congestion and accidents of vehicles. This Project is based on identifying accident spots on Katraj to Khadi Machine road, collecting severity of accident data from Police Station and Financial Losses, Government Property Damages through a questionnaire survey. The identification and analysis of these accident prone zone is done by modified formulae of Weighted Severity Index Method by considering Financial Losses and Government Property Damages.

Keywords - Weighted Severity Index Method, Financial Losses, Government Property Damages,Accident Prone Zone.

I. INTRODUCTION

The development of a country depends on its Road Transportation development. As it plays an important role in the development of the region in all aspects such as social, economic, etc. India is the second largest network of road transportation with 46,89,842 km. Development of road networks is ordinary in India for a long period due to issues of land acquirement, and illegal property development. Pune is the second largest in Maharashtra and the seventh-largest metropolitan city in India.

In the last decade, Pune City is developing tremendously because of the IT, automobile, and industrial sectors. Existing road infrastructure is not sufficient for the present traffic density scenario. The public transport system in Pune is not enough to carry the present flow so people are shifting to private vehicles causing more traffic on the roads. Now Pune city is included in a smart city so it needs to give more emphasis on the infrastructure of roads. According to surveys, it is observed that the main problem causing traffic congestion are an increase in the number of goods transport and multi-axle vehicles also poor signal systems, rash driving, cross lane driving of people adding the number of accidents.

The geometry of the Khadi machine square is inconvenient for smooth traffic flow. In the last few years, it has been observed that from Katraj to Yewalewadi, Kondhwa to Khadi Machine, there is an increase in accidents, and due to accidents number of fatalities also increases. The proposed metro as well as fly over the project, during the construction phase of such leads to traffic congestion this area.The vehicles in Katraj coming from the Kondhwa towards the Khadi machine and ISKON temple. There are some spots are there where accidents frequently happen. Due to these accidents also one thing happens which is huge vehicular traffic and delays for the people been in traffic for hours.

The study found that most commuters spend 30-60 minutes on Katraj-kondhwa road because of the long stretching of multi-axle vehicles. Khadi machine square is an arterial road connecting Solapur Highway and Satara Road on either side, carrying heavy traffic causing delays and accidents. This all leads to tremendous pollution resulting in the hampering of the environment. The existing road width is not sufficient to cope with the existing road traffic density.

Table 1 :-Accident and death in India (2022 -2023)

Parameter	2022	2023	Percentage change over previous year
Total accidents in the country	4,61,312	4,23,156	2.6
Total number of persons killed in the country	1,65,622	1,53,972	1.1
Total number of persons injured in the country	2,95,690	2,69,184	1.5

II. LITERATURE SURVEY

General :- In this chapter different studies that are carried out a accident-prone zone at katraj to khadi machine road using the weighted severity index method

1.Road Traffic Accidents in India: Issues And Challenges

In future, traffic accidents should be controlled using advanced artificial intelligence software because of the efficiency of such programmes to control and decrease traffic accidents Although solutions for road safety problems in India may differ from those countries that have very high rate of motorization.

2.Identification Of Accidental Black Spots On National Highway

The simultaneous increase in population and the number of vehicles led the road authorities to get more focus on the road safety improvements. According to the recent road accident data, the highly populated Maharashtra state has reported the highest accident rate which calls for the need of safety improvements. For this purpose, Identification of accident prone location is considered as the first step in road safety improvements. This paper mainly aimsto identify the accident prone locations along Amravati- Nagpur road stretch from Asian highway 46. The top accident prone spots were selected as black spots based on Weighted Severity Index Method and some suggestions are made to improve the transportation system.

3.Black Spot Analysis Using Weighted Severity Index Method at Bhongir Zone - Rachakonda Police Commissionerate – Hyderabad

The identification of accidental Black spots gives information about a particular stretch/location of a Road, which provides information to the road users at the time of travelling. To know about traffic information in the study area, Peak and Non- Peak hours traffic volumes and also spot speed data (Primary data) have been recorded. Past 3 years 2016-2018 accident data (Secondary data) were collected from Rachakonda Police Commissionerate. Further, this Primary and Secondary data has been analyzed by using MS Excel 2019; from the primary data total traffic volume, highest and lowest speeds of the particular locations of the study zone identified; from the secondary data, different types of analysis are carried out to identify the severities about accidents and also accident locations are marked in google maps.

4.Black Spot Analysis (Accident Black spot And Safety Analysis Of Road Network For NH-166)

With the rapid development of urban road traffic, there are a certain number of black spots in an urban road network. Therefore, it is important to create a method to effectively identify the urban road black spots in order to quickly and accurately ensure the safety of residents and maintain the sustainable development of a city. In this study, a GIS (geographic information system) and the Firefly Clustering Algorithm are combined. On the one hand, a GIS can accurately extract the distance between accident points through its spatial analysis function, overcoming the disadvantage of the accident data not usually including the specific location data.

5.Identification and Prioritization of Black Spots in Hilly Road Segment Using Accident Severity Index Method

Introduction: Road traffic accidents (RTA) will become the third-largest contributor to the global burden of diseases after the ischemic heart diseases and depression. The place where the traffic accident percentages are higher is called as black spot location. The most common assumption for a black spot location is that, there should be any road environmental or geometric issues resulting in the repetition of accidents. Methodology**:** Our study was conducted in two districts of the Northern Region of India (Uttarakhand). The data were collected on various factors such as weather, accident type, severity levels, and road geometry such as number of curves, segment length, Annual Average Daily Traffic. Results: The present study was an attempt to find out the black spots and to measure the accident severity index (ASI) of the identified black spots in the areas of Dehradun and Haridwar.

