Accident Analysis and Safety Measures at Erode City

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ABSTRACT

Indian roads have a sizeable amount of accidents happening in them. The transportation problems faced by various nations across the world have increased manifold, necessitating search for methods or alternatives that ensure efficient, safe, feasible and faster means of transport. Government of India is taking many efforts to minimize the road accidents. Amongst all traffic accident, road traffic accident bears largest number of human life and tends to be most serious problem world over. Road accidents are largely predictable and preventable, provided rational analysis and counter measures. The number of accidents in India is increasing rapidly every year due to addition of more number of vehicles on the streets. This project is to look for few accidental prone spots in our locality and analyze the causes of accidents and try to provide viable solutions for improving the safety in the accidental zones. In this study, the accident zones were taken and a particular spot was selected and suitable measures to control the accidents were suggested.

Keywords: Suspension system, Road, Vehicles, Accident zones, Measures, Suggestions

1. INTRODUCTION

Tamil Nadu is the state with the maximum number of road crash injuries. Road accidents in the country have decreased by around 4.1% during 2016, with the year seeing 4, 80,652 road accidents as against 5, 01,423 in 2015. On the other hand victims resulting from these accidents have risen by about 3.2% throughout the same period. Almost 1, 50,785 people were killed in 2016 as beside 1, 46,133 in 2015. India witnessed 17 deaths and 55 road accidents every hour in 2016, according to the latest report released by the Union road transport and highway ministry. It has been anticipated that India presently accounts for almost 10% of road accident victims worldwide. On top, over 1.3 million people are fatally injured on the Indian roads each year. Road accidents pose a serious threat for developing countries. There are certain locations that are more vulnerable to cause accidents than others. These locations are identified and certain measures are taken to reduce the accidents by a sizeable extent. And to do this, studies are done. More people have died in 2016 than in 2015. The project involves data collection, study on the causes of accidents and providing solutions for safe transportation.

LITERATURE REVIEW

The improvements in vehicle safety were dependent on the carrying out of fresh technologies and security character by the manufacturers (Battiato, Farinella, Gallo, & Giudice, 2018).

Control collection was used to think on the influences of previous factors which have been eliminated previous to estimating the mesh effect of the Road Safety System Approach for the aim cluster comparative to the control cluster (Haque & Haque, 2018).

The results were evaluated concerning all characteristics of the black spots, and a sequence of recommendations to develop traffic safety were analysed (Murat & Cakici, 2017).

The mean cause on property-damage-only accidents is uncertain (Elvik, 2017). The traffic safety audit inspects an active or planned road in conditions of which a cluster of independent experienced experts gave a ending about a potential accident risk in turn to prevent accident-prone situations (Huvarinen, Svatkova, Oleshchenko, & Pushchina, 2017).

Normally, despite the fact that in loads of developed and developing countries counting China, road safety circumstances were commonly improving, India faces a deterioration position (Singh, 2017).

Utmost accidents drop in the kind of non-injury type (49%). Severe injury type accidents were established to be supplementary than fatal accidents (Goel & Sachdeva, 2016).

For the accident-prone road sections a directory of way had been developed. The known recommendations would have advantageous influences on overtaking actions and their way will guide to an boost in safety lying on two-lane rural roads (Richter, Ruhl, Ortlepp, & Bakaba, 2016).

The most essential piece noticeably was the accident records. Based on these records the accident threat described by the worth of the safety impending was designed for all road sections (Kathmann, Ziegler, & Pozybill, 2016).

To get better Road Infrastructure Safety Management, road authorities, road designers and road safety practitioners require prediction tools, generally recognized as Accident Prediction Models (APMs), allowing them to analyze the possible safety issues, to recognize safety improvements and to approximate the potential effect of these improvements in conditions of crash drop (Yannis et al., 2016).

Road transportation has optimistic effects on the economy, but negative effects on safety and the environment (Luoma & Sivak, 2012).

Road safety process intended to alter the road environment to shrink the risks on driver errors and to shrink the seriousness of the belongings of driver errors are likely to increase road safety (Wiethoff et al., 2012).

To stay away from conflicts among cars and streetcar users at the streetcar stops, boarding and alighting from right-side doors by a self-service fare collection system was also investigated (Omatsu et al., 2011).

OBJECTIVE

➢ To collect the necessary data such as accident data and street conditions for the area of study.

