



INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X

Impact factor: 4.295

(Volume 5, Issue 3)

Available online at: www.ijariit.com

Analysis of intersection Dharmaraj Chowk

Malik Parvez

malikparvez5@gmail.com

Dr. D.Y. Patil Institute of Engineering, Management
and Research, Pune, Maharashtra

Rohan Solunke

solunke-rohan@gmail.com

Dr. D.Y. Patil Institute of Engineering, Management
and Research, Pune, Maharashtra

Susmit Pedapalliwar

susmit@gmail.com

Dr. D.Y. Patil Institute of Engineering, Management
and Research, Pune, Maharashtra

Sourabh Shigavan

sourabhshigavan@gmail.com

Dr. D.Y. Patil Institute of Engineering, Management
and Research, Pune, Maharashtra

ABSTRACT

Study of intersection is very important to control traffic flow, factors contributing to traffic accidents are numerous and they interact complexly. The occurrence of traffic conflict is determined. This study proposes methods of investigation and analysing data. Detailed accident analysis shows that intersection scenarios are a serious focal point for accidents in urban areas. Therefore such an analysis is necessary to be done. There exist a lot of different intersection types with different levels of complexity. Therefore, the relevant scenarios were chosen out of the accident analysis to focus only on the most dangerous scenarios. Pedestrian road crossings have become a major issue in road traffic flow, especially in urban areas where there is no control for pedestrian road crossings. Pedestrian road crossing behaviour is a serious threat to pedestrians at uncontrolled midblock crossing locations in the mixed traffic conditions. Due to increase in motor vehicle growth there is an increase in the regulation of motor vehicles only and the regulation of pedestrian is completely neglected. This increases the uncontrolled road crossing behaviour of pedestrian. The main motivation of this study is to investigate the errors in the design of intersection so as per our interest we choose 'Dharmaraj chowk' Akurdi. As number of accidents are increasing day by day, during the decade 2001 to 2011, the number of road accidents in the country are 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.

Keywords— Pedestrian survey, Traffic survey, Traffic problems, Footpath

1. INTRODUCTION

Intersections play an important role in the road network, where traffic flows in different directions converge. Because of their influence disturbance of pedestrians and bicycle to vehicles, and the loss of green time for beginning and clearance and so on the capacity of intersections is much lower than that of their approach links. Thus, the intersections usually are the bottleneck of the network, the popular and immediate source of the traffic jam and traffic accidents. Thus, it is significant to study the traffic flow characteristics at signalized intersections in the developed country and the developing country, because capacity of the intersection can be improved according to their Characteristics. Study on traffic flow characteristics at signalized intersections is one of most effective and immediate measure to enhance the capacity of road networks and relieve the congestion in cities.

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.

2. PROBLEM STATEMENT

This study was conducted to analyse and evaluate the performance of unsignalised intersection. Akurdi is one the key urban area in PCMC because the population in the area is above 3 lakh. At newly renovated intersection of 'Dharmaraj chowk' near Akurdi railway station, on D.Y. Patil road which is major road that connects to the express way so the traffic is more. There is two under passes designed, near the intersection engineering colleges on both side of railway line are located. And, the vehicles travelling on road have no safety measures while turning on crossing intersection. And road is having bigger traffic jams and the number of conflicts is increasing day by day.

The unsignalised intersection was identified as two way stop controlled unsignalised intersection (TWSC) where the traffic flow was controlled by stop rule. For a TWSC intersection, the stop control approach are referred to as the major road approaches. So analysis of the intersection in terms of design and other aspects is necessary to have a fluent flow of traffic, and this analysis is also important to overcome traffic accidents, conflicts by properly designing the intersection.

3. OBJECTIVE

Each accident calls for systematic study in 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 analyse the conflicts at intersection
- 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.

4. SCOPE OF PROJECT WORK

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 road use, 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, road side and intersections, interchanges, grade separators, location of bus stops, 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.

5. METHODOLOGY

5.1 Geometric study of intersection

In this we have studied the geometry of intersection. Such as width of lane, width of footpath, study of island, sight distance and AMF.

$$AMF = \frac{1.55L_c + \frac{80.2}{R} - .012S}{1.55L_c}$$

where

AMF = Accident modification factor, a multiplier that describes how many more crashes are likely to occur on the curve compared to a straight road

L_c = Length of the horizontal curve in miles.

R = Radius of the curve in feet.

S = 1 if spiral transition curves are present

= 0 if spiral transition curves are absent

Traffic volume study at intersection: To study count of vehicles passing through the intersection at particular points, on specific day, at specific time.

Conflict point analysis: Based on the traffic flow and the geometry of intersection conflict point can be decided.

Comparison with standard values given by IRC: Based on the survey conducted values obtained will be considered with the standard values of design given by IRC.

Design analysis: Analysis of design of intersection and its properties.

Alternate design solutions: Based on the analysis if there is any error in design correction and alternative measure can be provided.

Conclusion: Based on the study results, preventive measure and solutions are given.

