ACCIDENT CAUSES, BLACK SPOT IDENTIFICATION AND GEOMETRIC DESIGN ON NH-3

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ABSTRACT

National highways and expressways are considered as main veins for the development of states in the country. Road traffic accidents have been recognized as one of those adverse element which contribute to the suffocation of economic growth in the developing countries, due to high coast related to them, hence causes social and economic concern. Transportations include Air transportation, land transportation and water transportation. Maharashtra is one of the India's more advanced state and having relatively higher density of road network as well as motor vehicle as compared to other states. MUMBAI – AGRA National Highway (NH 3) connecting many of its major manufacturing center, commercial and culture centers. Rapid growth of population coupled with increased economic growth of motor vehicles. This is one of the primary factors responsible for road accidents. It's observed that few works have been carried out on statistical analysis of accidents particularly on two- lane National Highways. The accidental data was collected for last three year, 2014-2016 from the Police Stations where FIR was lodged. The collected data were analyzed to evaluate the effect of influencing parameters on accidents on the selected stretch. In order to appreciate the scale of problem in the state, it is common practice to relate the number of road accidents and deaths to demographic and vehicles in districts (administrative unit of a state) of Maharashtra.

Keyword: - *Accident Causes, Black spot Identification, Geometric study and Design etc....*

1. INTRODUCTION

Everywhere in the world, a growth in the transport system has naturally been one of the reflections of economic development. Accidents, tragically, are not often due to ignorance, but are due to carelessness, thoughtlessness and over confidence. More and more people are making investments in vehicle and transport infrastructure Maharashtra is a state in western region of India. It is the second most popular and third largest state by area in India. Maharashtra is the world's second most popular first level administrative country According to the national crime record, the number of vehicular accidents was 90 resulting in 40 deaths and 55 injuries thereby accounting for 75% of all accidental deaths due to unnatural causes. An unfortunate incident that happen unexpectedly and unintentionally typically resulting in damage or injuring is termed as accidents. Accidents are such a happenings resulting in injury that is in no way the fault of the injured person for which compensation or in. Road accidents are happen due to carelessness, high speed of vehicle, driver taking liquor (alcohol), human tendency, age group, violation of rules, times of accident the measure reason behind vehicles and condition of vehicle using road. Accidents are the most important negative impact of transportation system and it is complex flow pattern of vehicular traffic, presence of mix traffic along with pedestrians. Traffic accidents lead to loss of life and property. The road traffic accidents cannot be totally prevented but by suitable measures they can reduce to certain extent. For the purpose systematic study of road accidents or require to be help of providing preventive measure like design and control.

William Haddon has pointed out that road accidents were defined as accident, which took place on the road between two or more objects, one of which must be any kind of a moving vehicle. Maharashtra is a state in the western region of India. It is the second most popular and third largest state by area in India. Maharashtra is the world's second most popular first level administrative country. Accidents are such happenings resulting in injury that is in

no way the fault of the injured person for which compensation or indemnity is legally sought. Road accidents are happen due to carelessness, high speed of vehicle, driver taking liquor (alcohol), human tendency, age group, violation of rules, time of accidents. The major reason behind vehicles and condition of vehicle using road.

Worldwide, the transportation problems faced by various nations have increased manifold, necessitating search for methods or alternatives that ensure efficient, safe, feasible and faster means of transport. It has been estimated that India currently accounts for nearly 10% of road accident fatalities worldwide. As a result the use of personalized transport mainly two wheelers and intermediate public transport is growing at a rapid speed. The highway network is accelerated at a fast rate and the safety of vehicular movements becomes concern for everybody due to reporting of loss of lives and properties along with fatal injuries and periodical obstruction of traffic flow.

