



ROAD SAFETY AUDIT OF SERVICE ROADS ADJACENT TO NATIONAL HIGHWAY- 3 PASSING THROUGH NASHIK

Anuja H. Vanjari¹, Madhura C. Aher², Shrikant R. Baviskar³

^{1,2}Department of Civil Engineering, NDMVP'S K.B.T.C.O.E, Nashik (India)

³Department of Civil Engineering, Sandip Institute of Engineering & Management, Nashik (India)

ABSTRACT

The road accidents are the death causing phenomenon as far as the mixed traffic conditions are concerned. The Indian road traffic condition is mixed as all type of road users are travelling on the road at the same time. The damage to property and loss of lives are consequences of the road accidents. The rate of accidents in India is increasing year by year. This paper represents about the road safety audit of the service road adjacent to National Highway 3 passing through Nashik city. The road span selected for the study is from Adgaon Naka to Garware point. The work is carried out by doing site survey to identify the accident spots & analysing the accident data collected from police stations. Analysis of major accidents has concluded that most of the fatal accidents are occurring on the intersections in between Jatra hotel to Adgaon naka stretch & Mumbai Naka to Pathardi phata stretch, as well as during the month of July and in between 8 am to 8 pm. Due to less number of entry and exit points provided to the newly built flyover, most of the highway traffic is shifted to the service roads and that is the main reason of increasing the number of accidents on service roads.

Keywords: Accident spot, Road Safety Audit, Road Accidents, Safety, Service roads

I. INTRODUCTION

The road accidents are increasing day by day due to various reasons like mixed traffic conditions, disobeying the traffic rules, improper planning of the service roads etc. The haphazard flow of traffic is one of the most severe reasons for the road fatalities. The road safety audit will help in reducing the road accidents on service roads and will also reduce the fatalities. The proposed work will study the causes of accidents on service road adjacent to NH3. The need of safety will be recognized and corresponding safety measures will be given to reduce the severity of accidents and moreover the occurrence of accidents.

According to United Nations, by 2030 the fifth leading cause for death of people will be the Road accidents. The major victims in road accidents are pedestrians, cyclists and two wheeler users. To reduce the accident rates and improvise the safety conditions of road users, the road safety audit is implemented in many countries and it is necessary to implement it in low and middle class countries.



II. SERVICE ROAD TRAFFIC AND SAFETY SCENARIO

Traffic conditions in India are mixed. All types of vehicles moving on same road is called as mixed traffic conditions. In mixed traffic condition the pedestrians, Two wheeler, Three wheeler users, car, Jeep, Buses, Double axel trucks, Multi axle trucks, cyclists are included. Various other factors contributing to the road accidents are improper designs of road, unauthorized entry and exit to the road, error of driver and inadequate parking issues.

The second largest road network in the world is in India comprises of total length of road network as 4.24 million km. The total length of road network is distributed in 1000 km Expressways, 70934 km National Highways, 1,54,522 kms of State Highways and 25,77,396 kms of Major District Roads. Road Safety Scenario in India is in worst condition as regulations of traffic rules and policies are ineffective. As far as the large network in India is concerned, the condition of road is worst which generates the high need for safety measures of road users. The two wheeler and for wheeler users are most vulnerable to accidents as their number is more. In India there is no different lanes provided for cyclists and pedestrians which causes pedestrian fatalities on road.

Various organizations and authorities of government of India like Central and State Governments, Indian Road Congress, National Highway Authority of India etc. exercises road safety audit programs, awareness programs about traffic rules and regulations. The Road Safety Week is celebrated in India between 11th January to 17th January.

III. ROAD SAFETY AUDIT

Road Safety Audit is a formal examination of a proposed road or an existing road, in which an audit team evaluates on the road conditions and its safety performance. Independent, qualified teams consist of a team leader who is formally qualified to undertake a Road Safety Audit at the specified level, has not been directly involved in the previous stages of the project on which a judgment is required and who is supported, where necessary, by a number of appropriately experienced and qualified staff. The team leader and the team members will be sourced from outside the design office. There are five stages of road safety audit. The first stage is Feasibility design. The 2nd stage is Preliminary design. Third stage is Detail design stage. Fourth stage is Pre-opening design stage. The last stage is Existing roads. According to the feasibility the audit stage is decided and road safety audit is carried out.

