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STUDY AND IMPROVEMENT OF TRAFFIC SYSTEM AT LOHARA INSTERSECTION MIDC, YAVATMAL

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Abstract

Rapid growth of vehicles population has resulted in traffic congestion at the intersection when there is absence of certain assets like traffic signals. This project studies the traffic studies where carried out and measurements were taken at the lohara , MIDC square which is a skew intersection in order to design traffic signal. The main objective of the traffic signal design has to reduce congestion problems and accident and conflicts points etc. The increasing traffic volume at intersection has been rise which has results many problems. The traffic volume studies are to be made to determine numbers, movements and classification of vehicles at a given location. The counting of vehicles are done by manual method. This counting is then converted into single factor called passenger car unit. The design of traffic signal is done according to IS recommendation. the optimum cycle time for traffic signal design is determined by Webster method.

Index Terms: *Traffic signal, Passenger Car Unit, Traffic Volume, Webster's Method*

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1. INTRODUCTION

In the light of providing safety, smooth operation and effective traffic management system in urban road intersection the present study is initiated. Urban traffic is increasing day by day and creating several issues related to time management traffic since, understanding of traffic rules and operation. The problem of traffic is conflict one requiring design, planning, engineering and institutional inputs for developing proper solution. A real time problem of the skew intersection at Lohara M.I.D.C. Yavatmal city has some issue regarding traffic management. It is necessary to survey, analyze and design a traffic system pertaining to engineering. A traffic signal is an alternative form of intersection for traffic control. Traffic signals are one of the most effective and flexible active control of traffic and is widely used in several cities world-wide.the conflicts arising from movements of traffic in different directions is addressed by time sharing principle.

1.1 Study Area

At the mid place of Lohara i.e. Lohara skew intersection having very high density of Traffic due to all four roads like from A, bypass , city road , D roads meets at a one point. We investigate the problems from the experience of drivers and the traffic polices etc. and measured the whole area by Measuring Tape. The Lohara intersection is situated at N 20' 23' 25.1448" E 78^0 5'30.7788".

It is Important to provide traffic signal at Lohara skew intersection because there is no proper Traffic Management system except Island but these Island are not in proper working. The Peoples are not following the Traffic Rules. In Present Situation the design is not properly so that to create problems likes Traffic Jams, Collision of Vehicles and Time Consuming. Because of this problems are created we decided to design Effective Traffic signal System.

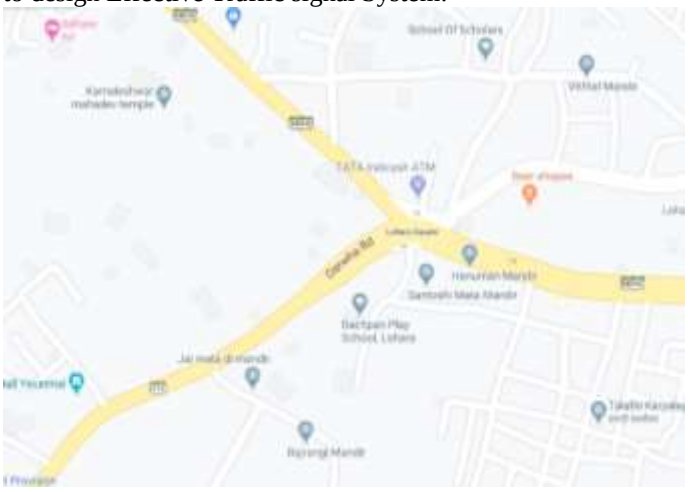

Fig-1: study area (Lohara Intersection)

2. LITERATURE REVIEW

These problems can now only be solved by providing an efficient control at intersections which is achieved by provision of light system at intersections for continuous and efficient movement of vehicles through the intersections ise a problems like road accidents, conflicts and congestions.In step with light, signal timing is most significant which is employed to make your mind up green time of the light shall be provided at an intersection and the way long the pedestrian walk signal should be provided. Traffic volume studies are to be made to see the amount, movement and classification of vehicles at the given location. These data is employed identify normal flow of the road; determine the influence of heavy vehicles or pedestrians on vehicle traffic volume. The length of the sampling period depends on the sort of count being taken. in step with manual count with 15-minute intervals can be accustomed obtain the traffic volume data. The collected data is converted into PCU units.

3. METHODOLOGY

Webster's Minimum Delay Method

The Webster's method of stoplight design requires estimation of traffic demand (q) on all approaches of the intersection for all movements (straight, left and right turning movements) and also the saturation flows (s) of the approaches. Saturation flows are estimated supported lane width, with flow ratio defined because the ratio of traffic demand rate of flow to saturation rate of flow of individual lane groups. These parameters are accustomed estimate signal cycle length, which is that the time required for complete signal sequence. The cycle length includes the green time plus lost times on all phases. during this method, the optimum signal cycle appreciate the minimum total delay to the traffic at the signalised intersection is obtained after detailed studies of cycle time and delay vis-a-vis the traffic volumes approaching the intersection. this can be considered to be a rational approach because it incorporates a mathematical basis.

