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Assessment of Road Safety Audit on State Highway

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ABSTRACT

According to MORTH, India has a road network of an estimated 3.3 million km which is continuously increasing carries nearly 65 percent of freight and 85 percent of passenger traffic. The road traffic is estimated to be growing at an annual rate of 7-10 per cent, while the vehicle population is growing at a rate of 12 percent per year. A Road Safety Audit (RSA) qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. The Road Safety Audit consists of safety principles to the design of a new or a rehabilitated road section, to prevent frequent occurrence of accidents or to reduce their severity. In this project, analysis of one of the major stretches of state highway¹⁹ will be undertaken. The location of interest for the analysis is from Manneguda to Sagaringroad. The roadway carries considerable amount of traffic throughout the day and it has number of conflict points such as merging of traffic from flyover. A detailed analysis of stretch will be carried out from the point of view of safety and supplemental analysis regarding the traffic growth and accident analysis will also be performed. From this project we have identified deficiencies and suggested mitigation strategies to improve the safety at intersections.

Keywords: Road safety, RSA, MORTH

I.INTRODUCTION

1.1 Introduction

Road fatality rates in India are probably among the highest and out of 1.25 million deaths worldwide every year, 8-10 per cent of all road deaths are in India. The road system and the traffic operations in India are deficient in safety management. One of the reasons for this situation is that there is very little opportunity to learn from the past mistakes. The accident records are supposed to provide the clue about deficiency in the road, vehicle and user systems to explain the causes of accidents and to develop remedial measures. This road safety management system is poor in India, with untrained

police officers collecting only incomplete records of fatal accidents and always stating the road user's fault as the cause of the accident. In a road environment where the road designs, knowledge of traffic rules, traffic control and policing (enforcement) are responsible for the accident. In a deficient road and traffic environment, causes are related to poor road geometry and poor traffic control aggravated by poor traffic sense.

A **Road Safety Audit (RSA)** qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. The Road Safety Audit consists of safety principles to the design of a new or a rehabilitated road section, to prevent frequent occurrence of accidents or to reduce their severity.

Road safety audit is tool for the improvement of road safety and to recognize potentially dangerous spots on the roads which includes highways, includes on highway, and propose remedial measures. It is a systematic approach for evaluating of new and existing roads by an independent team at different stages of planning, design, construction, operation, and maintenance to achieve accident-free roads and to increase overall safety performance. JSRPRCD [2012]: defined road safety audit as formal procedure for assessing accident potential & safety performance in the provision of new road as well as maintenance, improvement, rehabilitation of existing roads. AUSTROADS [2002]: describes it is a formal examination of a future road or traffic project or an existing road, in which an independent, qualified team report on the projects crash potential and safety performance. ADB [2003]: defined RSA as systematic procedure for accessing the road safety of roads and road schemes.

1.2 Safety Problem in India

Growth in urbanization and in the number of vehicles in many developing countries has led to increased traffic congestion in urban centres and

increase in traffic accidents on road networks, which were never designed for the volumes and types of traffic, which they are now required to carry. In addition, unplanned urban growth has led to incompatible land uses, with high levels of pedestrian-vehicle conflicts. The drift from rural areas to urban centres often results in large number of new urban residents unused to such high traffic levels. As a result, there has often been a severe deterioration in driving conditions and a significant increase in the hazards and competition between different classes of road users. In addition, the inherent dangers have often been made worse by poor road maintenance badly designed intersections and inadequate provision for pedestrians. All of these have contributed to the serious road safety problems in developing countries like India. It has been estimated that over 3 lakh persons die and 10 to 15 million persons are injured every single year in road accidents throughout the world. Road accidents in developing countries are a cause for growing concern and road accidents cost around one percent of Annual Gross National Product (GNP) resources of developing Countries, which they can ill afford to lose.

1.2.1 Accident Scenario in India

Road accident Studies have indicated that accident rate in developing countries are high compared with those in developed countries. The spectacular growth in the Road Transportation Sector in India has been a key element in the economic development. In the country, more than 80-90 thousand people die and nearly 4.5 lakhs persons are injured in road accidents every year. India's motor vehicle population is just 1.5% of the worlds, but her share of world road traffic accidents is 6%. Even though it can be observed that the accident rate has been steadily increasing over the past 25 years, the accident rate is still very high compared to the developed nations. In India, according to UNESCO 1,37,423 accidents have been occurred where 16 children die on Indian roads daily and one death occurs every minute. Totally 1214 road crashes occur every day in and two wheelers account for 25% of total road crash deaths. to be known 377 people die every day which is equivalent to a jumbo jet crashing every day. Two people die every hour in road accidents.

