

## STUDY OF ROAD SAFETY AUDIT IN MUNICIPAL AREA'

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**Abstract**—The numbers of road accidents are increasing at an alarming rate in India. Thus, there is an urgent need for a systematic approach to improve road safety. Road safety audit is formal procedure for assessing accident potential and safety performance in the provision of new road schemes, the improvement and rehabilitation of existing road & in maintenance of roads. Road safety improvement program is a systematic approach to reduce the injuries, fatalities, deaths and loss of public properties because of road accidents. In this project analysis of one of the major sub arterial street of PCMC will be undertaken. The location of interest for the analysis is Dharmraj chowk Intersection near Akurdi railway Station. The roadway carries considerable amount of traffic throughout the day and it has number of conflict points. A detailed analysis of Dharmraj chowk Intersection will be carried out from the point of view of safety and supplemental analysis regarding the traffic growth. The project aims to identify deficiencies, developing mitigating strategies, improving public relations, enhancing credibility of the roads and calculating the crash rate of intersection of roads.

**Keywords:** Road Safety, Road Geometrics, Traffic Survey, Pedestrian Survey.

### I. INTRODUCTION

In India, 15 people die and 60 are seriously injured or disabled every hour in road accidents. Every year more than 1.17 million people die in road accidents around the world. The majority of these deaths, about 70 percent occur in developing countries. Sixty-five percent of deaths involve pedestrians and 35 percent of pedestrian deaths are children. Over 10 million are crippled or injured each year. It has been estimated that at least 6 million more will die and 60 million will be injured during the next 10 years in developing countries unless urgent action is taken.

Road accidents not only impose huge economic losses representing between 1-3 % of annual Gross Domestic Product in most countries but also causes great emotional and financial stress to the millions of families affected. The continued steep increase in the number of road accidents indicates that these losses are undoubtedly inhibiting the economic and social development of the countries and adding to the poverty and hardships of the poor. Thus, there is an urgent need to improve safety of the roadway and its adjacent development. Considering this importance of improving road safety. The trends of road accidents and huge socio-economic losses shows that there is an urgent

need of systematic approach and development of road safety improving program to reduce road accidents and fatalities within limited resources available. During the decade 2001 to 2011, the number of road accidents in the country increased at a compound annual growth rate (CAGR) of 2.1 per cent. Similarly, the number of road accident fatalities and the number of persons injured in road accidents in the country between 2001 and 2011 increased by 5.8 per cent and 2.4 per cent, respectively. As a result of concerted and coordinated road safety efforts there has been a decline of the order 3.1 per cent and 0.4 per cent in the number of persons injured and the number of road accidents, respectively, in 2011, compared to 2010. However, the number of fatalities increased by 5.9 per cent in 2011.

### A. PROBLEM STATEMENT

In PCMC area there are many newly designed or renovated roads intersection. These intersections are not design with safety aspects. We have selected such intersection where the road is newly renovated. Near Akurdi railway station recently there is two under passes designed in the intersection. Engineering colleges on both side of railway line are located. Thus, the vehicles travelling on road have no safety measures while turning or crossing intersection.

### B. OBJECTIVES OF THE STUDY

Each accident calls for systematic study in a scientific manner and detailed investigation of the accident spot. This type of investigation will help to identify some of the causative factors responsible for accidents and to give relative importance. The results of the study could be employed advantageously to take up preventive measures to reduce the accidents. The objectives of the present study are

- To Study the effect of roadway geometrics and traffic conditions on this stretch.
- Study of Road Safety Audit.
- Traffic Survey.
- Identifying the problem at intersection.
- Suggestion for safe road travel.

### C. SCOPE OF THE STUDY

Prepare existing road safety audit in order to rectify safety and utility need. It recognizes that a roadway may

change over time. Changes may have resulted from changing roaduse, encroachments, and design inconsistency, ageing infrastructure and inadequate maintenance of road and traffic control devices and other measures. Points to be emphasized are adequacy of roadway, roadside and intersections, interchanges, grade separators, location of bus stops, truck laybys, needs of VRU, access management.

- ☑ The accidents on road network can be reduced.
- ☑ The severity of accidents can be reduced.
- ☑ The need for costly remedial work is reduced.

**II. METHODOLOGY**

- ☑ Study of ROAD SAFETY AUDIT.
- ☑ Data collection of present traffic count.
- ☑ Study of RSA for existing road intersection at Dharmraj Chowk

**A. TRAFFIC SURVEY:**

Traffic volumes studies are mainly carried out to obtain factual data concerning the movement of vehicles. Observations are mention (PCU Counts) in the figure.no1. Based on PCU Counts verse time graph was plotted. Figure no 2, shows the variation of PCU count in one day. The maximum PCU recorded is 7000 and minimum as 2000.As per IRC standards the PCU 1200 for two lane road. On an average 5000 PCU is recorded which is three times greater than permissible.