➢ To analyze the data and find the most critical location.

➢ To study the critical spot and suggest suitable measures.

➢ To provide a few solutions including design.

➢ To design according to IRC recommendations.

STUDY AREA

Perundurai is one of the busy areas located in Erode district. It is an educational hub for Erode and also contains various industries. It has various intersections along its stretch. The spot chosen is the Pethampalayam intersection which is 22 kilometers from Erode which lies between 11˚17"30.0"N to 11˚17"29.8"N latitude and 77˚34"39.1"E to 77˚34"36.2"E longitude. It is located on the National highway (NH 544) connecting Salem and Cochin. The road has high traffic capacity and the developments are occurring at a steady pace in the along area. The intersection is busy with more number of vehicles and over the years traffic density has gone up. Also, in recent years, fatal accidents have increased tremendously on this spot.
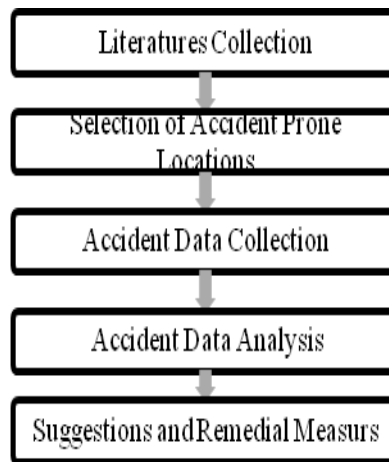
METHODOLOGY

Fig1. Methodology

DATA COLLECTION

Road inventory study was done primarily. Accident data is the most important data required for identifying the critical spot. Accident data was collected from the police station for the year 2017. The data consists of Location of accidents, Nature of accidents, Type of accidents, and Number of persons injured, fatal and non-fatal.

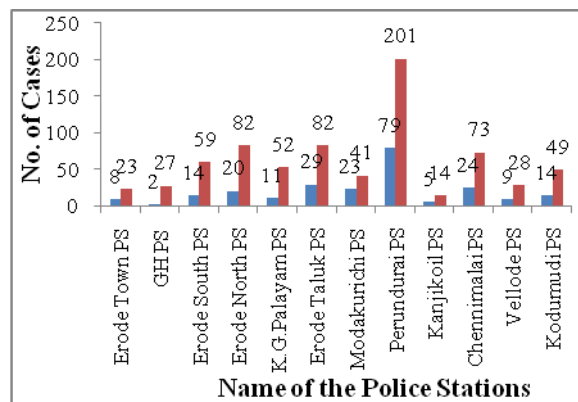The road accident cases for the year 2017 at Erode District (Fig. 2, Fig. 3 and Fig. 4) are shown.
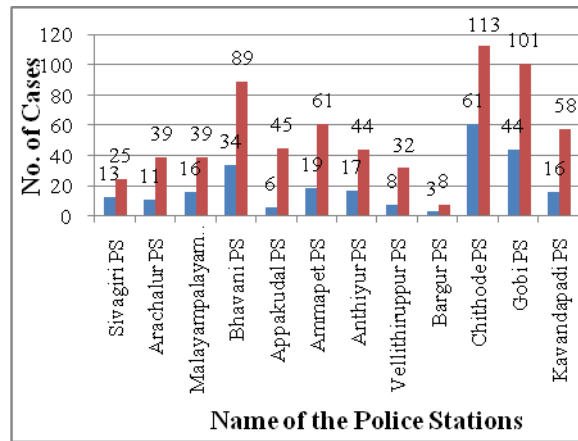

Fig 2: Road Accident Cases
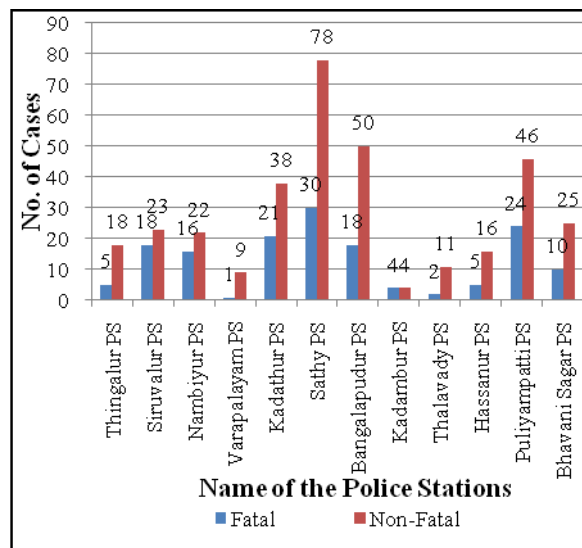
Fig 3: Road Accident Cases

Fig 4: Road Accident Cases

The total number of accidents caused based on the different types of vehicles are shown in the Table 1.