1.3 Objectives of the study

The Objectives of Study are:

- To study road safety characteristics of selected stretch from Manneguda (0+000Km) to Sagar ring road (15+000Km) part of state highway19.
- To study about the impact of roadway geometrics and traffic conditions on the highway.
- To Identify accident-prone regions on the highway.
- To Identify design imperfections and recommend improvements.

1.4 Site Selection for Study Area:

- Portion of SH 19 - FROM CHAINAGE 0+000 TO 15+000 km from MANNEGUDA to SAGAR RINGROAD.
- The current stretch has been selected since this stretch will be a part of Memorandum of Understanding (MoU) between CBIT and NHAI(National Highways Authority of India).



Figure 1.1: Location Map of Study Area

II. LITERATURE REVIEW

“Road Safety Audit: A Case Study for Wardha Road in Nagpur City”

Manish. D. Katiyari, Prof. S. D. Ghodmare had done road safety audit on Wardha road to ensure increased safety for the users. By performing various tasks like collecting traffic and road inventory of Wardha Road and collecting Accident Data and performing accident data analysis, they have made some conclusions by examining the data. They have aimed to Minimise the risk of accidents occurring in the future because of planning decisions on new transport infrastructure schemes,

Reduce the risk of accidents occurring in the future because of unintended effects of the design of road schemes. Reduce the long-term costs associated with a planning decision or a road scheme.

Road safety audit: a case study on NH-65

Tummala Bharat Kumar, Chukkapalli Jeswanth Chowdary had done a case study on the four lane National Highway-65, and they have drawn some conclusions by analysing data. The conclusions are road markings, condition of shoulder, condition of carriageway and median opening are the factors for causing accidents on the NH-65.

It also observed that the moderately moving vehicular traffic is generating traffic problems for the fast-moving vehicular traffic as it generally occupies innermost lane of national highway. Along this four-lane national highway, service roads need to be provided to isolate slow moving vehicular traffic from fast moving vehicular traffic. All the unauthorized gap-inmedian should be closed and necessary provisions like foot-over bridges to be provided for the local neighbourhood to cross the national highway on the priority basis. All undeveloped minor and major crossings should be developed with necessary lighting provisions such that the accident rate can be decreased along the surveyed areas. Footpath for the pedestrian need to be developed near the habitant areas, industries, educational institutions and to be properly maintained wherever it is there, and the guard rail need to be provided along the entire length of the footpath. Facilities for the differently abled people at bus stops need to be developed on the NH-65.

Accident Analysis of Anandapuram to Anakapalli Stretch via SH-38

S. Naveen Kumar, CH. Deepika had done road safety audit on SH-38 from Anandapuram to Anakapalli. From the Accident Analysis, they have concluded that the accidents are occurring almost uniformly during day as well as night hours, but severity index is very high wheelers and trucks in the night hours. This may also be attributed to poor illumination and absence of warning measures such as delineation and retro-reflective material. From the analysis that two contribute to majority of accidents. This is mainly because of the discontinuous service road leading to wrong side movement of traffic in order to avoid long detours.

Poorly designed access roads from the adjacent areas of the highway are also leading to frequent conflicts between local traffic (mostly two wheelers) and through traffic (goods vehicles).

III.METHODOLOGY

3.1 Introduction

In this project, A stretch of 15km of state highway19 has taken. The selected stretch is from Manneguda to Sagar ring road having considerable amount of traffic. Initially accident data was collected from various police stations along the study area stretch from Manneguda junction CH 00.00 km (SH-19) to Sagar ring road junction CH 15.00 km (SH-19). The data obtained for the stretch under study is obtained from 2 different police stations falling in the jurisdiction of study stretch. The road inventory survey data is carried out which gives the details of the exiting road facilities on the selected stretch on SH-19. The SH-19 stretch from Manneguda Junction (CH: 00.00Km) to Sagar ring road Junction (CH: 15.00Km) and is having residential and commercial land uses along the road sides. In Road inventory survey was various parameter taken into consider of road geometry like exiting roadway width, sign, signal, marking, and shoulders width, bridges, etc. Data has been collected by visiting the stretch in four-wheeler vehicle during weekend day. Detailed analysis for every 1 Km regarding geometric aspects has done and images indicating the deficiencies along the stretch are collected.