IV. OBJECTIVES OF THE STUDY

1. To study the concept of road safety audit.
2. To identify the causes of accidents & accident spots on the study area.
3. To analyse the collected accident data during the year 2010 to 2015.
4. To carry out the results & discussions from the analysis & remedial will be given.

V. NEED OF THE STUDY



Service road adjacent to NH3 in Nashik is the most busy road in Nashik as it is used by the citizens as well as the highway users. As there is no more entry and exit points at the nearby constructed bridge, most of the highway users are using service road. Many heavy vehicles are transporting the material from this service road. As two way traffic is allowed on service roads, the density of traffic is more. As a result of which more number of accidents are occurring on the service roads. This generates the need of carrying out road safety audit on service roads.

VI. DATA COLLECTION AND ANALYSIS

The data is collected by following means:

- i. Classified Volume Count
 - ii. Accident data from police station & NHAI
 - iii. Site Survey of the stretch
- i. The Classified Volume Count is calculated by measuring the number of vehicles from time 8 am to 10 pm. The classified volume count is calculated by manual method on daily basis on the study stretch. At the study area the number of two wheeler users is more as the service connects the core of the city & Industrial area and the people in the nearby area uses the two wheelers to go to work.. The heavy vehicles & cars are diverted mostly to the flyover.

Table No. 1:- Classified Volume Count

Sr. No.	Type of vehicle	Aurangabad Naka	Dwarka circle	Mumbai Naka	Garware point	Total
1	2 wheeler	2592	5184	2880	2880	13536
2	3 wheeler	916	1728	1440	971	5055
3	Car, jeep	1728	4320	2304	1152	9504
4	Buses	963	1440	864	716	3983
5	Double axel trucks	288	628	427	539	1882
6	Multi axle trucks	82	104	84	97	367
7	Cycle	412	382	418	573	1785
8	Total	6981	13786	8417	6928	36112
	Percentage	19.33	38.18	23.31	19.18	100.00

The highest traffic volume at Dwarka circle is 13786. the dwarka circle is the one which is the heart of the Nashik city. All the connecting roads come at the dwarka and hence there is maximum rush of traffic. The least traffic volume is at Garware point. The Garware is away from the city area and hence less traffic volume amongst all.

- ii. The accident data of the years from 2010 to 2015 is collected from police station & National Highway Authority India (NHAI) for the stretch of study area. The mixed data was sorted according to various factors like accidents on the basis of Road user type, accidents on the basis of Vehicle type, accidents on the basis of time of accident, accidents on the basis of Month, accidents on the basis of Nature of accident, accidents on



the basis of Vehicle maneuver, accidents on the basis of causes of accidents, accidents on the basis of location and the yearly distribution of accident data.

iii.Site survey is carried out to find out the accident prone areas.

VII. ANALYSIS AND INTERPRETATION OF ACCIDENT DATA

There are total 224 accidents recorded during the period 2010-2015 on the study area. The collected data is analyzed based on following parameters.

1. Yearly Distribution of accident data
2. Accidents classified as per vehicle type
3. Accidents classified as per time
4. Monthly classification of accidents
5. Accidents classified as per the location

7.1 Yearly Distribution of accident data

Table No 2:- Yearly Distribution of accident data

Sr. No.	Year	Fatal	Serious	Minor	Non injury	Total
1	2010	21	2	15	6	44
2	2011	19	3	16	4	42
3	2012	21	2	11	5	39
4	2013	5	1	17	6	29
5	2014	11	1	18	1	31
6	2015	17	3	14	5	39
	Total	94	12	91	27	224

The accidents are more in the year 2010 as the construction of flyover was going on and the traffic was diverted to the service roads. As the construction preceded the rate of accidents decreased up to year 2013.

The rate of accidents in the year 2013 to 2015 increased again.

