



STUDY AND ANALYSIS OF ROTARY INTERSECTION AT LIC SQUARE, YAVATMAL

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Abstract: This project related to Study and Analysis of Rotary Intersection at LIC Square, Yavatmal for smoothly flow of traffic and also to avoid collision between vehicles at intersection. In recent years, increase growth of vehicles has caused heavier traffic congestions on the roads and intersections so it creates difficulty to road users, this condition is more intense in peak hour time. At that intersection which increases the travel time of the vehicles cause delays and also cause more traffic accidents or conflicts at that intersection. Traffic volume is increasing in peak hours, so it becomes extremely difficult to handle for traffic police to control the traffic manually at the intersections. Therefore, to give the proper management of traffic stream at the LIC Square intersection and to reduce the accidents head of collision between vehicles on road. The situation become more intense during the peak hours when increase of traffic volume by 50% than normal traffic. Flow of rotary are studied to observe the performance of rotary at that intersection. Volume of traffic around rotary roadway which depends on flow at different legs of rotary. Purpose of this project is that to Study and Analysis of Rotary Intersection at LIC square which include site investigation, measurement present geometry of intersection, traffic volume count, then calculate result and calculations.

Keywords – traffic, rotary, intersection, PCU, congestion, traffic volume.

1.INTRODUCTION

A rotary is a type of intersection for controlling of traffic. Rotaries are usually circular in shape, which has characteristic to entry at rotary around circular island. Rotaries are suitable for many intersections including locations which enhance performance, reduces traffic delays and balanced the traffic flow. Rotary has ability to solve various traffic flow problems. Traffic volume on one road is higher that is avoid to vehicles coming from different road to enter in rotary. Delay, level of service, accident, operation cost, and other issues which are depending upon maximum capacity of rotary. Most of rotary has three approaches, four approach, five approach and six approach. Most of them have served more than 15 years in India Especially mixed traffic is present in urban area in India. Higher traffic volume is the main reason for traffic congestion in city roads and at intersections. The increase in traffic volume will reduce the performance of urban roads and at intersections. The traffic must be regulated effectively to overcome these problems and to provide better service for the road users. Rotary is a huge road intersection in which all vehicles from different roads that are moved around a large central island in clockwise direction, before they can weave out of traffic flow into their respective directions. Rotaries are more efficient whenever the traffic coming from three or more approaches are relatively equal. IRC suggests that rotary can efficiently handle vehicles about 3000 per hour entering from all legs of the intersection and volume of 500 vehicles per hour is the lower limit. Traffic rotaries should be provided on that place where the intersecting traffic is about 50 percent or more of the total traffic of all intersecting roads or where the fast traffic turning right is minimum 30 percent of the total traffic. Due to increase in population private owned vehicles are also increased which results in traffic congestion.

1.1 Location and Study of Area

This area is core area if the city where all activities take placed. Here petrol pump, Government Hospital, private hospital, bus stand, school and college within range of 500m from this location. Here traffic congestion is more in peak hour than off peak hour, so we are selected this location for this project.



Fig 1. Location and of Study of Area

1.2 Performance of Rotary

The rotary intersection is defined as the special form of intersections present at the grade where vehicles are coming from the different road which are moving around the large central island in one direction without any stopping. Traffic enters into the rotary will converges first then travel in the road for some distance and turns into the different directions. This distance covered by vehicles after converging and before diverging on rotary intersection will be called as weaving length. The presence of Central Island will reduce the collision of vehicles entering into intersection and helps to easily maneuver by driver across intersection.

1.3 Objectives

Following are the main objectives of study:

1. Study of existing rotary intersection which includes data collection, site investigation, measurements.
2. To carry out analysis of intersection which includes traffic volume survey, weaving section, flow of traffic.
3. To calculate the PCU of these intersections.

2. METHODOLOGY

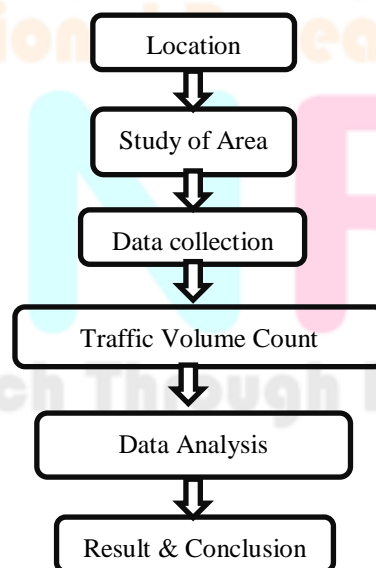


Fig.2 Flow Diagram

2.1 Data Collection on Site

Data collection on site was carried out by using measurements which is conducted by our project group members with the help of some materials like writing materials, tape, chalk powder, etc. Details measurements are given in figure. Traffic volume count are conducted at week days. This traffic volume count is converted into PCU's.