5.2 Flow Chart

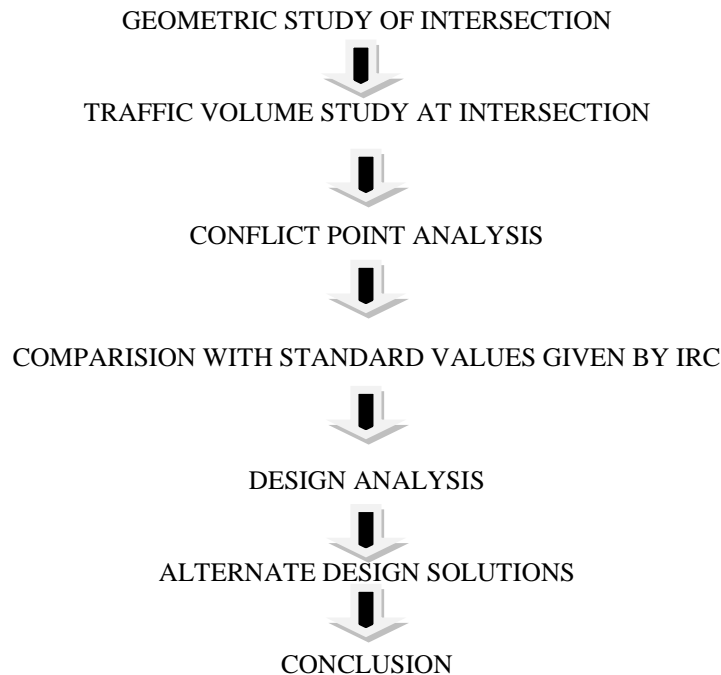


Fig. 1: Flow chart

5.3 Limitations of study

In spite of the several advantages mentioned in this study, there are many limitations some of these are listed below.

- There might be an error in traffic volume survey.
- There can be error in calculation.
- Exact data from municipality is not available.
- Alternatives proposed by this survey might be costly.

5.4 Expected outcomes

- Points of conflict will be known.
- Error in design can be identified.
- Reasons of Traffic jam can be known.
- Number of accidents will be reduced.
- Requirement of signals can be identified.

5.5 At Glance

We made a team of four, consulted Mrs. Aavni Thampi and discussed about the project. She gave us a brief idea about the project. Our project was to analyse an intersection. We had visiting many nearby instructions in PCMC, we had visited Kiwale Chowk, Gurudwara Chowk, Jagtap Dairy Chowk, Bhondawe Chowk. After that with the help of our guide Mr. Rohit Shinde, we selected Dharmaraj Chowk for study.

6. RESEARCH

Next step of our project was research. So after searching 10 to 15 research papers of National and International journals, we collected all the information regarding the intersection such that types of intersection, rules by IRC for the intersection, consulting Mrs. Aavni Thampi who is expert in transportation engineering as well as our co-guide. And some information was collected from Wikipedia and Google.

7. GEOMETRIC STUDY

Next step was requirement of field study so with the permission of our guide we collected required instruments from our department and went to the field for actual calculation of field properties, we measured the following data:

- Width of carriage way = 7.5 m
- Width of footpath = 1.5 m
- Height of kerb = 100mm
- Design speed = 60kmph



Fig. 2: Geometry

8. TRAFFIC STUDY

After the geometric study our next step was the traffic flow study of intersection so we decided a day and did the traffic study on specific day at peak hours and normal hours. We counted the vehicles on each lane at particular point and categorised them as car, motor, bus, bike, LCV, HGV and other.

9. PEDESTRIAN SURVEY

We performed pedestrians’ survey in 2 shifts that is morning peak hours and evening peak hours, as there are engineering colleges on both sides of the tunnel pedestrians are more mostly the college students so there safety is a major issue so this survey becomes very important.

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.

10. ANALYTIC SURVEY OF ROAD

In this survey we analysed the roads for:

- Availability of lights-There is no provision of lights on the road.
- Provision of zebra crossing- no zebra crossings are provided on the road.
- No pedestrian signals, no lane marking, pavement structure is in good condition, and no traffic signs.

10.1 Obtained Data

Table 1: Obtained data

Description	Recommended values by IS code	Present value	Comment
Traffic Volume PCU (Morning Peak Hour)	1200	7485.5	Unsafe
Traffic Volume PCU(Evening Peak hours)	1200	9637.6	Unsafe
Pedestrians volume (Morning peak hours)	800	1500	Should increase width of footpath up to 2m
Pedestrians volume (Evening peak hours)	800	1800	Should increase width of footpath up to 2m

Table 2: Obtained data for, Intersection Approach: DY Patil, Place: Dharmaraj Chowk

Counts Hrs.	Cars		Buses		Trucks		2 Wheelers		3 Wheelers		Cycles	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
9-10am	44	42	11	07	04	06	203	198	25	28	08	13
10-11am	22	32	03	08	08	09	178	169	14	11	02	05
11-12 noon	29	22	04	02	05	03	134	142	15	11	01	00