The optimum signal cycle C_0 is given by,
$C_0 = (1.5L+5)/(1-y)$
Here,
L= Total lost time per cycle in seconds = 2*n+R
Where,
n is the number of phases based on traffic signal installations on the approach road and 2 is the lost time for the phase and R is the all red time in seconds.
If,
$Y=y_1+y_2+y_3+\ldots\ldots$
Where, $y_1 = q_1/S_2$, $y_2 = q_2/S_2$
Then,
$G_1= (y_1/Y)*(C_0-L)$
$G_2= (y_2/Y)*(C_0-L)$

3.1 Data collection

Data collection is that the major effort for the execution of project. As for instance, to analysis the traffic volume, traffic survey must be applied, to analysis the traffic safety parameters, traffic accident data must be obtained, etc. The traffic data is collected by manual method by counting the amount of various styles of vehicle approaching to the intersection from all the four directions so converting the values in to the factor called carriage Unit (PCU).

4. RESULT

Design traffic volume on leg 1: 620
Design traffic volume on leg 2: 399.5
Design traffic volume on leg 3: 699.5
Design traffic volume on leg 4: 743.5
Each approach has 2 lanes each

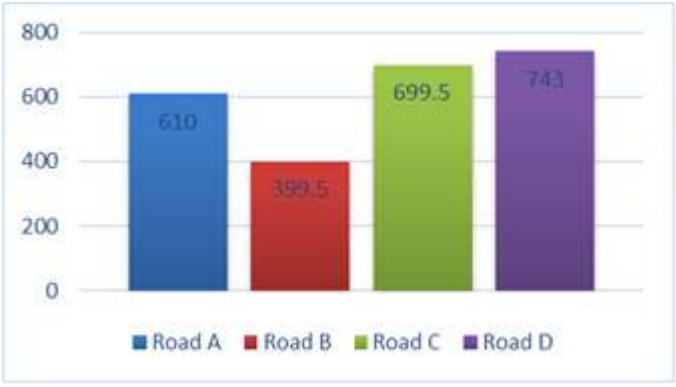

Fig-2: volume density at Lohara intersection (4/10/2019, Thuesday, 5.00 PM to 6.00 PM)

Table-1: Width of Road

APPROACH	ROAD	LEG	WIDTH(M)
AMARAVATI	A	1	15.6
WAGHAPUR	B	2	6.3
DARDA NAGAR	C	3	13.2
DARWHA ROAD	D	4	11.2

Approach volume per lane on leg 1: 310(q_1)

Approach volume per lane on leg 2: 195.25(q_2)

Approach volume per lane on leg 3: 349.75(q_3)

Approach volume per lane on leg 4: 371.75(q_4)

Saturation flow on leg 1: 525*7.8 = 4095(S_1)

From IRC 93-1985, for width from 5.5 m to 18 m for lesser width the value may be obtained from Table
Saturation flow on leg 2: 1850(S_2)

Saturation flow on leg 3: 525*6.6 = 3465(S_3)

Saturation flow on leg 4: 525*5.6 = 4575(S_4)

$y_1 = q_1/(S_1)$ = 620/4095 = 0.15

$y_2 = q_2/(S_2)$ = 390.5/1850 = 0.21

$y_3 = q_3/(S_3)$ = 699.5/3465 = 0.20

$y_4 = q_4/(S_4)$ = 743.5/4515 = 0.16

$Y = y_{1+}\ y_{2+}\ y_{3+}\ y_4$ = 0.72

L = 2n+R = (2*4 + 14= 20

Therefore,

Co = (1.5*L)+5/1-Y

Co = (1.5*20)+5/1-0.72

Co = 125 sec

G1 = Y1/Y*(Co-L)

G1 = 0.15/0.72*(125-20) = 22 sec

G2 = 0.21/0.72*(125-20) = 94 sec

G3 = 0.20/0.72*(125-20) = 91 sec

G4 = 0.16/0.72*(125-20) =97 sec

Table -2: Signal Timing For Road

Route	Green Time	Amber Time	Red Time
Route A	22	4	99
Route B	31	4	90
Route C	30	4	91
Route D	24	4	97

Phase Diagram:

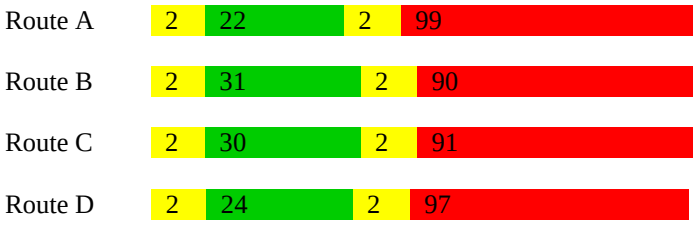

Fig 3: Phase Diagram of Signal Timing

5. CONCLUSION

While the study of traffic light we see the many parameters were monitored, evaluated and analyzed to grasp the traffic improvement necessities to be implemented or adopted. Traffic parameters are the most important element for the analysis of the traffic capacity. during this study, we had analyzed the traffic be due each of the route at Lohara intersection such A to C, A to D, etc. After the study of the traffic capacity and volume features for the planning of traffic light at Lohara intersection, Yavatmal following results were observed

- Total cycle time required in seconds=125 sec
- Actual green time for leg 1= 22 sec
- Actual green time for leg 2= 31 sec
- Actual green time for leg 3= 30 sec
- Actual green time for leg 4= 24 sec

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