7.2 Accidents classified as per vehicle type

Table No. 3:- Accidents classified as per vehicle type

Sr. No.	Vehicle type	Fatal	Serious	Minor	Non injury	Total
1	2 wheeler	31	3	30	9	73
2	3 wheeler	10	2	9	3	24
3	Car, jeep	23	3	23	6	55
4	Buses	11	1	11	3	26
5	Double axle trucks	10	1	9	3	23
6	Multi axle trucks	4	1	5	1	11
7	Cycle	5	1	4	2	12
	Total	94	12	91	27	224

The two wheelers are responsible for maximum fatal accidents i.e. 73. As the industrial & commercial area is nearby Highway, the two wheeler road users are more in number. Accidents occurred due to multi axle vehicles

is minimum in number which is 11. The multi axle vehicles travel on the flyover & hence mixed traffic condition on service roads is avoided. Therefore less number of accidents to multi axle vehicles occurs.

7.3 Accidents classified as per time

Table No.4:- Accidents classified as per time

Sr. No.	Time	Fatal	Serious	Minor	Non injury	Total
1	0:00- 1:00	3	0	2	0	5
2	1:00-2:00	3	0	4	0	7
3	2:00-3:00	5	1	3	2	11
4	3:00-4:00	3	0	2	2	7
5	4:00-5:00	2	0	2	2	6
6	5:00-6:00	3	0	2	0	5
7	6:00-7:00	3	0	3	1	7
8	7:00-8:00	2	0	2	1	5
9	8:00-9:00	7	1	7	3	18
10	9:00-10:00	7	2	9	2	20
11	10:00-11:00	6	1	8	2	17
12	11:00-12:00	6	1	6	0	13
13	12:00-13:00	3	0	4	0	7
14	13:00-14:00	2	0	1	1	4
15	14:00-15:00	3	0	3	2	8
16	15:00-16:00	4	1	2	0	7
17	16:00-17:00	4	1	3	0	8
18	17:00-18:00	7	1	7	2	17
19	18:00-19:00	6	0	7	2	15
20	19:00-20:00	7	1	6	3	17
21	20:00-21:00	2	1	3	1	7
22	21:00-22:00	2	0	2	0	4
23	22:00-23:00	2	0	1	0	3
24	23:00-24:00	2	1	2	1	6
	Total	94	12	91	27	224

The more number of accidents are occurred in between 8am to 8pm. The office going vehicles travel on the road on 9am to 10am as it is general timing of offices opening. The two wheeler rush is more at this time. The next highest number of accidents occurring is in time 12am to 8am which is 53. In this timing there is no more rush on the service roads and hence the vehicles travel in high speed which is the cause of accidents. The time in between 8pm to 12pm, the number of accidents occurring are mere 20 which are less as rush is not more on the service roads due to closure of markets on 9 pm to 10 pm.

7.4 Monthly classification of accidents

Table No.5:- Monthly classification of accidents

Sr. No.	Month	Fatal	Serious	Minor	Non injury
1	January	7	1	7	2
2	February	7	2	6	1
3	March	6	1	6	2
4	April	6	0	4	2
5	May	5	1	5	0
6	June	10	2	10	4
7	July	12	2	12	5
8	August	11	2	12	4
9	September	8	0	7	2
10	October	7	0	6	2
11	November	7	1	7	3
12	December	8	0	9	0
	Total	94	12	91	27

The more number of accidents has been occurred during the month of July consisting of 13.84% of total road accidents which are in the rainy season. The roads are wet during rainy season. The vehicles especially two wheelers are supposed to get skid on the wet road and accidents occur. Due to less visibility to drivers in rainy season and foggy environment the collisions increases tremendously. The accidents are less in the month of May i.e. in summer season due to dry road conditions, clear visibility & no fear of skidding of vehicles.

