

Road Safety Auditing of Koratty Intersection

Deepu R¹, Amrutha K R², Aswathy P Sudhi², Fathima Salwa C K², Gayathri Jayaprakash²

Assistant Professor, Department of Civil Engineering, SCMS School of Engineering and Technology, Kerala, India¹

B.Tech student, Department of Civil Engineering, SCMS School of Engineering and Technology, Kerala, India²

Abstract – Road safety audit is done on existing roads and proposed roads. Main objective of this audit is to determine the deficiencies of each road and suggest the methods to overcome those deficiencies. Accident study has to be carried out at the selected intersection and the probable reason for accidents and remedial measure to avoid accidents in future has to be suggested. Various road furnitures have to be identified and the observed data has to be compared with the standard data given by Indian Roads Congress (IRC). The aim of this study was to carry out road safety audit at Koratty intersection located on NH544. Accident data, spot speed data and other road geometry data were collected and suitable conclusions drawn. Traffic volume count was taken for three days and traffic flow diagram was plotted.

Key Words: Road Safety Audit, Accidents, Road Geometry, Spot Speed Data, Road deficiencies

1. INTRODUCTION

Road safety audit is a process of safety check for new and existing roads which came into practice in 1980s. Objective of road safety audit is to ensure that all the proposed roads can operate safely. Safety has to be considered at various stages of the project like design, construction, operation and maintenance of the road. Road safety is very important as it directly affects the road users which include pedestrians, cyclists, motor cyclists, public transport users, truck drivers, bus drivers, etc. Road safety audit aims at identifying the road deficiencies and recommending steps to correct those deficiencies. Road safety audit can be carried out on new and existing roads also as existing roads may also be operating with less safety.

For a new road, road safety audit is carried out during feasibility study, completion of preliminary design, completion of detailed design, during construction stage and completion of construction. Road inventory, classified volume count, speed survey, first investigation report from police stations can be used to carry out the road safety audit on existing roads.

Current study was carried out at Koratty intersection which is a part of NH544 from Salem to Kochi which is 350km long. It is an important intersection on that highway as it is near to different important destinations like Korattymuthy Shrine St. Mary's Forane church which is an important pilgrim place at 600m distance from the junction, Mar Augustine Memorial High School which is just 250m from the junction and

Koratty Infopark which is just 700m from the junction. Kinfra industrial park is also near this junction just 1300m away. Hence RSA is done on this particular junction as it is near school, industrial park and infopark which results in high traffic flow during peak hours.

The main objectives of the work includes:

- To study the road geometrics of selected section
- To examine the safety measures adopted and deficiencies in the road network
- To study the traffic volume passing through the intersection
- To identify the speed of vehicles approaching the intersection
- To study the accident records and suggest remedial measures

2. METHODOLOGY

Number of lanes, width of the lane, width of footpath, width of median, position of pedestrian crossing, presence of hand rail, height of hand rail, distance between intersection and bus stop are the main data that has to be collected from the study location. Traffic volume that enters and leaves the intersection has to be noted and the suitability of traffic signals also has to be ensured. Standard values to be followed for different features as per IRC is given below:

- Minimum width of footpath for residential area – 1.8 m
Minimum clear width of footpath for commercial area – 2.5 m
- Lane width – 3.5 m
- Width of median – 2.5 m
- Width of shoulder – 2.5 m
- Guard-rail height – 1100 mm high from median level
- Pedestrian crossing width – 2 to 4 m
- Bus stops- 75m from the junction

Classified traffic volume count has to be taken at the intersection. Spot speed study can be carried out by measuring the time needed for a vehicle to travel on the selected road stretch of 25m. Position of sign posts, presence of road markings can also be looked into since they have a serious impact on the efficient traffic flow.

2.1 Layout of the Junction

Width of different roads and medians were taken with the help of a measuring tape and following results obtained. The distance of the bus stop from the junction was also measured using a tape. The bus stop to Nalukettu was at a distance of 20m from the junction and the bus stop to Ernakulum was at a distance of 27m from the junction.