Table 1. Accidents based on vehicles

SI. No.	Type of Vehicles	Total
1	Bus- Govt	**79**
2	Bus Private	**100**
3	Truck/Lorry	**251**
4	Car/Jeep/Taxi/Tempo	**757**
5	Two Wheelers	**1007**
6	Three Wheelers	**45**
7	Others	**126**
	Total	**2365**

The accident case particulars in Perundurai police station (Fig. 5) are shown.
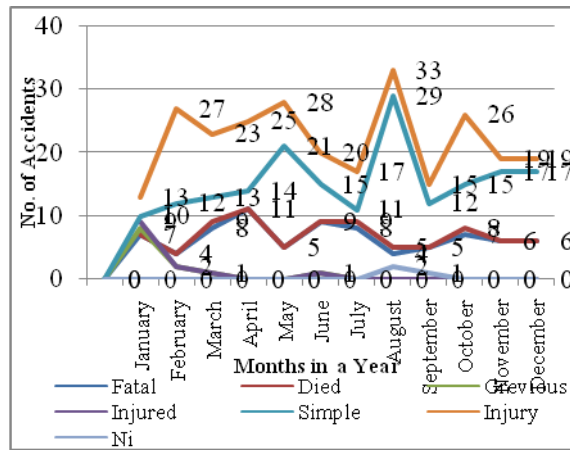
*Ni- Not injured

Fig 5. Perundurai PS Accident case particulars

VI. DATA ANALYSIS

Using the data given by the police personnel and the district crime records bureau, the location which recorded the highest number of accidents was selected. The intersection selected has a high degree of varying traffic flow and the vehicle movement is continuous which leads to a conflict between the vehicles coming from the minor road and the vehicles on the major road.

The continuous flow in the major road provides very less probability for the vehicles from the minor road to cross safely. This results in the drivers losing their patience and getting agitated, which leads them to take a quick move on the major road crossing. And this leads to accidents which are severe and in some cases fatal. In some places, there is a lack of service roads which caused the accidents. Other places have do not have an adequate slope for drainage of rain water. The reasons are plenty and it results in accidents. The accidental spots were analyzed (Fig. 6) and their remedial measures are listed below in Table II.
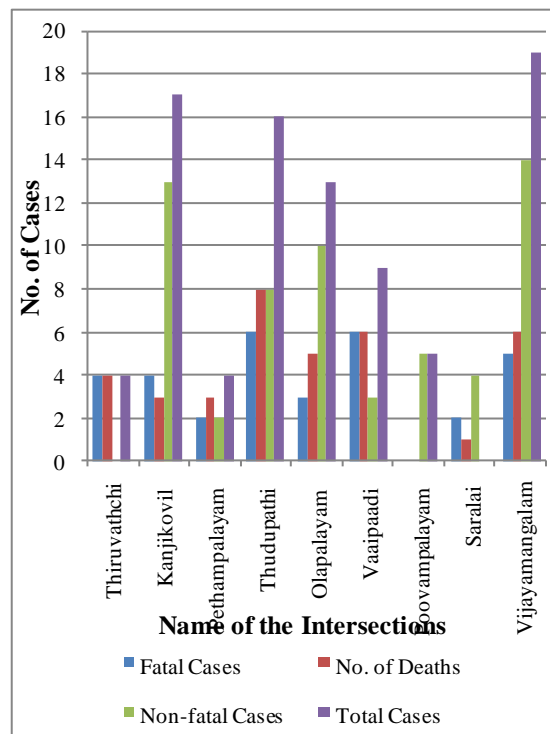

Fig 6. Accident spot details

Table 2: Remedial measures

Intersections	Reason for accidents	Preventive measures
Thiruvathchi	No service road	Service road must be provided
	Rainwater stagnation due to improper drainage	Adequate camber must be provided for proper drainage
Kanjikovil		
Pethampalayam	Lack of flyover &No service road	Flyover must be provided & Service roa must be provided
Thudupathi		
Olapalayam		
Vaaipaadi		
Poovampalayam		
Saralai		
Vijayamangalam		

SUGGESTIONS FOR IMPROVEMENT

After a clear analysis of the data we have chosen the Perundurai-Pethampalayam intersection which has witnessed around 200 accidents out of which 51 were fatal during the year 2017. There is a considerable increase in rate of accidents, so we have planned to provide two proof solutions.