7.5 Accidents classified as per the location

Table No.6:- Accidents classified as per the location

Sr. No.	Location	Fatal	Serious	Minor	Non injury
1	Adgaon-Jatra	10	1	10	3
2	Jatra - Abd naka	25	2	22	6
3	Abd naka - Dwarka	13	2	13	5
4	Dwarka-Mum naka	11	2	12	3
5	Mum naka - Pathardi	27	3	24	8
6	Pathardi - Garware	8	2	10	2
	Total	94	12	91	27

The accidents from Mumbai Naka to Pathardi phata are more in number & 28%. As there are entry & exit points to the flyover from service roads. Also these places connects the major industrial, business & market places,



rush is always there in this span. The accidents in the span Pathardi to Garware is 10%. As it is MIDC area and there is no rush apart from office & industry timings.

VIII. ACCIDENT SPOT IDENTIFICATION BY SITE SURVEY

The study area has been surveyed thoroughly to find out the accident spots by visual observation. The accident spots are found at Jatra hotel junction, Rasbihari cross road, Amrutdham cross road, Dwarka, Mumbai Naka, Indira Nagar underpass & Pathardi phata.

IX. REMEDIAL MEASURES

The various Remedial measures are to be taken at accident spots

1. At Jatra hotel junction, Rasbihari cross road & Amrutdham ring road crosses the service road. Traffic gets jammed due to lack of signals at this point. Highway traffic gets mixed with the service road traffic. To avoid the accidents flyover or underpass should be provided.
2. At Dwarka circle, the flyover is having entry & exit points hence the mixed traffic condition occurs. Separate lanes should be provided for different direction. Speed breakers are necessary to reduce the speed.
3. At Mumbai Naka, Separate lanes should be provided for different flow direction of vehicles. The signals should be provided to regulate the traffic. Speed breakers should be provided to reduce the speed of the vehicles to avoid collisions.
4. At Indiranagar underpass, the carriageway width is much narrow. Speed breakers are damaged. Turns are blind. Signals are to be provided. Proper sight distance should be provided.
5. At Pathardi Phata, the vehicles enter on the service road illegally through dividers. This unauthorized entry should be closed. Signals are necessary to regulate the traffic and avoid traffic jams. Under the flyover the lanes should be defined & dividers are necessary to separate one way traffic.

X. CONCLUSIONS

From the accident analysis, it has been observed that more accidents occur during day time. The factors contributing to the accidents are mixed traffic, poor road geometry, lack of traffic sense, disobedience of traffic rules & regulations, climatic conditions, habits & negligence of driver. To reduce the number of accidents, one way or two way traffic system should be defined. Traffic regulation policies should be defined during rush hours. This will reduce the accidents on black spots considerably. More attention should be given on the intersections in between Jatra hotel to Adgaon naka stretch & Mumbai Naka to Pathardi phata stretch. This will help to reduce the accidents on service roads.

REFERENCES

- [1] Chetan R. Mankar & N. H. Pitale, "Road Safety and Audit An Accident Studies of Selected Stretch Road", International Journal Of Innovative Research & Development.



- [2] Devang G Patel, F.S. Umrigar, C.B. Mishra & Amit A Vankar, “Road Safety Audit of Selected Stretch from Umreth Junction to Vasad Junction”, International Journal of Science and Modern Engineering (IJSME) ISSN: 2319-6386, Volume-1, Issue-6, May 2013.
- [3] Dr. S. S. Jain, P. K. Singh & Dr. M Parida, “Road Safety Audit For Four Lane National Highways”, 3rd International Conference on Road Safety and Simulation, September 14-16, 2011, Indianapolis, USA.
- [4] IRC: SP 88-2010, Manual of Road Safety Audit”, Indian Road Congress, November 2010.
- [5] Mohamed Rehan Karim, Jamilah Marjan & Sulaiman Abdullah, “Road Safety Audit”, Journal of the Eastern Asia Society for Transportation Studies, Vol.5, October, 2003.
- [6] Parikh Vaidehi Ashokbhai, Dr. A.M. Jain, “Road Safety Audit: An Identification of Black Spots On Busy Corridor Between Narol- Naroda Of Ahemedabad City”, International Journal of Engineering and Technical Research (IJETR) ISSN: 2321-0869, Volume-2, Issue-3, March 2014.
- [7] Road Accidents in India”, Government of India, Ministry of Road Transport and Highways, transportation wing, New Delhi, June 2012.