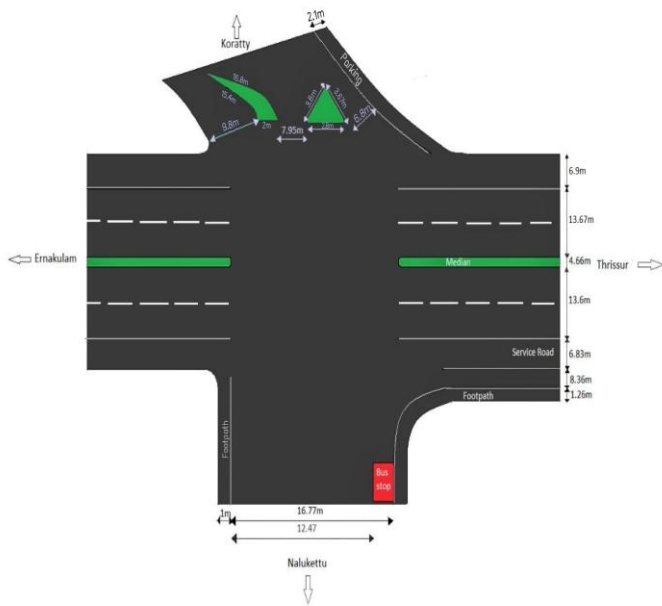


Fig-1: Layout

2.2 Traffic Volume Count

Traffic volume count was taken for three different days: Sunday, Monday and Wednesday. Number of vehicles entering and leaving the junction was found out. The count was taken at three different time that is morning from 7.30 am to 10.30 am, at noon from 12.00 pm to 2.00 pm and at evening from 3.30 pm to 6.30 pm. The obtained number of vehicles were classified as mentioned in IRC: SP: 41-1994 Guidelines for the design of at-grade intersections in rural and urban areas. The vehicle count obtained was represented in passenger car unit (PCU) for design purpose. This is done by multiplying the obtained number of vehicle with equivalency factors obtained from IRC: SP: 41-1994. Vehicular traffic was maximum on Monday followed by Wednesday and the least on Sunday. It follows the usual pattern. Traffic flow is more during the morning and evening peak hours and less during the off-peak hours.

