STUDY` OF TRAFFIC CONGESTION & CONTROLLING STRATEGIES AT RAMLEELA SQUARE, VIDISHA (MP) MP SH 19

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Abstract : Congestion impacts the movement of people. Traffic congestion not only causes pollution, but also wastes time and energy of the people. Traffic congestion is a main urban transport issue. Due to traffic congestion, there is likelihood of accidents because of unfair traffic management. To eliminate road accidents and to save valuable human life it is necessary to find proper solution for traffic congestion. The main objective of the study is to recognize the concrete cause behind the congestion and suggest the practical solutions at Ramleela square SH 19 Vidisha city to reduced congestion. The aim of the study is to suggest a strategic vision, conceptual framework of the methodology, logical sense and guidance on some practical idea to reduce congestion in such way as to lessen its overall blow on individual and civilization. The conservative as well as habitual approach construct new road is a momentary relief but it does not work always for variety of reasons like political, surroundings, monetary, moreover it may support the development of new vehicles and forced occupancy. Considering the regulation and infrastructure gap on city road this first study explain the factor causing the congestion on the city road and after that suggest some recommended measure like redesign the road, executing the regulation for road users. The effect of traffic congestion on the study area are time consuming, Delay movement, Accidents, lack of ability to forecast travel time, Fuel utilization, Road anger and environmental pollution. Practical Possible solutions to traffic congestion on the case study region are to: Dialyze the Road, Provide sufficient Parking Space, build proper Drainage system and Install varies traffic Control Devices. In this study we have investigated various possible solutions to reduce the traffic congestion of the Ramleela square in Vidisha city.

IndexTerms **– Congestion, practical solution, traffic control devices, traffic management .**

I. INTRODUCTION

Most of the cities in Country like India are experiencing multi-faceted problems because of the rapid development and sudden growth in the private transport. Traffic Congestion on the urban roads is afflicting means of transportation stockpile in India, and affects the urban economies in unusual ways. Congestion may be defined as surplus demand for trip over its supply. In fact, the reason why governments are forced to revisit their policies for urban transport just because of increasing demand of travel with in limited available services like public transports. The incident of congestion on the city transportation prevents the movement of traffic and leading to the unbearable increase in the trip delay. Congestion problems appears with the long term, so if the traffic on the roads is acceptable these days, due to growth and the raise in number of cars the roads will bring the new traffic volumes, and jamming problems will occur again.

Vidisha City is the nucleus of the greater Vidisha regions and all of the divisional head office of corporate offices, the higher educational facilities (one public universities, one public medical college, one public engineering college, two more colleges, many private hospitals and clinics, government colleges and schools), so many business shopping complexes, and seven temples are located in or around the Vidisha city. According to Bureau of Statistics the total population of this area was about 15 lakh. The speedy and unrestrained developments of vehicles have created the increase in transportation demand, which resulted in traffic congestion and environmental degradation. To achieve at a symmetry level between the demand and the supply of transport and traffic system, it is required to implement traffic engineering and transport planning measures on the basis of scientific studies. Traffic and transportation problems in vidisha City have not been commensurate with the increasing demands for its usage.Against the serious existing problem this paper have introduced some practical and logical solutions for vidisha city like-changing the route system, regular monitoring, suitable parking management system, demand of public transport, which are supportable from both the way, physically and economically for local govt. Therefore we are regularly occupied in searching for traffic answer that will give not only smooth mobility, but also provide economic productivity and livable environment.

II. OBJECTIVE

- The main objectives of this research are to identify the possible traffic congestion management techniques.
- To study the various methods with the help of which congestion can be reduced.
- To find the total traffic approaching to the intersection.
- Improve roadway capacity and reduce traffic congestion in the intersection area and side streets.
- Improve safety and access for pedestrians who pass through the intersection.
- To Design two- Phase traffic signal by IRC and Webster method and compare both methods.
- To define the problem of traffic congestion like delay in traffic, wastage of time, reckless driving etc.

III. LITERATURE REVIEW

Soham Sarda et al (2018) studied that congestion impacts the movement of people.. The major factor for traffic congestion in Hinjewadi today is the imbalance seen in its Modal Split Ratio - a very low ridership in public transport due to poor service quality and less frequency - which leads to an increase in the number of private vehicles causing congestion which further leads to an increase in travel time and emission of exhaust gases causing air pollution.. The Origin-Destination matrix was drawn and the visuals were created using VISSIM Software. Solutions for increasing congestion in the area are given by suggesting optimal infrastructural changes, enhancing the use of public/semi-public transportation, and increasing the Occupancy Factor of vehicles. The future development of the IT-sector and the impact of Pune Metro Rail are also taken into account.