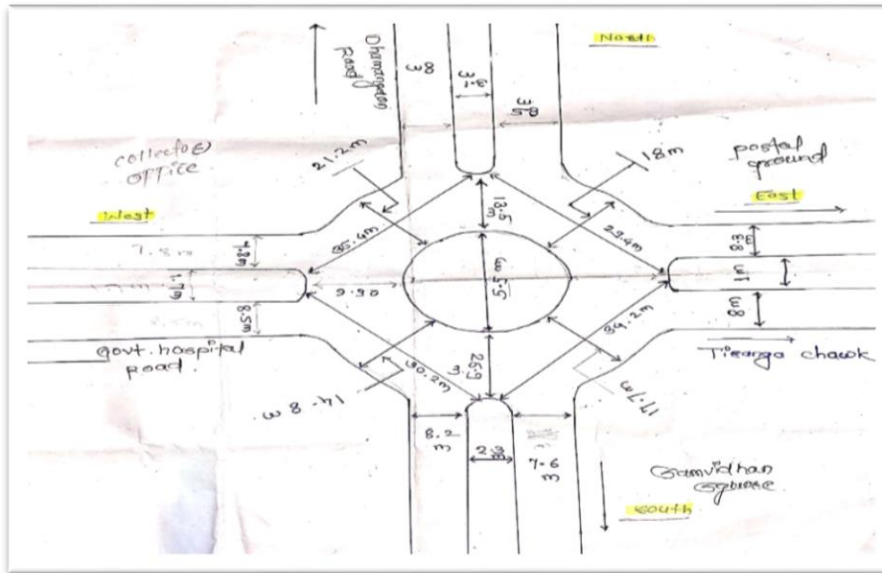


Fig.3 Existing Rotary Intersection at LIC Square, Yavatmal

2.2 Traffic Volume Count

Traffic volume count are carried out by manually at LIC Square, Yavatmal from our project group members in peak hours for particular time here traffic volume is more in peak hour as compared to other time. We are taken traffic volume for each road separately. These roads are Bus stand road, Govt. hospital road, Dhamangaon road, Tiranga chawk which are shown in fig 2. Traffic volume count are given below in table.

Bus stand road:

Sign of Road Route	←	↑	→	Total	Time
	Left	Straight	Right		
	Bus stand to Govt. Hospital road	Bus stand to Dhamangaon	Bus stand to Tiranga chawk		
Car, Van, Jeep	280	424	304	952	4:00pm to 6:00pm
Motorcycle	368	952	248	1568	4:00pm to 6:00pm
Bicycle	18	21	10	49	4:00pm to 6:00pm
Bus, school bus	09	13	07	29	4:00pm to 6:00pm
Three wheelers, Auto	128	178	144	450	4:00pm to 6:00pm
Heavy vehicles	08	19	6	33	4:00pm to 6:00pm

Government Hospital Road:

Sign of Road Route	←	↑	→	Total	Time
	Left	Straight	Right		
	Govt. hospital road to Dhamangaon road	Govt. hospital road to Tiranga chowk	Govt. hospital road to bus stand		
Car, Van, Jeep	184	216	244	644	4:00pm to 6:00pm
Motorcycle	412	534	377	1323	4:00pm to 6:00pm
Bicycle	12	09	07	28	4:00pm to 6:00pm
Bus, school bus	19	13	06	38	4:00pm to 6:00pm
Three wheelers, Auto	152	129	166	447	4:00pm to 6:00pm
Heavy vehicles	09	06	04	19	4:00pm to 6:00pm

Dhamangaon Road:

Sign of Road Route	←	↑	→	Total	Time
	Left	Straight	Right		
	Dhamangaon to Tiranga chowk	Dhamangaon to Bus stand	Dhamangaon to Govt. hospital road		
Car, Van, Jeep	258	394	286	938	4:00pm to 6:00pm
Motorcycle	412	1008	352	1772	4:00pm to 6:00pm
Bicycle	18	14	08	40	4:00pm to 6:00pm
Bus, school bus	05	09	04	18	4:00pm to 6:00pm
Three wheelers, Auto	104	162	134	390	4:00pm to 6:00pm
Heavy vehicles	03	07	04	14	4:00pm to 6:00pm

Tiranga Chowk:

Sign of Road Route	←	↑	→	Total	Time
	Left	Straight	Right		
	Tiranga chowk to Bus stand	Tiranga chowk to govt. hospital road	Tiranga chowk to Dhamangaon road		
Car, Van, Jeep	224	208	188	620	4:00pm to 6:00pm
Motorcycle	544	574	354	1472	4:00pm to 6:00pm
Bicycle	07	05	03	15	4:00pm to 6:00pm
Bus, school bus	03	04	03	10	4:00pm to 6:00pm
Three wheelers, Auto	190	162	146	498	4:00pm to 6:00pm
Heavy vehicles	03	04	04	11	4:00pm to 6:00pm

Total traffic volume count:

Vehicles	Bus stand road	Govt. Hospital Road	Dhamangaon road	Tiranga chowk
Day/Time	Wednesday 04:00 to 06:00pm	Wednesday 04:00 to 06:00pm	Thursday 04:00 to 06:00pm	Thursday 04:00 to 06:00pm
Car, jeep, van	952	644	938	620
Motorcycle	1568	1323	1772	1472
Bicycle	49	28	40	15
Bus, school bus	29	38	18	10
Three wheelers, auto	450	447	390	498
Heavy vehicles	33	19	14	11

2.3 Data Analysis

- Traffic volume survey was conducted for days in week. This traffic volume count is analysis manually and calculated during peak hour of day. This data tabulates with help of MS-Word, MS-Excel. The with help of MS-Excel plot a graph of traffic volume in a day.
- When we analysed traffic volume in a day with the help of traffic volume survey and graph, we noticed that traffic volume is more in peak hour and in off peak hour traffic is less as compared to peak hour traffic volume.
- After calculating traffic volume count, we multiplied by PCU factor to traffic volume count then we got maximum PCU for hour which is 4440.5 PCU/Hr.

2.4 PCU Calculation

vehicles	Traffic volume count	PCU Factor	PCU/Hr
Car, Jeep, Van	1577	1	1577
Motorcycle	3067	0.5	1533.5
Bicycle	66	0.5	33
Bus, School Bus	52	2.2	114.4
3-Wheelers, Auto	892	1.2	1070.4
Heavy Vehicles	51	2.2	112.2
Total			4440.5 PCU/Hr

Traffic Volume count Photos:



Fig.4 Manually traffic volume count

3.CONCLUSION

After surveying area, we noticed that here traffic is more in peak hour due to this reason there is lot of traffic jams on that intersection so we are decided to study on that area for the complete information so we are selected LIC Square, Yavatmal for the project which is study and analysis of Rotary intersection at LIC Square, Yavatmal.

- Firstly, we are taken measurement of four road in all direction for complete information, from this information we noticed that measurements of all four roads are different so here need to give proper dimension of road.
- After that we are taken traffic volume count in peak hour of each road such as Bus stand road, Government Hospital Road, Dhamangaon road, Tiranga chowk, from this traffic volume count we observed that it is more in peak hours, then calculating PCU of intersection that is 4440.5 PCU/hr. From the guidelines of IRC, when PCU of roads are maximum about 3000 vehicles per hour so here need to redesign.
- IRC suggest that a rotary can handle maximum traffic volume of 3000 PCU/Hour. So, from analysis we can conclude that the existing rotary is not cable to handle maximum traffic volume.

Other solutions:

- We can redesign rotary intersection to avoid traffic congestion, head collision, accident, etc.
- We can use directional sign for giving proper flow of traffic on this intersection.
- Also, we can provide traffic signal to handle the traffic volume in peak hour as well as throughout day.

REFERENCES

- [1] S.K. Khanna, C.E.G. Justo, A Veerangaram, Highway Engineering, Revised 10th Edition, Neem Chand & Bros. Roorkee.
- [2] Dr. L.R. Kadiyali, Dr. N.B. Lal. Principal & facilities of Highway Engineering – 7th edition, Khanna Publisher's Delhi.
- [3] S.K. Mahajan, New Concept of Traffic Rotary Design at road Intersections Science Direct 96 (2013) 2791-2799.
- [4] Saurabh Gupta, Solution for Reduction of Traffic congestion at Polytechnic Roundabout, Bhopal, IJSRD vol.5 issue02, 2017.
- [5] Shivam Kushwaha, Evaluation of Traffic Rotary & Design of Traffic Signal at Habibganj, Naka Bhopal, IJSRD/vol.3 issue06, 2015.
- [6] Chandrakant Patel, Capacity Estimation Approaches for roundabouts: A Review ISSN (online): 2349-784X.
- [7] C.N. Gawli, Comparative Study of Signalized Intersection and Rotary for effective Traffic Management IJMTEI vol. 9, issue I, 2019.
- [8] Akhilendra Singh, Designing of Rotary Intersection Using AutoCAD Civil 3d Software IJTIMES, vol.5 issue 08, 19.
- [9] Siteshkuar Singh, Statistical analysis of traffic of rotary intersection IJESRT, Feb, 2017.
- [10] S. Vansantha Kumar, Design of a rotary for an uncontrolled multi-leg intersection in Chennai, India IOP, 14th ICSET 17.
- [11] Chandrakant Patel, Performance Analysis of Roundabouts under Mixed Traffic Flow Conditions ISSN (online): 2349-784X
- [12] Pankaj Thakre, Design and Safety Evaluation of Highway Intersection Using Vehicle Simulation Mode IRJET voln 05 ISS 04/2018
- [13] Ankit Bansal, Investigation of Capacity and Causes of Congestion at Rotary Intersection: A Case Study of Kulula Pushtasquare Kabul, Afghanistan ResearchGate Conference Paper · April 2016.
- [14] www.irjet.net
- [15] www.ijert.org