1) Sensors to aid vehicle information

2) An underpass to reduce the fatality rates which is growing steadily.

A. Magnetic loop sensors

An unbroken run of wire which enters and exits from the similar point is covered in the traffic lane. This is generally well-known as saw-cut loop or preformed loop. The vehicle detector is associated with the loop wing cable which is further joined to the two ends of the loop wire. The loop is power-driven with a detector and it produces a magnetic field in the loop area. The detector monitors a stable frequency. When no vehicle passes above the loop, a base frequency is created. The frequency increases while a vehicle passes over the loop. When the frequency increases, the pass on closes. Until the vehicle is passed above the loop, the pass on remains blocked. Devices such as a traffic signal, intercom device, gate etc are able to stimulate the pass on.

B. Construction of Underpass

According to IRC SP 84:2009, Lateral and Vertical clearance at Underpasses. At any time a cross road is planned to be taken below the project highway, minimum clearances at underpasses shall be as follows:

a) Lateral Clearance:

i) The underpass is used to evaluate the full road width of targets. This width shall not be less than 12m (7m carriageway = 2 x 2.5m shoulder width on either side) or as indicated in Schedule-B.

ii) The vehicle collusion is prevented by providing crash barriers/guardrails

iii) 5m is minimum width provided for cattle or pedestrians.

b) Vertical clearance:

Vertical clearance at underpasses shall not be less than 5.5m.

c) Cross slope:

While deciding the highway terrains, small distance terrains (eg. Less than 1 km) meeting the road is not considered.

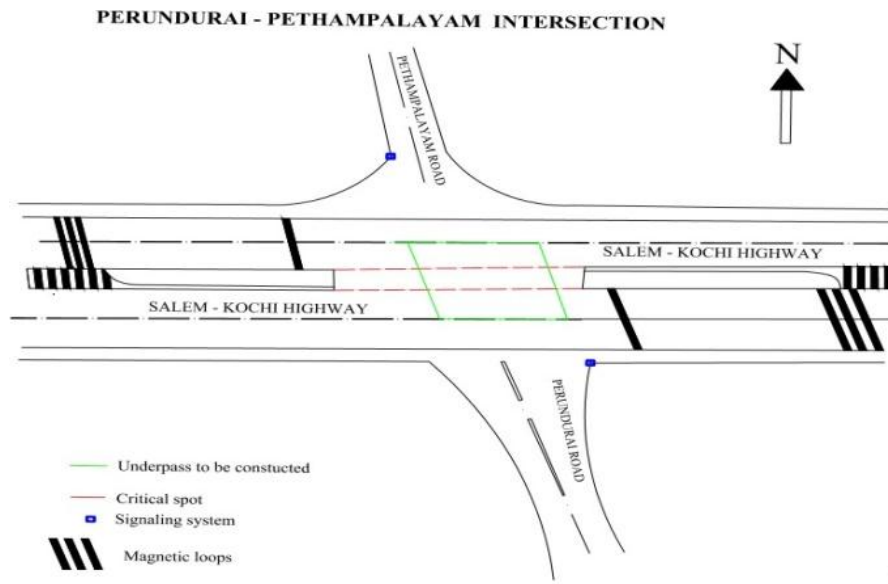The safety measures provided in Perundurai – Pethampalayam intersection (Fig. 6) is shown.

Fig 7. Safety measures provided in Perundurai – Pethampalayam intersection

CONCLUSION

In this project the intersection at Pethampalayam located near Perundurai, Erode is chosen based on critical number of fatal accidents at this spot and two solutions have been suggested.

➢ Magnetic sensors are more economical compared to the construction of a culvert.

➢ Culvert provides a higher life span and is safer in terms of safety and reduces accidents drastically.

➢ Further study can be done for measuring the level of roads at the intersection. Similar studies will be conducted on all National Highways and State Highways.

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Conflict of Interest

None of the authors have any conflicts of interest to declare.

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