associated with numerous problems each of which needed to be addressed separately. Human, vehicle and environmental factors play roles before, during and after a trauma event. Accidents, therefore, can be studied in terms of agent, host and environmental factors and epidemiologically classified into time, place and person distribution .For the purpose of the study, a Road Traffic Accident (RTA) was
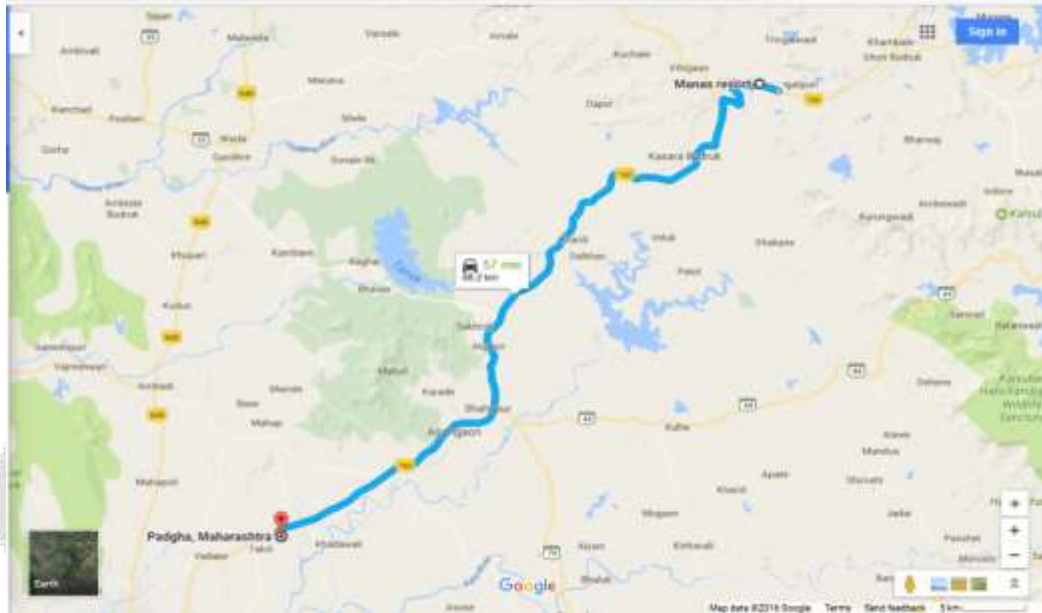

Fig -1: Location of Route on Google Map

1.1 Study Area

NH-3 runs for a distance of 1,190 km. The highway originates in Agra in Utter Pradesh, generally travels southwest through Dhaulpur in Rajasthan , Morena,Gwalior, Shivpuri, Biaora, Maksi, Dewas, Indore and Julwaniya in Madhya Pradesh, Dhule, Nashik, Thane and terminates at Mumbai in Maharashtra.

The stretch between Mumbai-Agra is 6 lane (partly 4 lane). The general causes of accidents on National Highway 3 are the:

1.1.1 Natural Causes
a)   Due to rain
b)   Due to landslide
c)   Due to smoke
d)   Due to earthquake

1.1.2 Artificial Causes
a)   Due to drink & drive
b)   Due to excess speed
c)   Due to lack of road sign, marking
d)   Due to pedestrian road crossing
e)   Due to Signal problems
f)   Due to overtaking
g)   Due to bad lighting

1.2 Problem Statement:

In the project we will do accidental analysis of selected area. We have selected area of route on National Highway-3 is Kasara to Kalyan In accidental analysis we will find various accidental crime record studies on route Kasara – Kalyan