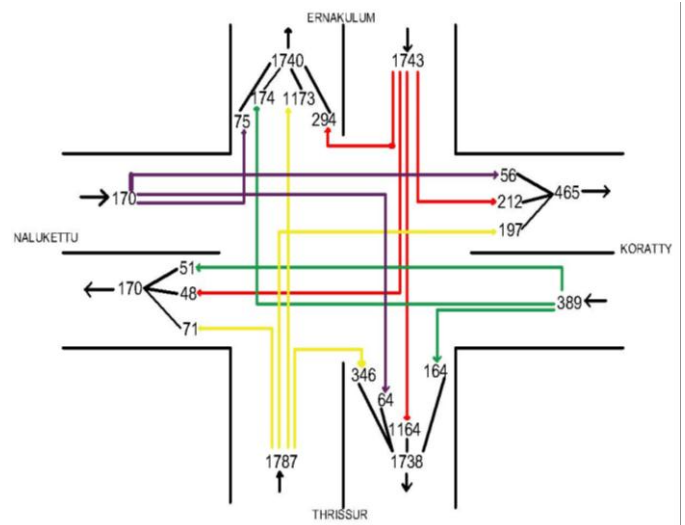


Fig-2: Traffic Volume on Sunday

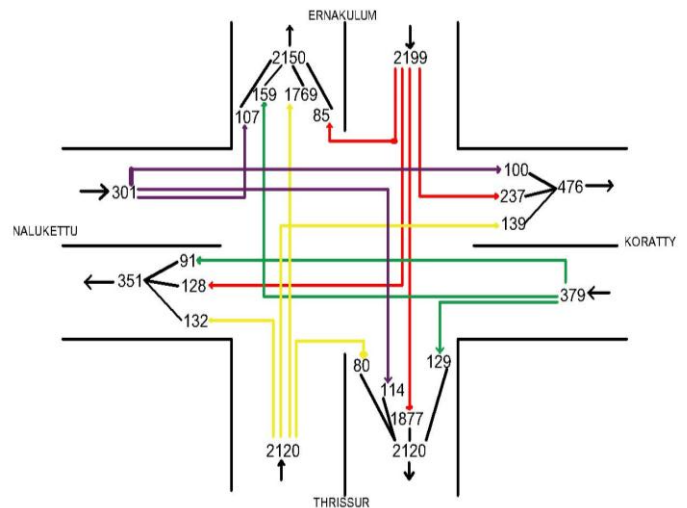


Fig-3: Traffic Volume on Monday

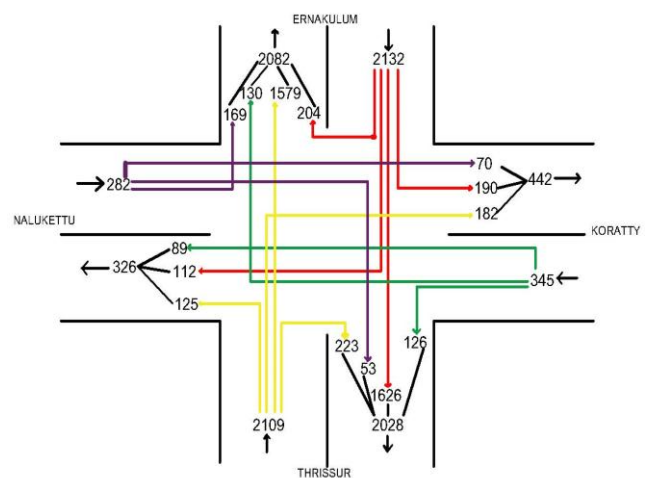


Fig-4: Traffic Volume on Wednesday

2.3 Spot Speed Study

Spot speed study was carried out at the midblock section away from the influence of intersection. A road stretch of 50m length was marked and two observers were posted at the end points of that stretch. When a vehicle crosses the first observer, he signals the other observer and notes the time when the vehicle has passed his spot, Second observer also notes the time when the same vehicle crosses his spot which is 50m apart from the first spot. So the time taken to travel 50m is known and speed of the vehicle while travelling that stretch can be easily calculated. Spot speed study was carried out on two wheelers, four wheelers and heavy vehicles.



Table-1: Spot speed data

Vehicle type	Time (sec)	Speed (km/h)
Bike 1	2.45	73.47
Bike 2	2.38	75.63
Bike 3	2.27	79.29
Car 1	2.28	78.95
Car 2	2.41	74.69
Car 3	2.35	76.60
Truck 1	2.72	66.18
Truck 2	2.70	66.67
Truck 3	2.59	69.50

Average speed of bike was found to be 76.13 kmph, of car is 76.84 kmph and that of a truck was found to be 67.45 kmph.

2.4 Observations on Road

Pavement edges are not well maintained. Median has sufficient width but the plants grown on the median are projecting to the traffic lane adjacent to the median which forces more vehicles to move to left lane. Pavement failures like cracks and edge break are seen in many spots. Hoardings and flex boards are placed even on the traffic signal posts which affect the visibility of the driver. Bus stops are located near to the intersection which affect the traffic flow especially when green signal is given to the traffic. Road markings are not clear on many of the road stretches. Pedestrian crossing is absent at main points also. Foot path is not provided on both sides of the road. Sign posts are also missing at some important locations. Direction boards and speed limit boards are not maintained properly.



Fig-5: Road Observations

2.5 Accident Rates

Accident data for past 10 years that is from 2011 to 2020 were collected from Koratty police station and was classified into fatal, grievous and minor accidents. Fatal means that death of a person due to the accident. Grievous means the

person involved in the accident has got some serious injury including fracture of bones and damage to teeth. Minor stands for accident involving persons with minor scratch and injury. It was also found that more accidents occurred at day time when compared to night.