Ankush Kumar et al (2017) studies Traffic Congestion and Possible Solutions in Urban Transportation System In rapidly growing cities of country like India, the increasing private transport and high movement of the population toward urban cities leads to problem of congestion, which further leads to complications and hazard on the cities roads. Indian cities already suffering with huge deficiencies in term of infrastructures as well as in operational efficiencies. Considering the policy gaps on country roads this paper first describes the factor causing the congestion and after that presents some recommended measures to reduce the congestion on the city roads.

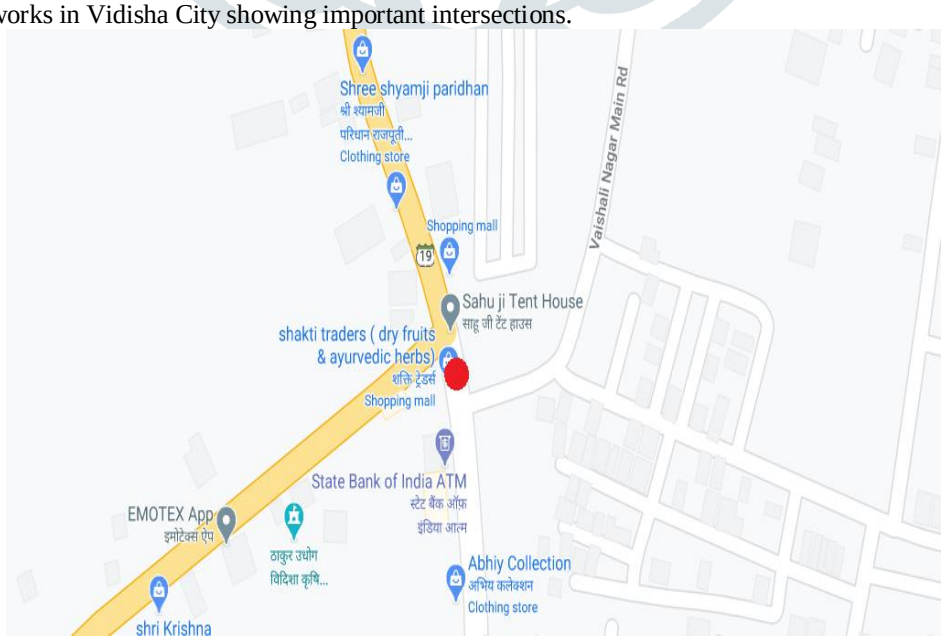
Satyanarayana (2012) studied the effect of traffic volume, its composition and stream speed on passenger car equivalents. Method proposed by Chandra is used for developing the PCU factors and found that for two axle trucks PCU values are found to increase with an increase in compositional share of respective vehicle types in the traffic stream. The PCU of two wheelers practically remains unaffected by its compositional share in the traffic stream. Compositional share of 2W at different locations were observed in the range of 31.69% to 34.23% whereas increase in PCU values are 1.1% only and it may be attributed due to high maneuve rability. In 25 slow moving traffic PCU values of bullock carts are increasing with the decreasing in the compositional share in the stream.

IV. METHODOLOGY

Stage-1, Selection of Study Area: - In this various literature papers have been studied.
Stage-2, Zoning of study area:- The first step selecting the indicator to highlight the congestion that is the flow diagram, and snapping the images.
Stage-3, Data Collection: - The data has been collected through survey method-counting the vehicles movements in peak hours.
Stage-4:-Snapping the images at peak hour and also non-peak hour to show comparison of different situation on different time.
Stage-5, Questionnaire Survey:- To know the actual situation and get possible suggestions about the problem of listed questions have been asked among 60 peoples randomly which are pedestrians, bus drivers, vehicle owners, and retailers since 4 days.
Stage-6, Data with different source:- The secondary data have been collected from journals available on internet, R.T.O Office, Bus Association Office about vehicles number, Bus number are running on city road for daily purpose.
Stage-7, Data analysis & Result:-All the methods are carried out in systematic way first data collection, data processing, data analysis, and last presenting the data in a right way.