2. Literature Review

2.1 Introduction

The highway originates in Agra in Utter Pradesh, generally travels southwest through Dhaulpur in Rajasthan, Morena,Gwalior, Shivpuri, Biaora, Maksi, Dewas, Indore and Julwaniya in Madhya Pradesh, Dhule, Nashik, Thane and terminates at Mumbai in Maharashtra. Traffic engineering is the branch which deals with science of measuring traffic, planning, designing & operating system to achieve safe and efficient movements of persons and goods. Traffic engineering applies engineering principle that helps solve transportation problem by considering the psychology and habits of the transportation system users. Traffic engineering, in a broad sense, is the use of engineering principles and methods to help create or bring about orderly and efficient highway transportation. It makes use of systems analysis and operations research. The profession, although modem, has precedents as old as vehicles on wheels. The Roman Empire made use of some traffic engineering tools when one-way streets were introduced in some of their "urban" settings. The first traffic engineer joined the highway engineer, planner and others in seeking safe and efficient highway transportation in the nineteen twenties. The traffic engineer now forms part of every state highway department in most large cities. His job continues to grow in importance as highway transportation increases in magnitude and complexity. The traffic engineer, with the traffic police, is responsible for die traffic management and operations of our highways as more sections are opened for travel. The traffic engineering profession is faced with the amazing growth of highway improvements. The traffic engineer must constantly seek to improve the efficiency of operations of today's overcrowded streets and highways. At the same time he is engaged in helping to engineer a tremendous program of new roads. Some of these activities require the use or study of problem-solving techniques, higher mathematics, statistical methods, computer processing of data, human factors including capabilities and behavior of drivers and pedestrians, physics, economics and other subjects fundamental to highway engineering. The traffic engineer is part of the team that makes instant decisions, changing the flow of traffic when a major highway accident or other emergency requires traffic to be rerouted. He works with the police andfire equipment.

Fig -2: NH-3

2.2 Traffic Studies

To analyze the characteristics, traffic studies are made. Some of the important basic elements to be studied for analyzing the traffic studies are as follows:

1. Road users
2. Vehicles
3. Traffic flow characteristics
4. Traffic volume studies
5. Speed studies
6. Origin & destination studies
7. Accidents studies

The most important & fundamental study is volume study.

2.2.1 Traffic Volume Study:

It is define as survey of number of vehicles and pedestrians crossing sections of road per unit during any selected period. Purpose of Traffic volume :

1. Establish relative importance of ant road.
2. Planning design and regulation of traffic.
3. Structural design of road.
4. Planning and design of new street.
5. Establish properties and schedule for traffic improvements.
6. Design of intersection and other control devices.

3. METHODOLOGY

Identification of accidental black spot is the procedure to find spots that are particularly dangerous where accidents had occurred historically in this study the identification of such hazardous locations are done based on accidental record available about location of accident, nature of accident, causes of accidents and classification of accidents and others by using various method like ranking and severity index. The methodology suggested for study includes;

i. To collect accident data on Mumbai-Agra National Highway from National Highway Authority of India & state government of India.
ii. To find out different methods to prioritize hazardous locations.
iii. To identify various traffic and road related factors causing accidents.
iv. The reading taken on Mumbai-Agra National Highway then analyzed by method of ranking. According to importance of the parameter.
v. The most important parameter because of which more number of accidents is occurred had given top rank and maximum weightage.
vi. Analysis of the top ranked accidental spots.
vii. The percentages after giving rank and weightage were calculated and on the basis of value of percentage the accidental black spots were identified.
viii. To carry out analysis of black spots by using statistical models.
ix. Detailed analysis of the identified black spots.
x. Comparison of real time data with records available in the police station.

3.1 Analysis:

Sample Calculation:

Severity Index-

Severity index denotes vulnerability of a particular spot to accidents

a) Severity (β) was calculated by adding respective weight ages of the parameters indicating y for a particular chainage.

b) Severity index (SI) was calculated as shown below;

$$SI = (\beta / \sum W) \times 100$$

Where,

Summation $W = W1 + W2 + W3 + \dots + W11$

c) sample calculation for nature of accidents

Consider any location distance 12.5 km

Severity (β) = 11

Severity index

$SI = (\beta / \sum W) \times 100$

Summation W= 11+10+9+8+7+6+5+4+3+2+1=66
Severity index (SI)= (11/66)×100= 16.67%
Severity index Benchmark:
Severity index benchmark is the severity index value above which corresponding spots are black spots. It is calculated as the sum of the weight ages assigned to the top 7 parameters divided by weightage of all the parameters. The value obtained in % is then subtract from 100 to obtain severity index benchmark for e.g. summation of the weightages assigned to top 7 parameters
=11+10+9+8+7+6+5=56
Weightage of all parameters = 66
Severity index benchmark =100-[(56/66)*100] =15.15