Fig.1.Showing Peak hour PCU

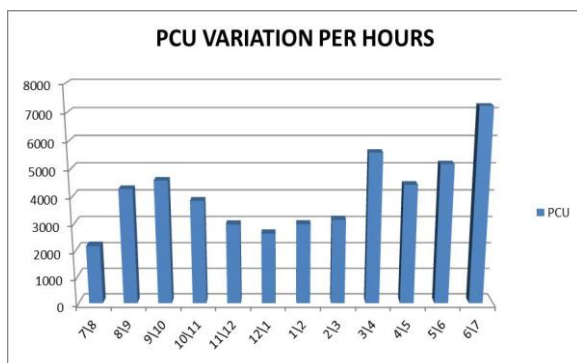


Fig.2.Showing PCU variation per hour

TABLE 4. TENTATIVE CAPACITIES OF URBAN ROADS BETWEEN INTERSECTIONS

No. of traffic lanes and widths	Traffic flow	Capacity in PCUs per hour for various traffic conditions		
		Roads with no frontage access, no standing vehicles, very little cross traffic	Roads with frontage access but no standing vehicle and high capacity intersections	Roads with free frontage access, parked vehicles and heavy cross traffic
2-lane (7-7.5m)	One way	2400	1500	1200
	Two way	1500	1200	750
3-lane (10.5m)	One way	3600	2500	2000
4-lane (14 m)	One way	4800	3000	2400
	Two way	4000	2500	2000
6-lane (21 m)	One way*	3600	2500	2200
	Two way	6000	4200	3600

Fig.3. Capacities of urban roads between intersections

**B. PEDESTRAIN SURVEY:**

Pedestrians are unsafe while crossing the intersection, insufficient width of footpath on both lanes of road, required more time for crossing. A questionnaire based survey was carried out for suggestions and short comes for pedestrian crossing at junction.

Based on surveys, and analysing with Road Safety Audit and IRC recommendation. Table no 1 show the values of PCU with standard as per road design. Table clearly shows the traffic on road is about thrice the capacity of design. The pedestrians route are insufficient need to be widen.

**TABLE 1 : Comparison Of Collected Data With Recommended Values By Is Code**

Description	Recommended value by IS code	Present Value	Comment
Traffic Volume PCU(Morning Peak Hour)	1200	4580.5	Unsafe
Traffic Volume PCU(Evening Peak Hour)	1200	7223.5	Unsafe
Pedestrains volume(Morning Peak hour)	800	1136	Required width of footpath 2m
Pedestrains volume(Evening Peak hour)	800	1230	Required width of footpath 2m
Footpath width (M)	2	1.5	Insufficient
Design Speed Km/hr	60	-	-
Carriage Way Width (M)	7.5	7.5	Safe

**III. CHECKLIST FOR EXISTING ROAD:**

- ☑ Are the prevailing speed levels within desirable limits
- ☑ Are there signs of other conflict situations and minor accident.

- ☐ Are the surface and carriageway markings in good condition.
- ☐ Are medians and islands of adequate width for the likely users.
- ☐ Are there signs of pedestrian traffic in places that seem hazardous to pedestrian.
- ☐ Do road users park in ways that could constitute hazards.
- ☐ Do plantations obscure visibility or the view of sign.
- ☐ Are the specified distances to rigid obstacles to maintained for all group road users.
- ☐ Does there appear to be need for more or better crossing facilities for pedestrian.
- ☐ Are overtaking opportunities available for heavy vehicles where volumes are high.
- ☐ Is sufficient warning provided in advance of breaks in service roads and openings in medians for traffic using multilane highway.
- ☐ Any provisions for parking satisfactory in relations to traffic operations and safety.
- ☐ Does there appear to be need for more or better facilities for cyclist.

**IV. RESULTS :**

**A. PROBLEMS AT DHARMRAJ CHOWK**

While observing the site, we came to know the following problems:

- ☐ Improper lane marking.
- ☐ Wrong position of stop bars.
- ☐ Invisible zebra crossing markings.
- ☐ Absence of outer radius marking.
- ☐ No provision of signal.
- ☐ Lack of pedestrian signals.
- ☐ Improper pavement structures.
- ☐ Disturbance to outer lane due to unauthorized ramp on the road.
- ☐ Lighting problems at night.

**B. SHORTFALLS**

- ☐ Intersections alignment of roads, due to new tunnels disturbs.
- ☐ As per PCU counts, road is insufficient for present traffic.
- ☐ On street parking leads to congestion for vehicles to travel on road.
- ☐ NO Pathway defined for pedestrians on intersections.
- ☐ Insufficient Informatory signs at Intersection which causes vehicles collision.
- ☐ Zebra crossing mark is not available at this intersection.
- ☐ Improper arrangement of Island.



Fig.2.Over Drive Of Vehicle On Island Due To Improper Arrangement Of Island

**C. SUGGESTIONS**

- ☐ Signal system should be provided for free flow of traffic
- ☐ Width of footpath should be increased.
- ☐ Proper pedestrian crossing arrangement should be provided.
- ☐ The requirement of all informatory signs should be fulfilled at the intersection.
- ☐ Island should be redesign to avoid vehicles collision and illegal passing at intersection.
- ☐ Grade separator on road coming from Gurudwara should be made.
- ☐ For future traffic flow the road may require underpass at intersection for road.



Fig.5. CASE STUDY – DHARMRAJ CHOWK (Island should be redesign to avoid vehicles collision and illegal passing at intersection)

## VI. CONCLUSIONS

- ☒ RSA is guiding tool for roads which are increasing or renovated due to heavy traffic.
- ☒ For Reducing the risk of accidents occurring in the future as a result of renovation of roads will be minimize by RSA.
- ☒ By implementing suggestions on roads their may be reduction of accidents on roads at Dharmaraj Chowk.
- ☒ RSA, Reduces the long-term costs associated with a planning decision or a road scheme.
- ☒ Safety of roads and pedestrians should be mandatory point while designing, renovating, extending the roads of PCMC.

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