

# Road Safety Audit in Aurangabad City

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**ABSTRACT:** In India, 65% is carried out by freight & 85% by passenger traffic out of total road network. Annual growth of road is about 7-10% & population of vehicle is growing at rate of 12% per year. Road Safety Audit (RSA) recognizes & provides possibilities for improvement in safety for all road users. RSA prevents instance of accidents or to reduce it. The motive of the study is to determine the accident prone areas on the road from first information report, to study the road stretch & know the relation accidents rates & reasons of accidents. In this project analysis one of the major road will be considered and the selected stretch is from Baba Petrol Pump to Daulatabad T-point. The scope of study is to minimize accidents on the road and need for costly remedial work is reduced.

**KEYWORDS:** Road Safety Audit, Road Accidents, Traffic, Inspection, Median.

## I. INTRODUCTION

Road safety audit is a formal procedure for assessing accident potential and safety performance in the provision of new road scheme and for improvement and maintains of existing roads.

Road Safety Audit first of all was adopted by UK in 1980, then introduced to Australia and New Zealand in 1990, in the mid of 1990, it moved to USA. Now it has adopted all over the world for safety purpose.

Out of 1.25 million road death worldwide every year, 8-10 % of all road deaths are in India. The road safety management system in India is very inferior due to untrained police officers, submitting incomplete record of fatal accident, non-uniformity of current work and always pointing the user mistake for the cause of accidents.

## II. ROAD SAFETY AUDIT IN INDIA

RSA also introduced in India & importance of RSA has realized by India. The ministry of road to construct the 8 packages of TNHP & 7 packages of GNTRIP on NH-2, the national highway authority of India handover it to CRRI to carry out RSA. It was about 900 km which was the longest road project for which RSA has done in the world. India realized the importance because of the ministry of road transport & highway sponsored the project on "Development of safety audit methodology for existing roadway sections" to CRRI in 2002. However, it has found that RSA can be carried out to all types of road.

## III. OBJECTIVE OF STUDY

The first object of carrying Road Safety Audit on stretch of Baba Petrol Pump to Daulatabad T-Point is to increase safety for the users. Specially, the objectives & various tasks to be achieved are as follow.

- 1) To collect the traffic intensity and description of Baba Petrol Pump to Daulatabad T-Point.
- 2) To collect accident data of last 3 years from police station.
- 3) To collect perform accident data analysis.
- 4) To identify safety influencing parameter to reduce the accident rates.
- 5) To identify defects and black spots on the road network which cause to accidents.

## IV. METHODOLOGY

In this Road Safety Audit, we have selected some parameter for deciding the condition of road and make some changes which reduce the rate of accidents & ensure more safety for road user.

Table No: 1 The mark assessment table for parameters.

No	Content	Details	Detailed Score	Max Score	Achieved Score
1	<b>Road Infrastructure and alignment</b>	Road divided/ undivided		12	
		Sign board quality, direction boards, design, function			
		Road marking, pavement condition, alignment			
2	<b>Median type, design and condition</b>	Type-Temporary/ Fixed, material		14	
		Width- ( $\geq 0.5$ m)			
		Height- ( $\geq 1$ m)			
3	<b>Shoulder provision and quality</b>	Paved/ unpaved, pavement condition		8	
		Width ( $\geq 1.5$ m), function			
4	<b>Footpath provision and function</b>	Present / absent		12	
		Paved/ unpaved, pavement condition			
		Footpath width ( $\geq 1.8$ m) function			
		Footpath curb height ( $\geq 0.15$ m)			
5	<b>Cycle track provision and function</b>	Presence and pavement condition		12	
		Width ( $\geq 2$ m), function			
		Track marking, design, signage			
6	<b>Pedestrian crossings function</b>	Location, type, controlled with appropriate green time		8	
7	<b>Land use (sensitive zones)</b>	Special provision in sensitive zones (institutes, hospital)		4	
8	<b>Auto stand/Bus stand</b>	Location planning, function		4	
9	<b>Parking</b>	Type, function and design		6	
		Location and impact			
10	<b>Encroachment</b>	Type and density		8	
11	<b>Light quality</b>	Light type		12	
		Intensity (at center of poles)			
<b>Total</b>				<b>100</b>	

Also, the road safety audit was done by various methods were as follows:

## A. Origin and Destination Study:

Origin is defined as the place where the trip begins and destination is defined as the place where the trip ends. Origin-Destination (OD) studies are an important tool for transportation professionals. OD studies are conducted to understand the pattern of the movement of persons and goods in a particular area of interest during a particular period of time.