Fig-3: Flow Chart of Accident type

3.2 Data Analysis:

Table No.1-Accidental Data of Kasara Police Station

Sr. No	Date	Time	Location	Class Of Vehicles	Accident Causes	No of Death	Injured Persons	Age Of Dead Persons
1.	9/1/2014	2.30am	Old Kasara Ghat Ohalachiwadi	2-Wheeler + Commercial	3	-	1	-
2.	12/1/2014	2.15pm	Saibaba Khind Hotel	4-Wheeler	9	-	1	-
3.	20/1/2014	12.30am	New Kasara Ghat Break Fail Point	2-Wheeler + Commercial	3	-	-	-
4.	22/1/2014	3.00am	Shirolgaon Amon Hotel	2-Wheeler + Commercial	2	2	-	27,32
5.	24/1/2014	5.36pm	Nh4 By Pass	4Wheeler + Commercial	9	-	-	-
6.	25/1/2014	8.00am	Break Fail Point New Kasara	4-Wheeler + Commercial	2	-	-	-
7.	27/1/2014	5.45am	Old Kasara Ghat Nh4	4-Wheeler	11	-	-	-
8.	2/2/2014	9.15am	Nh3 Old Kasara Ghat	2-Wheeler	4	-	-	-

9.	2/2/2014	3.00pm	Nh3 Saibaba Khimd	4-Wheeler	2	-	-	-
10.	3/2/2014	3.00am	New Kasara Ghat	Public+ Commercial	7	-	-	-
11.	4/2/2014	7.30am	New Kasara Ghat Break Fail Point	Commercial	3	-	-	-
12.	5/2/2014	11.30am	Kasara Bandhra Nh3	4Wheeler + Commercial	3	-	-	-
13.	10/2/2014	6.00pm	Nh3 Hotel Mayor Nh3	4-Wheeler	3	1	2	58
14.	15/2/2014	6.00pm	Ohalachiwadi Old Kasara	4-Wheeler	4	-	-	-
15.	18/2/2014	11.10am	Nh3 New Kasara Break Point	Commercial	9	-	-	-
16.	23/2/2014	12.30am	Old Kasara Ghat	4Wheeler + Commercial	3	-	-	-
17.	23/2/2014	4.00am	New Kasara Ghat	4-Wheeler	4	-	-	-
18.	28/2/2014	12.15am	Latifwadi New Kasara Ghat Nh3	4-Wheeler	9	-	-	-
19.	4/3/2014	5.30am	Latifwadi New Kasara Ghat Nh3	4-Wheeler	9	-	-	-
20.	5/3/2014	8.10pm	New Kasara Ghat Break Failpoint	Buss+ 4Wheeler	3	-	1	-
21.	8/3/2014	1.00pm	Bit No.3 Kasara Ghat	4-Wheeler+ 4-Wheeler + 4-Wheeler	3	-	2	-
22.	9/3/2014	11.00pm	Laifwadi New Kasara Ghat Nh3	Commercial	9	-	-	-
23.	10/3/2014	11.45pm	Latifwadi New Kasara Ghat Nh3-	Commercial	9	-	-	-
24.	14/3/2014	2.25am	Far From Police Station Kasara Hat 2.11km	Commercial = 4-Wheeler	3	-	-	-
25.	14/3/2014	2.30pm	Latifwadi New Kasara Ghat	Commercial	11	-	-	-
26.	16/3/2014	4.00pm	New Kasara Ghatb	Commercia	7	-	-	-
27.	16/3/2014	4.45pm	Umber Mali Village Mumbai Highway	4-Wheeler	3	-	1	-
28.	20/3/2014	2.15pm	Mokhavne Gaon Sia Hotel MumbaiHighway	Commercial	9	-	-	-
29.	23/3/2014	12.00pm	Latifwadi New Kasara Ghat	Commercial	8	-	1	-
30.	24/3/2014	2.15pm	Near Kasara Ghat	2-Wheeler	8	-	-	-