III. RESEARCH METHODOLOGY

Step1
- Literature Review
- Problem Statement
- Objectives

Step2
- Actual Case study
- Primary Data Collection

Step3
- Preparation of Questionnaire
- Data Collection

Step4
- Analysis of Data
- Find Weighted Severity Index value of given location

Step5
- Result and Discussion

Step6
- Recommendations

Step7
- Paper Presentation and report writing.

Step8
- Submission and Approval of Report

Figure No 1: Methodology chart

The weighted Severity Index Method is used to calculate the accident spots considering factors suchas type of injury, financial losses, and government property damages.

WSI is calculated by formula

$$(41*K)+(4*GI)+(1*MI)+(3*FL_{ma})+(1*FL_{mi})+(2*PD_{ma})+(1*PD_{mi})$$

Where,

K= Number of persons killed GI
= Number of Serious injuriesMI =
Number of Minor injuries FL_{ma} =
Major Financial Losses
FL_{mi} = Minor Financial Losses
PD_{ma} = Major Property DamagesPD_{mi}
= Minor Property Damages

In the WSI formula, the locations with a WSI value greater than or equal to 40 is usually termed black spot. WSI value is independent of traffic volume, traffic speed, number of vehicles, or length of road. The weight age points 41, 4, and 1 was assigned based on the updated Road User Cost Study (RUCS) carried out by the Ministry of Road Transport and Highways (MORTH), And the weight age points for Major financial losses, Minor financial losses, Major Property damages and Minor Property damages were 3, 1, 2, and 1 respectively was assigned based on experts from respective field. Once the accident spots are analyzed by using the WSI method it is important to develop strategies for preventing similar accidents in the future. Proposing the measure for prevention of accidents at Katraj To Khadi Machine Road. This can include safety protocols and standards.

IV. Data Collection, Analysis And Result

According to the different routes a the Khadi Machine intersection we divided the table into four phases. It got easy for us to do the survey and collect data with more convenience .Also according to the PCU units we recorded the data for different types of vehicles. PCU FOR INTERSECTION VOLUME COUNT PCU is a complex parameter and is influenced by a large number of factors. Various methods are available in literature to derive PCU values of a vehicle type.

Table No : 2 Accident Data2022-23

Location	2022			2023		
	Death	Serious injury	Minor Injury	Death	Serious injury	Minor Injury
Khadi Machine Chowk	3	6	5	0	4	2
Khadi Machine PoliceStation	0	0	2	0	1	4
Tilekar nagar	1	1	1	2	0	1
ISKCON Chowk	3	1	1	1	2	5
Gokul Nagar Chowk	1	1	2	0	1	1
Indian Oil Petroleum	0	1	0	0	1	2
Katraj Flyover Bridge	0	1	3	0	2	4
Katraj Kondhwa RoadUnder Flyover	0	0	2	0	0	4
Katraj Chowk	1	0	3	1	2	4

Table No : 3 Financial losses and Government property Damages–2023

Location	Major Finacial Losses	Minor Finacial Losses	Major Government Property Damages	Minor Government Property Damages
Khadi Machine Chowk	8	13	2	19
Khadi Machine Police Station	0	1	0	1
Kesar Lodging Junction	0	0	0	0
ISKCON Chowk	3	4	2	5
Gokul Nagar Chowk	1	2	0	3
Indian Oil Petroleum	1	0	0	1
Tilekar Nagar	2	1	3	0
Katraj Flyover Bridge	3	0	1	2
Katraj Kondhwa Road Under Flyover	0	0	0	0
Katraj Chowk	2	4	0	6

Table No:4 Weighted severity index of given locations

Location	2023
Khadi Machine Chowk	73
Khadi Machine Police Station	13
Kesar Lodging Junction	0
ISKCON Chowk	76
Gokul Nagar Chowk	09
Indian Oil Petroleum	06
Tilekar Nagar	64
Katraj Flyover Bridge	25
Katraj Kondhwa Road Under Flyover	03
Katraj Chowk	69

Table No: 5 Result Showing Top Accident Prone Zone

Based on the analysis of accident data using weighted severity index method, top accident prone zonealong the katraj to khadi machine is determined

Rank	Location
1	ISKCON Chowk
2	Khadi Machine Chowk
3	Katraj Chowk

4	Tilekar Nagar

V. Remedial Measures

1. To increase the road width as the present road are insufficient for present traffic flow.
2. Proper planning of traffic management and strengthening the public transport system.
3. Use of Modern technology in management traffic system and proper signal system.
4. Road safety assistance using piezoelectric sensor.

VI. Conclusion

The following are the important conclusion based on Identification of accident-prone zone at Katraj to Khadi Machine Road using the Weighted Severity Index Method:

- This information helpful to the road users where the accident-prone locations are identified in the map, when the time of travelling with help road map road users can know the accidental prone locations.

- Severity index method is an effective method to prioritize accident black spots as it pin points the nature of rectification works to be carried out on each locations.

- The information also helpful, for road safety authorities need to provide proper accident zones related information in the form of signs and symbols to alert road users.

- Severity index value also helps to identify the short term, midterm and long term measures to be carried out to rectify defects on black spot locations as per the availability of funds.

- The above study suggest to take safety measures to prevent accidents and also to provide signals at black spotlocations.

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