12-1 pm	19	21	08	02	05	04	89	71	12	13	00	00
1-2 pm	08	12	04	08	07	02	61	71	17	22	00	00
2-3 pm	09	11	05	09	12	09	89	83	06	8	00	00
3-4 pm	13	21	04	05	08	11	121	134	05	03	01	00
4-5 pm	09	14	08	11	12	09	143	156	13	04	04	02
5-6 pm	31	21	11	13	03	07	151	131	19	14	03	00
6-7 pm	56	61	15	17	08	09	189	179	13	09	06	02
7-8 pm	89	91	18	08	12	13	283	280	22	18	2	1
8-9 pm	101	90	20	38	15	18	301	290	28	22	0	0

Table 3: Obtained data, Intersection Approach: Gurudwara road, Place: Dharmaraj chowk

Counts Hrs.	Cars		Buses		Trucks		2 Wheelers		3 Wheelers		Cycles	
	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down	Up	Down
9-10am	41	32	15	09	04	06	201	110	12	18	7	7
10-11am	26	32	04	09	08	09	191	180	14	11	8	2
11-12 noon	31	29	05	01	05	03	109	121	15	11	10	9
12-1 pm	16	19	04	06	05	04	95	62	14	13	11	14
1-2 pm	09	12	04	08	07	02	81	61	17	28	12	02
2-3 pm	23	11	05	09	12	09	79	83	06	8	2	4
3-4 pm	13	21	07	08	08	11	131	141	05	03	6	2
4-5 pm	34	39	11	13	12	09	133	146	13	04	7	8
5-6 pm	56	49	13	09	03	07	154	139	12	14	2	8
6-7 pm	86	61	14	17	08	09	180	178	13	09	14	1
7-8 pm	99	91	18	09	12	13	284	270	21	10	5	9

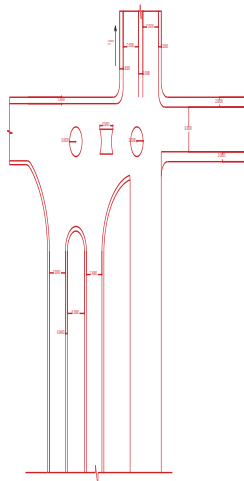


Fig. 2: Actual dimensions and structure of the intersection, with three islands in the intersection.

10.2 Dimensions measured

- a. D.Y.Patil road which is 7.5m wide and a foot path of 1.6m on left and 1.3 on right.
- b. Gurudwara road is of 8m with 1.3m footpath.
- c. Road towards Iskon is 9m wide with 2m footpaths on each side.
- d. New tunnel of 7.6m.
- e. Old tunnel of 4m.
- f. Circular islands of 3m radius.

11. CONCLUSION

- There might be error in design of island on intersection.
- As per the survey traffic flow is huge.
- For Reducing the risk of accidents occurring in the future as a result of renovation of roads will be minimize by RSA.
- Safety of roads and pedestrians should be mandatory point while designing, renovating, extending the roads.
- Improper lane marking. Wrong position of stop bars. Invisible zebra crossing markings. Absence of outer radium 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.

12. EXPLICATION

- Expand the width of footpath up to 2.5m.

- Signals should be introduced at intersection.
- Grade separator can be implemented on D.Y.Patil college road towards bigger tunnel.
- Another 9m wide road should be constructed properly to ease the traffic.
- A provision for proper street lights should be provided.

13. REFERENCES

- [1] H. Li, Z. Tian, and P. Hu, Department of Civil and Environment Engineering, University of Nevada, Reno, Reno, NV 89557. W. Deng, Transportation College, Southeast University, No. 2, Sipailou, 210096, Nanjing, China. Corresponding author: H. Li, haiyuanli2008@hotmail.com.
- [2] Jonathan Aguero-Valverde, Paul P. Jovanisa a Department of Civil and Environmental Engineering and Pennsylvania Transportation Institute, Pennsylvania State University, 212 Sackett Building, University Park PA 16802-1408
- [3] B RaghuramKadali , P Vedagiri Research scholar, Transportation Systems Engineering, Department of Civil Engineering, Indian Institute of Technology Bombay, Mumbai, India.
- [4] Prof. Dr.-Ing. Werner Brilon Dr.-Ing. Ning Wu Dr.-Ing. Lothar Bondzio Ruhr University Bochum Institute for Transportation and Traffic Engineering D - 44 780 Bochum Germany.
- [5] Prof. Siddhath Gupta, Assistant professor, department of civil engineering Parul institute of engineering, Parul university.
- [6] Vaiana Rosolina, Iuele Teresa, Astarita Vittorio, Festa D. Carmine, Tassitani Antonio, Rogano Daniele, Zaffino, Claudio "Road safety performance assessment: a new road network Risk Index for info mobility" Published by Elsevier Ltd.
- [7] Wikipedia
- [8] Google
- [9] IS Codes- IRC: SP: 88-2010 G "MANUAL ON ROAD SAFETY AUDIT", Indian Road Congress New Delhi, India. IRC 86-1983 GEOMETRIC DESIGN STANDARDS FOR URBAN ROAD IN PLAINS.