31.	24/3/2014	7.00pm	Star Hotel Mumbai Hotel	2-Wheeler + 4-Wheeler	2	-	2	-
32.	26/3/2014	2.00am	Latifwadi New Kasara Ghat	Commercial	2	-	-	-
33.	26/3/2014	4.00pm	Sai Baba Khind Nh3	Commercial	9	-	-	-
34.	28/3/2014	4.15am	Latifwadi New Kasara Ghat	Commercial	11	-	-	-
35.	30/3/2014	10.45pm	Nh3 New Kasara Ghat	Commercial	7	-	3	-
36.	6/4/2014	8.00pm	Nh3 New Kasara Ghat	2-Wheeler	4	1	1	22
37.	13/4/2014	4.30pm	New Kasara Ghat Break Fail Point	Commercial	7	-	1	-
38.	20/4/2014	1.00am	Break Fail Point New Kasara Ghat	4-Wheeler	3,11	-	-	-
39.	20/4/2014	3.05am	Break Fail Point New Kasara Ghat	Commercial	7,9	-	-	-
40.	5/5/2014	1.00pm	Litifwadi New Kasara Ghat	4-Wheeler	11	-	1	-
41.	23/5/2014	3.00am	Umbormali Mayor Hotel New Kasara Ghat	Commercial	9	-	3	-
42.	25/5/2014	2.00pm	Mohachiwadi Kasara Ghat	Commercial	3	-	-	-
43.	25/5/2014	4.15pm	Bit No. Near Mayor Hotel	4-Wheeler	3	-	-	-
44.	29/5/2014	11.30pm	Latifwadi New Kasara Ghat	Commercial	7	-	-	-
45.	5/6/2014	3.30pm	Shirosgaon Amon Hotel	Commercial	3	-	4	-
46.	7/6/2014	12.50pm	Kasara Ghat Nh3	4-Wheeler	4,11	-	-	-
47.	14/6/2014	2.00pm	New Kasara Ghat	4-Wheeler	4	-	-	-
48.	24/6/2014	9.30am	Umber Mali Gaon Nashik-Mumbai Vahini	Commercial + 4-Wheeler	3,6	-	-	-
49.	2/7/2014	3015pm	New Kasara Ghat	Commercial	4	-	-	-
50	16/7/2014	11.30am	Old Kasara Ghat	Commercial	1	-	1	-
51.	25/7/2014	7.00am	Latifwadi New Kasara Ghat	4-Wheeler + Buss	7	-	-	-
52.	28/7/2014	11.00am	Saibaba Khind Nh3	4-Wheeler	4,11	-	1	-
53.	28/7/2014	6.00am	Kasara Bhandha Mumbai-Vahini	Commercial	4	-	-	-
54.	8/8/2014	8.30am	Kasara Ghat Nh3	Commercial	11	-	-	-