3.1 Salient Features of the Study Segment

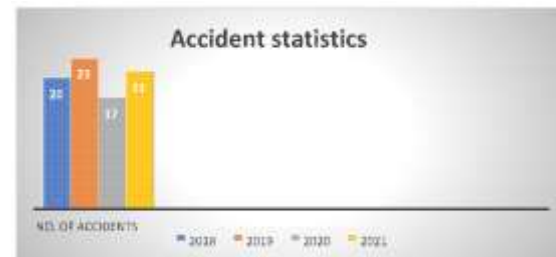
The width of main carriageway is of 7.00m with 1.50m earthen shoulder on both left and right carriage way of the highway. The width median is 1.5m and raised type in general. Road infrastructures details are as under:

Table 3.1: Road infrastructures details

Sr. No	Salient Features	In Total Number
1	Major Junctions	10
2	Signalized Junctions	4
3	Unsignalized Junctions	6
4	Major Bridges	1

Table 3.2: Road Accidents in Telangana

YEAR	January - December		
	No. of Accidents	No. of fatalities	No. of injuries
2014	20078	6906	21636
2015	21252	7110	22948
Growth Rate	5.8	3.0	6.1
2016	22,811	7,219	24,217
2017	22,475	6,595	24,017
Growth Rate	-1.5	-8.6	-0.8
2018	22,230	6,603	23,613
2019	21,588	6,800	22,265
Growth Rate	-3%	3%	-5.70%
2020	19,164	6,668	18,745
Growth Rate	-11.23	-1.94	-15.81

**Figure 3.3: Accident statistics in the selected stretch**

IV.RESULT AND DISCUSSION

RESULTS AND FINDINGS ALONG THE STRETCH

In this chapter, data was collected and by analysing the data some conclusions have drawn for the factors causing the accidents and parameters for safety improvement of roads.

Selected stretch is lacking road markings completely. Various issues identified were as:

1. Markings in carriage way are not clearly visible.
2. Road information markings are completely absent at junctions

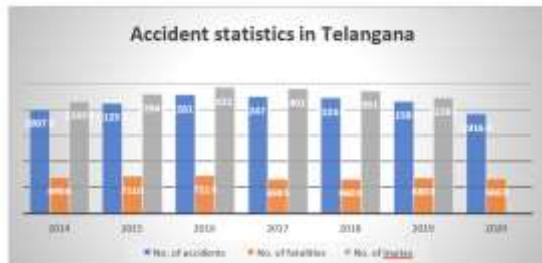
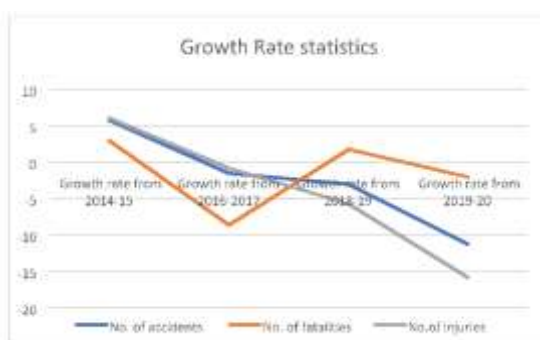
Recommendations:

1. Road marking shall be provided at roads according to rules of IRC: 35-1997;
2. Marking shows wear and tear at some sections so road markings shall be maintained in well condition and time-to-time checking of visibility of the same at night shall be checked;
3. Road information marking shall be provided at turning, bus stop.
4. Bus bay shall be marked with "BUS STOP".

Identified such issues are captured and shown in Figure 9.

Various such locations are:

1. Vehicle Park at restricted area CH: 2.300 km;
2. Inadequate parking facility near Ice cream factory CH 3.900 km.

**Figure 3.1: Accident statistics in Telangana****Figure 3.2: Growth Rate Statistics**

Recommendations:

IRC: SP: 12-1973 provide tentative recommendations on the provision of Parking Space for urban Areas. Moreover IRC: 67-2012 provide guideline and standards for signs necessary for on-street and parking lots. IRC: 35-1997 recommends various road markings to distinguish parking lot from service lane and park a vehicle is allotted space only.



Figure 4.1: At chainage 0.800km,

footpath of 3km length and width 1.3m is provided for pedestrians.

According to IRC:103-2012, Footpaths in residential areas require a minimum clear width of 1.8 m.



Figure 4.2: At chainage 1.400Km,



Figure 4.3: At chainage 1.900 km,

Roundabout ahead sign is blocked by vegetation beside the road. And poor visibility signs at CH:3.600 km, 6.800 km, 9.000 km.

IRC: 67-2012 shall be referred as code of practice for road signs and should be erected not less than 60 cm away from the edge of kerb in the case of kerbed road and at a distance of 2-3 m from the carriageway edge in case of un kerbed roads and all signs shall be inspected at least twice a year.



Figure 4.4: At chainage 2.300Km,

there is no shoulder for car parking. The vehicles are parked on side of a road. Adequate enforcement shall be applied to restrict parking in no-parking zones.



Figure 4.5: At chainage 2.600 Km,
Barricades provided are damaged. Need to be replaced



Figure 4.6 At chainage 3.000 Km,

Unauthorized opening in the median for illegal movement of two wheelers leading to unsafety.



Figure 4.7 At chainage 7.400 Km,
Unauthorized parking by group of vehicles along the road.
Temple located on side of road having less width.



Figure 4.8: Chainage 14.700 Km

Have a Junction without working traffic signal.
Junction with considerable amount of traffic without a working traffic signal is a major spot for accidents.