V. SELECTION OF STUDY AREA

Vidisha City, is situated at the northeast portion of the state with latitude of 23.53◦N and longitude of 77.820E. The study area selected for this study comprises 26.50 sq. km of central urban portion of Vidisha City. For the analysis of regional transportation activities, the study area is divided into two regions which are designated as origin & destination points. Fig. indicating road networks in Vidisha City showing important intersections.



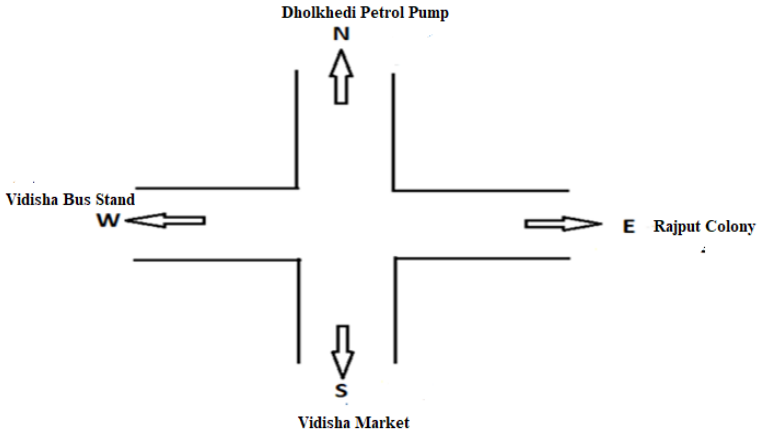
Map of Ramleela Square Vidisha

VI. TRAFFIC VOLUME COUNT

A traffic count is a count of traffic along a particular road either done electronically or by people counting by the side of the road. Traffic counts can be used by the local council to identify which routes are used most and to either improve that road or

provide an alternative if there is an excessive amount of traffic. The most important data are generated through the modern survey techniques like traffic volume count at different links and intersections. The extent of variation of traffic flow was ascertained by carrying at peak hour counts at intersection. By analyzing the Peak hour traffic volumes, the period of peak flows are assessed. Traffic volume counts were performed at one major intersection and 4 important links only in the period of peak flows as assessed by peak hour traffic volume count. The traffic volume is expressed as passenger car unit per hour (PCU/h).

Survey Images

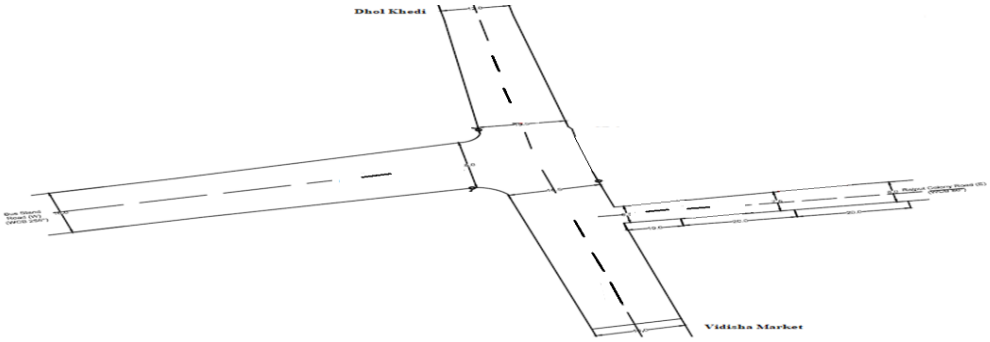


The traffic data collected from manual counting is later converted into a common factor called Passenger Car Unit (PCU). The traffic volume counted for 7days of the week and the peak traffic data is considered for the next step of calculation. The maximum traffic volume from the table is selected and show in table below.