55.	8/8/2014	3.30pm	Nh3 Highway	4-Wheeler	4	-	1	-
56.	14/8/2014	6.20pm	Vrundavan Hotel	4-Wheeler +4 –Wheeler	3	-	-	-
57.	24/8/2014	4.30am	Saibaba Khind Nh3	2-Wheeler + 2-Wheeler	8	-	4	-
58.	26/8/2014	11.30am	Nh3	commercial	1	-	-	-
59.	26/8/2014	11.30pm	Aambevarlan Kasara Ghat	4-Wheeler	9	-	6	-
60.	26/8/2014	12.00pm	Kasara Ghat Mumbai Vahini	4-Wheeler	3,4	-	3	-
61.	12/9/2014	8.00am	Bit No. 3	commercial	4	-	2	-
62.	18/9/2014	4.30am	New Kasara Ghat	commercial	7	-	-	-
63.	2/10/2014	12.15am	Latifwadi New Kasara Ghat	2-Wheeler	4	-	3	-
64.	21/10/2014	2.50am	Nh3 Mu,Bai Vahini	4-Wheeler + 2-Wheeler	3	-	1	-
65.	23/10/2014	11.50am	New KasaraGhat	Commercial+Commercial	8	-	-	-
66.	23/10/2014	1.30pm	Latifwadi New Kasara Ghat	Commercial	9	-	-	-
67.	30/10/2014	10.30am	Latifwadi New Kasara Ghat Nh3	Commercial	3	-	-	-
68.	16/11/2014	9.45am	Kasanj Wada Gaon Nh3	4-wheeler	1	-	2	-
69	21/11/2014	11.15pm	Mumbai Nashik Vahini Nh3	4-wheeler	1,3	-	-	-
70.	22/11/2014	7.00am	Mu,Bai Nashik Vahini Old Kasara Nh3	4-wheeler	1,8	-	-	-
71.	23/11/2014	10.30am	Mumbai Nshik Vaihini Old Kasara Nh3	4-wheeler	11	-	-	-
72.	4/12/2014	5.30pm	Latifwadi Old Kasara Ghat Nh3	commercial	1	-	-	-
73.	18/12/2014	2.30am	Mumbai Nashik Vahini Nh3	4-wheeler	11	-	2	-
74.	22/12/2014	12.30am	Latifwadi Old Kasara Nh3	4-wheeler+ Public	7	-	1	-
75.	25/12/2014	1.00pm	Break Fail Point Kasara Ghat Nh3	Commercial	7	-	-	-
76.	2/1/2015	1.30pm	Nh3	4-wheeler + 4-wheeler	2	-	-	-
77.	4/1/2015	5.00pm	Shitol Phata Nh3	2-wheeler +4-wheeler	3	-	2	-

78.	7/1/2015	2.30pm	Chintaman Wadi Latifwadi Nh3	4-wheeler	3	-	-	-
79.	22/1/2015	10.00pm	Power House Road Nh3	4-wheeler	3	-	1	-
80.	25/1/2015	4.00am	Mumbai Nshik Vahini Nh3	Commercial + Public	3	-	-	-
81.	8/2/2015	4.15am	Latifwadi New Kasara Ght Nh3	4-wheeler	4	-	3	-
82.	14/3/2015	1.30am	Latifwadi New Kasara Ghat	commercial	3	-	1	-
83.	24/3/2015	12.45pm	Star Cute Hotel New Kasara Ghat Nh3	commercial	1	-	2	-
84.	24/3/2015	5.15pm	Onlachi Wadi Nh3	4-wheeler	1	-	-	-
85.	27/3/2015	9.55am	Old Kasara Ghat Janta Hotel Nh3	4-wheeler	3	-	1	-
86.	1/4/2015	9.45am	Mukhavani Gaon Nh3	4-wheeler	1	-	3	-
87.	2/4/2015	11pm	Latifwadi Nh3	commercial	11	-	-	-
88.	14/4/2015	6.45am	Break Fail Point New Kasara Ght Nh3	Commercial	7	-	-	-
89.	4/5/2015	12.40am	Chintaman Vadi Nh3	Commercial + Commercial	3	-	-	-
90.	22/5/2015	5.20pm	Kasara Break Point Nh3	4-wheeler + Commercial	2	3	-	-
91.	29/5/2015	1.00am	Mumbai Agra Highway Near Shirol Gaon Nh3	Commercial	3	-	-	-
92.	12/6/2015	10.30am	Mumbai Agra Highway Road Nh3	4-wheeler + Commercial	4	-	-	-
93.	14/6/2015	8.00am	Latifwadi New Kasara Ght Nh3	Commercial	7	-	-	-
94.	22/6/2015	10.15am	Mumbai Agra Highway Nh3	Commercial	4	-	-	-
95.	8/7/2015	4.00pm	Ambarmali Gaon Nh3	4-wheeler	4,7	-	-	-
96.	8/8/2015	7.15pm	Near Star Hotel Nh3--	Commercial	3	-	1	-
97.	23/8/2015	5.45am	Mohalachi-Wadi Nh3	Commercial	9	-	-	-
98.	12/9/2015	3.35am	Latifwadi New Kasara Ghat Nh3	Commercial	8	-	-	-
99.	15/9/2015	10.15pm	Latifwadi New Kasara Ght Nh3	Commercial	9	-	-	-
100	20/9/2015	10.30pm	Nh3 Amberwali	Commercial + 4-wheeler	3	-	-	-