Figure 4.9 Chainage (15.000 Km)

Sagar Ring Road junction which is at the end of Stretch, major junction without proper functioning

of traffic signals. The traffic from flyover converging in to Junction without a traffic signal is a major spot for accidents happening over there.

4.2 IDENTIFICATION OF BLACKSPOTS IN STUDY STRETCH

The entire section of study between Manneguda to Sagar ringroad is unsafe from safety point of view. The main reason is local traffic has direct access to the State Highway, which results in congestion and accidents. Analysis of accident data within the study area showed that about 38 accidents occurred on the study stretch in the year 2020-21. Maximum accidents were occurred at (Manneguda Junction, Sagar ring road Junction, Injapur lake, turkayamjal x road, Gurramguda). The identified black spots were investigated in detail to assess the cause of accidents and suggest the remedial measures to minimize the accidents.

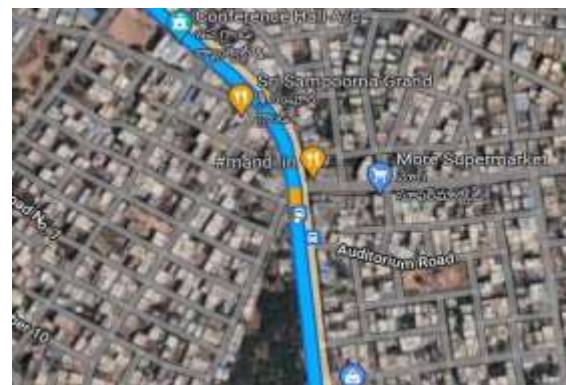


Figure 4.10: Vanasthalipuram x road



Figure 4.11: Sagar Ring Road Junction



Figure 4.12: Injapur lake

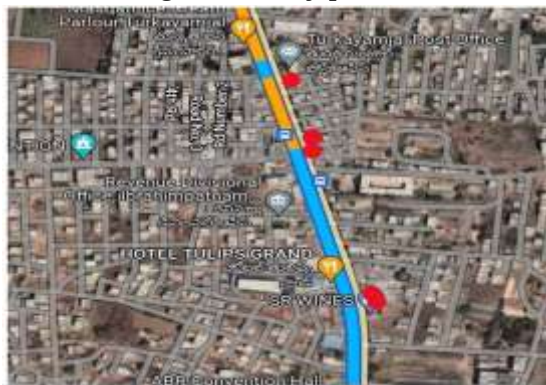


Figure: 4.13 Turkayamjal x road

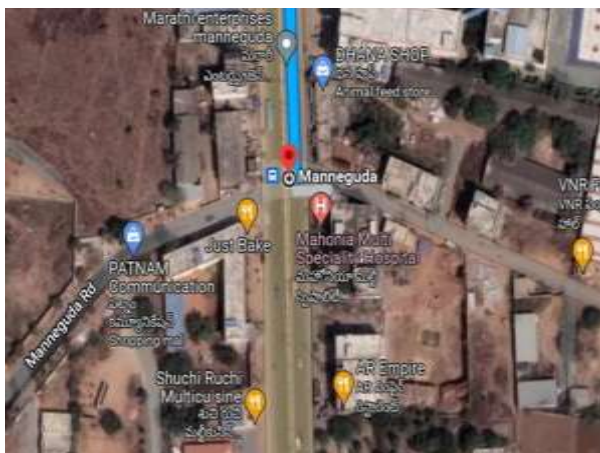


Figure 4.14: Manneguda Junction

V.CONCLUSIONS

5.1 Introduction

This project concludes and summaries the “ASSESSMENT OF ROAD SAFETY AUDIT ON STATE HIGHWAY”. Analysis from MANNEGUDA to SAGAR RING ROAD.

5.2 Some major conclusions have drawn are:

1. By analysing the information it is found that road markings, condition of shoulder, condition of carriageway and median opening are the factors for causing accidents on the state highway.
2. It also observed that the moderately moving vehicular traffic is generating traffic problems for the fastmoving vehicular traffic.
3. All the unauthorized gap-in-median should be closed.
4. Footpath for the pedestrian need to be developed near the habitant areas, industries, educational institutions and to be properly maintained wherever it is there.
5. Traffic Signals need to be properly maintained at the major intersection.
6. Sign boards, road markings are not properly there at required spots.
7. Many restricted places on side of a road are being occupied for business works.
8. Sign boards for accident prone regions are properly maintained.
9. Speed limit indication boards need to be provided.
10. Barricades were dismantled and destroyed and no repairing for the roadside facilities were not seen.
11. Most of the accidents are caused due to over speeding of vehicles and recklessness of the driver.
12. 2-wheeler vehicles are more contributing to the accidents than the heavy vehicles.

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