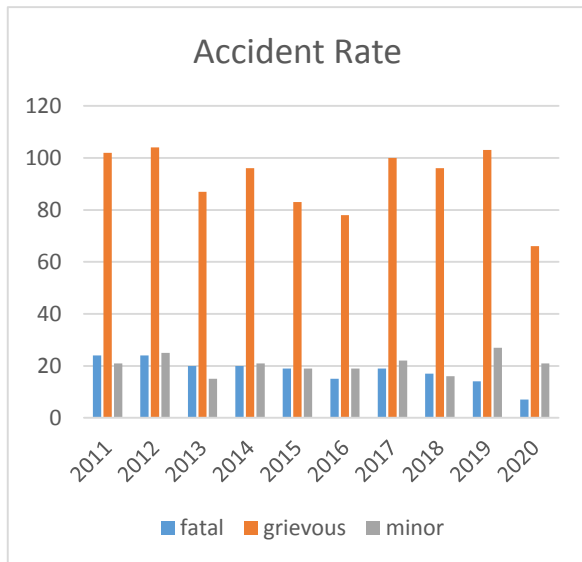


Fig-6 : Accident classification

2.6 Road Geometry

Lane width, median width and shoulder width were found to be greater than the minimum value specified by IRC. Footpath was narrower than the standard width given in IRC code. Bus stop location was also another issue as it was located at a distance less than 75m from the intersection. Bus stop to one direction was at a distance of 20m and another one was 27m from the intersection.

Table-2: Road Geometry

Parameter	Measured value(m)	Standard value (m)
Lane width	6.8	3.5
Median width	4.66	2.5
Shoulder width	8.36	2.5
Footpath width	1.26	2.5
Bus stop	20, 27	45

3. Conclusion

One of the biggest causes of accidents in our Country is road accidents. That shows the importance of road safety and safety awareness programmes. Road safety audit data plays an important role in identifying the deficiencies on different roads and remedial measures to correct those deficiencies. Number of vehicles on the road is increasing day by day but

the road infrastructure is not developing in that same pace. From the road safety audit conducted, it can be concluded that the bus stops in the mentioned junction has to be relocated. Presence of bus stops close to the intersection will hinder the uninterrupted flow of through traffic and this will sometimes waste the green signal time provided for that traffic also. Foot path width has to be increased and hand rails have to be installed on the footpaths. Proper sign boards have to be placed at appropriate locations. Pedestrian crossing marking has to be made more visible and pavement condition has to be improved. More accidents occur in that intersection during day time and this can be closely monitored by appointing police patrol during day time. Spot speed studies show that two wheelers and heavy vehicles are moving at a speed greater than speed limit prescribed for that vehicle class.

References

[1] Abdul Rahoof , Bipin Kumar Singh (2017), "Road Safety and Road Safety Audit in India: A Review", International Journal For Technological Research In Engineering Volume 4, Issue 7

[2] Mohit Bansal (2019), "Review Paper on Identification of Road Safety Aspects and analysis of Faridabad Gurugram Road", International Journal of Multidisciplinary Research, Volume-04, Issue-04

[3] Nilam Phadtare, Madhav Chinchole (2017), "Study of Road Safety Audit in Municipal Area", International Research Journal of Engineering and Technology (IRJET) Volume: 04 Issue: 08

[4] N. Naveen, M. Rajesh, M. Srinivas, Fasiuddin (2017), "Road Safety Audit of a Rural Road", International Journal of Civil Engineering and Technology (IJCIET) Volume 8, Issue 4

[5] Omkar Gholap , Nikita Shinde , Vaishnavi Shelke , Navnath Navale , Kuldeepak Deshmukh, Ashutosh Kotkar (2018), "Road Safety Audit", International Journal of Engineering Research & Technology (IJERT) Vol. 7 Issue 04, April-2018

[6] Tummala Bharat Kumar , Chukkapalli Jeswanth Chowdary (2018), "Road safety audit: a case study on NH-65", International Journal of Engineering & Technology, 2018

[7] S. S. Jain, P. K. Singh, M Parida (2011), "Road Safety Audit for Four Lane National Highways", Submitted to the 3rd International Conference on Road Safety and Simulation, September 14-16, 2011, Indianapolis, USA

[8] Prashant Awsarmal, S. L. Hake , Shubham Vaidya P. K. Bhandari , M. P. Wagh (2020), " Case Study for Road Safety Audit of Aurangabad City", E3S Web of Conferences 170,2020

[9] N.N.G. Sai Pavan, K. Hemantha Raja, B.G.Rahul, SS. Asadi (2018), "A Statistical Evaluation on Road Safety Audit: A Model Study From Hanuman Junction to Kanaka Durga Vaaradhi Vijayawada", International Journal of Mechanical Engineering and Technology (IJMET) Volume 9, Issue 2, February 2018

[10] N. Naveen, Dinesh Kumar Yadav (2017) "Road Safety Audit of RBVRR TSPA Junction - Moinabad Town", National Conference Proceeding NCESTFOSS Dec 2017