Table No. 2 Calculation Table for Identification of Black Spot on National Highway

NATURE OF ACCIDENT														
1-Overturing ,2-Head On Collision , 3- Rear End Collision ,4- Skidding, 5-Overspeeding, 6- Vehicle Out Of Control, 7-Breake Fail, 8- Fault Of Driver, 9-Default Mechanical Condition Of Motor ,10-Drunk & Drive, 11-Crossing,														
Sr. No	Accident Location (Km)	Nature Of Accidents											Severity	Severity Index %
		1	2	3	4	5	6	7	8	9	10	11		
1.	12.5			*									11	16.67
2.	22.2									*			8	12.12
3.	10.3			*									11	16.67
4.	21.6		*										6	9.9
5.	17									*			2	3.03
6.	10.3		*										6	9.9
7.	12.5											*	5	7.57
8.	12.5				*								10	15.15
9.	22.2		*										6	9.9
10.	10.3							*					9	13.63
11.	10.3			*									11	16.67
12.	17.3			*									11	16.67
13.	20.5			*									11	16.67
14.	12.5				*								10	15.15
15.	10.3									*			8	12.12
16.	12.5			*									11	16.67
17.	10.5				*								10	15.15
18.	9.3									*			8	12.12
19.	9.3									*			8	12.12
20.	10.3			*									11	16.67
21.	-			*									11	16.67
22.	9.3									*			8	12.12
23.	9.3									*			8	12.12
24.	15.8			*									11	16.67
25.	9.3										*		5	7.57
26.	10.3							*					7	10.60
27.	20.5			*									11	16.67
28.	16									*			8	12.12
29.	10.3								*				3	4.54
30.	10.3								*				3	4.54
31.	8		*										6	9.9
32.	10.3		*										6	9.9
33.	22.2									*			8	12.12
34.	9.3										*		5	7.57
35.	10.3							*					7	10.60
36.	10.3				*								10	15.15
37.	10.3							*					9	13.63
38.	10.3			*							*		11	16.67
39.	10.3							*		*			9	13.63
40.	10.3										*		5	7.57
41.	20.5									*			8	12.12
42.	21.6			*									11	16.67
43.	22.5			*									11	16.67

44.	10.3						*				9	13.63
45.	21.6		*								11	16.67
46.	12.5			*						*	10	15.15
47.	10.3			*							10	15.15
48.	20.5		*		*						11	16.67
49.	10.3				*						7	10.60
50.	12.5	*									4	6.06
51.	10.3						*				9	13.63
52.	22.2			*						*	10	15.15
53.	17			*							10	15.15
54.	12.5									*	5	7.57
55.	12.5			*							10	15.15
56.	8		*								11	16.67
57.	22.2							*			3	16.67
58.	12.5	*									4	6.06
59.	10.3								*		8	12.12
60.	12.5		*	*							11	16.67
61.	-			*							10	15.15
62.	10.3						*				9	13.63
63.	10.3		*								11	16.67
64.	17		*								11	16.67
65.	10.3							*			3	4.54
66.	10.3								*		8	12.12
67.	10.3		*								11	16.67
68.	8.1	*									4	6.06
69.	17	*	*								4	6.06
70.	17	*						*			4	6.06
71.	17									*	5	7.57
72.	10.3	*									4	6.06
73.	17									*	5	7.57
74.	9.3						*				9	13.63
75.	10.3						*				9	13.63
76.	12.5		*								6	9.09
77.	21.6		*								11	16.67
78.	14.2		*								11	16.67
79.	-		*								11	16.67
80.	17		*								11	16.67
81.	10.3			*							10	15.15
82.	10.3		*								11	16.67
83.	8.1	*									4	6.06
84.	12.5	*									4	6.06
85.	12.5		*								11	16.67
86.	12.5	*									4	6.06
87.	9.3									*	5	7.57
88.	10.3						*				9	13.63
89.	14.2		*								11	16.67
90.	10.3		*								6	9.09
91.	21.6		*								11	16.67
92.	17			*							10	15.15
93.	10.3						*				9	13.63
94.	17			*							10	15.15
95.	20.5			*			*				10	15.15
96.	8		*								11	16.67