In this study, we have asked some questions to the road users of stretch from Baba Petrol Pump to Daulatabad T-Point and the questions are as follows:

1. Where did you begin your trip?
2. Where will you end your trip?
3. What is the purpose of making this trip?
4. How frequently do you travel on this road?
5. How much time do you required to reach to your destination?

- 6. What difficulties do you face during your Journey?
- 7. Comment about road defects and facilities!



Fig.No.1. In the OD study, the questions were asked to the road users.

**B.Spot Speed Study:**

Spot speed study are used to determine the speed distribution of a traffic. Stream at a specific location. The data gathered in spot speed studies are used to determine vehicle speed. Percentiles which are useful in making many speed related to decisions. Spot speed data are gathered using one of three methods: (1) stopwatch method, (2) radar meter method, (3) pneumatic road tube method. These methods are described in order from least expensive to most expensive. The stopwatch method is the least expensive and least accurate of the methods.

**Stop Watch Method:**

The stopwatch method can be used to successfully complete a spot speed study using a small sample size taken over a relatively short period of time. The stopwatch method is a quick and inexpensive method for collecting speed data.

A stopwatch spot speed study includes five key steps:

- 1. Obtain appropriate study length.
- 2. Select proper location and layout.
- 3. Record observations on stopwatch spot speed study data form.
- 4. Calculate vehicle speeds.
- 5. Generate frequency distribution table and determine speed percentile.

When selecting a location and layout, care must be exercised so that the observer can clearly see any vertical reference posts. The observer should be positioned higher than the study area and be looking down. The position could be on a bridge or a roadway back slope. An accurate sketch of the site should be documented, including number of lanes, position of observer, and description of reference points.



Fig.No.2. The speed limit board i.e., 40 km/h is given for the vehicles on the stretch.

A stretch was selected from Baba Petrol Pump to Daulataad T-Point and the length of the stretch is 7km. The posted speed limit is 40 km/h. The study was conducted on a Monday in the month of March and started at 4:42 p.m. The time was selected as per our CPE slot. The study continued until a sample size of 6 vehicles at different spots and each length of 100m was measured. The study length of 3 spots each 100m was used because the posted speed limit is between 40 and 50 km/h.

## VII. DATA COLLECTED

The data regarding the road accidents occurred on the stretch from Baba Petrol Pump to Daulatabad T-Point have been collected for a period of 3 years from Chavni Police Station i.e., from 2016-2108. The data includes the accidents according to traffic at junction, nature of accidents, types & traffic isolation.

Table No: 2 Road Accident Format From 2016 to 2018

Sr. No.	Name of Judisdictionl Police Station	Name of the Location	Number of Accidents				Number of Fatalities			
			2016	2017	2018	Total	2016	2017	2018	Total
1	Chavni	Army HQ	3	2	3	8	2	1	0	3
2	Chavni	Mitmita	5	8	3	16	2	1	4	7
3	Chavni	Padegaon	11	12	8	31	6	1	7	14
4	Chavni	Infront of Income Tax Office	3	4	3	10	0	2	0	2
5	Chavni	Nagarnaka&KasliwalTaranagan	6	5	8	19	0	3	1	4
6	Chavni	Rana Petrolpump	2	4	3	9	0	4	1	5

This is been useful for calculating the crash rate, studying the number of accident occurred in last 3 years pointing out the most accidental prone area, marking out the black spots, identifying the major causes of accidents, recognizing whether there is fault of road or any other fault.

Although, this road is having less number of accidents but the chances of occurring an accident is also a big threat for the users. So, to reduce it the geometric parameters of the road, proper functioning of the traffic signals and the road markings should be proper.

Likewise, we have also collected the accident data occurred on the different traffic controls at junction, accidents classified according to nature of accidents and also according to type & traffic violation.

## V. PERFORMANCE ANALYSIS

Divided our group in 3 groups of 2 members each, and then divided our route of 7 km in 10 stretches each of approximately 500m. Then pointed out the defects while doing audit, we observed various parameter's, measured its width, height and given score to parameter's on basis of its condition the mark which is mentioned below.

Table No: 3 Stretch from Military Hospital to Nagar Naka.