97.	21.6									*			8	12.12
98.	10.3								*				3	4.54
99.	10.3								*				8	12.12
100.	20.5			*									11	16.67
∑		9	7	31	15	0	2	13	6	15	0	11		
Ranking		6	7	1	2	10	9	4	8	3	11	5		
Weightage		6	5	11	10	2	3	8	4	9	1	7	∑ = 66	
Severity Index Bench Mark														15.15%

4. CONCLUSIONS

It has been concluded that by considering all these parameters the accidental black spots can be identified by Severity Index (SI)methods. More number of accidents are occurred due to causes of accidents followed by classification of accidents and least number of accidents are occurred due to nature of accidents.

Road accidents are a human tragedy. They involve high human suffering and monetary costs in terms of untimely death, injuries and loss of potential income. The present paper provides the magnitude and various dimensions of deaths of road accidental data in districts of Maharashtra. Due to newly upgraded four lanes National Highway-58 between Km 75.000 to Km 130.00, the road standards have been raised suddenly. But other related factors are not brought to this level such as road user behavior, surrounding prevailing 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 Kmph and now 60-70 Kmph whereas design speed is 100 Kmph which is very high. From data simulation, it found that Road Markings, Condition of Shoulder, Traffic Volume, Spot Speed, Median Opening and Carriageway condition were main parameters for causing accidents. It was also seen that slow moving traffics were creating traffic hazards for fast moving traffic as it always occupied the innermost lane of highway. Therefore service roads should be provided for the entire length of four lane roads in order to separate slow moving traffic from fast moving traffic. All unauthorized median openings should closed and adequate provisions for crossing local people be made on priority. All undeveloped major and minor intersections must be developed with adequate lighting provisions as quickly as possible since maximum accidents were observed on these locations. Pedestrian guardrail should be provided all along the footpath of service road and at bus stops.

There is no definite trend for monthly variation in accident on a section of highway. But the accident in months of July is generally higher. It may be due to fast deterioration of earthen shoulder by rain in these months. Accident in month of January has relatively high value; it may be due to the foggy weather. Heavy vehicles like truck are involved in maximum number of accidents on National Highways. It is estimated that a heavy vehicles is involved in almost 48 % accidents followed by two-wheelers (motorcycle) 16%, car12% and Bus10%. Accident rate in terms of number of accidents per km-year increases with traffic volume. But the accidents rate in terms of number of accident per million-vehicle kilometer-year (MVKY) decreases with increase in traffic volume.

Accidents rate per MVKY increases during the study year, whereas, both injury and fatality rate per MVKY show a declining in trend over time.

Accident prediction model developed in the present study show that number of accidents per km-year increases with AADT and decreases with improvement in road/shoulder condition. Accident prediction model was validated by chi squared test and found to have a good linear relationship between AADT and CR.

Remedial Measures:

1. Installation of warning and informative signs.
2. Safe speed limit be imposed in the area.
3. Redesigning of the intersection.
4. Creating awareness in the people about accidents.
5. Provide underground crossing for the pedestrians
6. Provide flyover in high traffic areas.
7. Follow the traffic rules.
8. Always wear the seat belts.
9. Provide Air bags in vehicles.

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