No	Content	Details	Detailed Score	Max Score	Achieved Score
1	<b>Road Infrastructure and alignment</b>	Road divided/ undivided	0	12	4
		Sign board quality, direction boards, design, function	2		
		Road marking, pavement condition, alignment	2		
2	<b>Median type, design and condition</b>	Type-Temporary/ Fixed, material	0	14	0
		Width- ( $\Rightarrow$ 0.5m)	0		
		Height- ( $\Rightarrow$ 1m)	0		
3	<b>Shoulder provision and quality</b>	Paved/ unpaved, pavement condition	0	8	0
		Width ( $\Rightarrow$ 1.5m), function	0		
4	<b>Footpath provision and function</b>	Present / absent	0	12	0
		Paved/ unpaved, pavement condition	0		
		Footpath width ( $\Rightarrow$ 1.8m) function	0		
		Footpath curb height ( $\Rightarrow$ 0.15m)	0		
5	<b>Cycle track provision and function</b>	Presence and pavement condition	0	12	0
		Width ( $\Rightarrow$ 2m), function	0		
		Track marking, design, signage	0		
6	<b>Pedestrian crossings function</b>	Location, type, controlled with appropriate green time	0	8	0
7	<b>Land use (sensitive zones)</b>	Special provision in sensitive zones (institutes, hospital)	4	4	4
8	<b>Auto stand/Bus stand</b>	Location planning, function	1	4	1
9	<b>Parking</b>	Type, function and design	0	6	0
		Location and impact	0		
10	<b>Encroachment</b>	Type and density	6	8	6
11	<b>Light quality</b>	Light type	2	12	3
		Intensity (at center of poles)	1		
<b>Total</b>				<b>100</b>	<b>18</b>

By the similar process, we have given marks to the other 9 stretches from Baba Petrol Pump to Daulatabad T-Point and for that we have got 35 marks on an average out of 100, respectively.

#### VI. OBSERVATION MADE FROM AUDIT

Our observation specific to location are provided with has been taken during safety audit.

- If the score is below 30% then it is high accident prone area.
- If the score is between 30 to 60% then is moderate accidents area.
- If the score is above 70% then it is low accident prone area.

Since, most of the stretch are getting score below then 30%, therefore it is high accident prone area, because of various parameters like less height of median, no clear sign boards and speed boards and potholes, etc. So, to reduce the number of accidents and to provide safety to users we have provided recommendations.

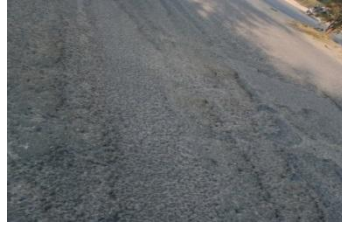


Fig.No.3. The various parameters of road are shown due to it the accidents occur and no safety to the road users.

### VIII. CONCLUSION

The study of the Stretch from Baba Petrol Pump to Daulatabad T-point concludes that is the area or the stretch where the number of accidents are less but the occurring chances of it are very high due to many factors. As it got less then 30% marks.If we make changes as per above suggestions we can minimize the number of accidents also the chances of occurring accidents and can save the life of many people.

### IX. RECOMMENDATION

- Immediately, road repair and maintenance should be required.
- There should be provision of shoulder, cycle track and pedestrian crossing.
- Minimizing the risk of accidents in future as a result of unintended effects of the design of road schemes.
- Over loaded vehicle should not be allowed on the stretch.
- Alignment marking should be dark.
- LED Street light should be provided with proper functioning.
- There should be proper functioning of the traffic signals.

### REFERENCES

- [1]. Arun S Bagi, Dheeraj N Kumar, "Road Safety Audit", 2012.
- [2]. Hitesh Kumar, Mrs. Monika, "Research Paper on the Road Safety Audit & A Case Study on Kaithal-Kurukshtra Road Haryana", India 2017.
- [3]. Prof. Bhutekar S.B. "Road Safety Audit: A Case Study ForBeed By Pass Road In Aurangabad City".
- [4]. Abdul Rahoof, Bipin Kumar Singh, Road Safety Audit IN INDIA : A REVIEW, 2017.
- [5]. Dr. S.S.JAIN, P.K. Singh, Dr. M Parida, Road Safety Audit for four lane national highways, 2011.
- [6]. MazherSayed, SumedhMhaske, GIS based Road Safety Audit, 2017.
- [7]. S.K.Khanna& C.E.G. Justo, "Hghway Engineering", Khanna Publisher, New Delhi – 1993.
- [8]. Prof. P.K.Sikdar and Dr. Nishi Mittal "Road Safety Ensuring Safety In Road System" Indian Highways, January 2003.