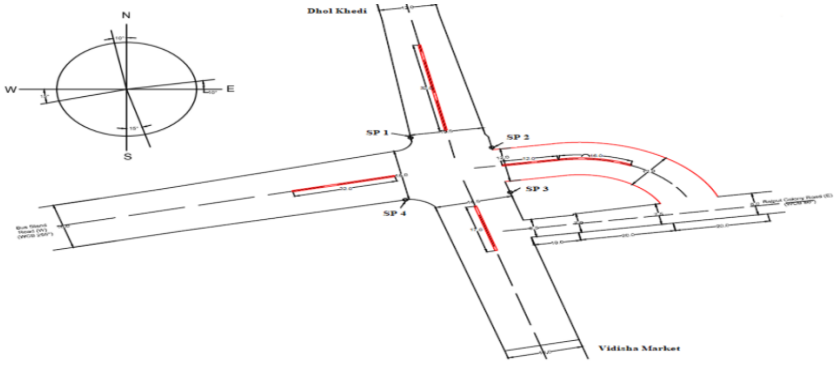
Approach	Left	Straight	Right	Total
Dholkhedi Petrol Pump (N)	**212**	**474**	**615**	**1301**
Bus Stand (W)	**594**	**228**	**395**	**1217**
Vidisha Market(S)	**215**	**432**	**156**	**803**
Rajput Colony(E)	**218**	**155**	**506**	**879**
Total	**1239**	**1289**	**1672**	**4200**

From the data collected it was observed that the total traffic volume of Ramleela Square approaching from all the legs of the intersection is 4276 PCU which can be clearly seen as an extremely high volume.

According to irc-65-1976-recommended-practice total volume of about 3500 vehicles per hour can be considered as the upper limiting case and a volume of 500 vehicles per hour is the lower limit. So in this case signalized intersection can be provided which is suggested in this study.



ACTUAL LOCATION OF RAMLEELA SQUARE



PROPOSED PLAN OF RAMLEELA SQUARE

VII. TRAFFIC SIGNAL DESIGN

Design IRC Method: - For Road 1 and Road 2
Step-i:-
Given data: - Road width, street 1=16 m and street 2=18m
PCU / hour, street 1=803 and street 2=1217
IS code method
Critical lane volume of street 1= higher of two approach
=803/2= 402 PCU/hour
Critical lane volume of street 2= higher of two approach
=1217/2 =609 PCU/hour

Step-ii: - pedestrian crossing time,
Pedestrian clearance time for street1 = 16/1.2= 13.33 sec
Pedestrian green time for crossing street 1= 13.33 + 7= 21 sec
Pedestrian clearance time for street 2 =18/1.2= 15sec
Pedestrian green time for crossing road 2 = 15+7 = 22sec
Step-iii: - Minimum green time for traffic,
Minimum green time for vehicle on street 2 = 22 sec
Minimum green time for vehicle on street 1 = 609/402 *22= 34 sec
Step-iv: - Revised green time for traffic signals,
Addinginitialamberandclearanceof2secondseachforminoraswellasmajorstreetapproaches.
The minimum cycle length works out to
= (2+22+2) + (2+34+2) = 64 sec.

Signal cycle time may be conveniently set in multiples of five seconds and so cycle time = 65 seconds
Extra time (65-64= 1 sec per cycle) is provided adding 1second to road 1
Therefore Adopt, G1 = 34+1= 35 sec
G2 = 22 sec

Table showing timing of traffic Signal for Street 1 and 2

Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 1	2	35	2	22	61
Street 2	2	22	2	35	61

For Road 3 and Road 4
Step-i :-
Given data: - Road width, street 3=15.5 m and street 4=12 m
PCU / hour, street 3=1301 and street 4=879

IS code method
Critical lane volume of street 3 =1301/2= 651 PCU/hour
Critical lane volume of street 4 =879/2 =440 PCU/hour

Step-ii: - pedestrian crossing time,

Pedestrian clearance time for street3 = 15.5/1.2= 12.92 sec
Pedestrian green time for crossing street 3= 12.92 + 7= 20 sec
Pedestrian clearance time for street 4 =12/1.2= 10sec
Pedestrian green time for crossing road 4 = 10+7 = 17sec
Step-iii: - Minimum green time for traffic,
Minimum green time for vehicle on street 4 = 20 sec
Minimum green time for vehicle on street 3 = 651/440 *20= 30sec
Step-iv: - Revised green time for traffic signals,
Adding initial amber and clearance of 2seconds each for minor as well as major street approaches.
The minimum cycle length works out to
= (2+20+2) + (2+30+2) = 58sec.
Signal cycle time may be conveniently set in multiples of five seconds and so cycle time = 60 seconds
Extra time (60-58= 2 sec per cycle) is provided adding 1 second to road 3and 1 to road 4
Therefore Adopt, G3 = 20+1= 31 sec
G4 = 30+1 =21 sec

Table showing timing of traffic Signal for street 3 and 4

Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 3	2	31	2	21	56
Street 4	2	21	2	31	56

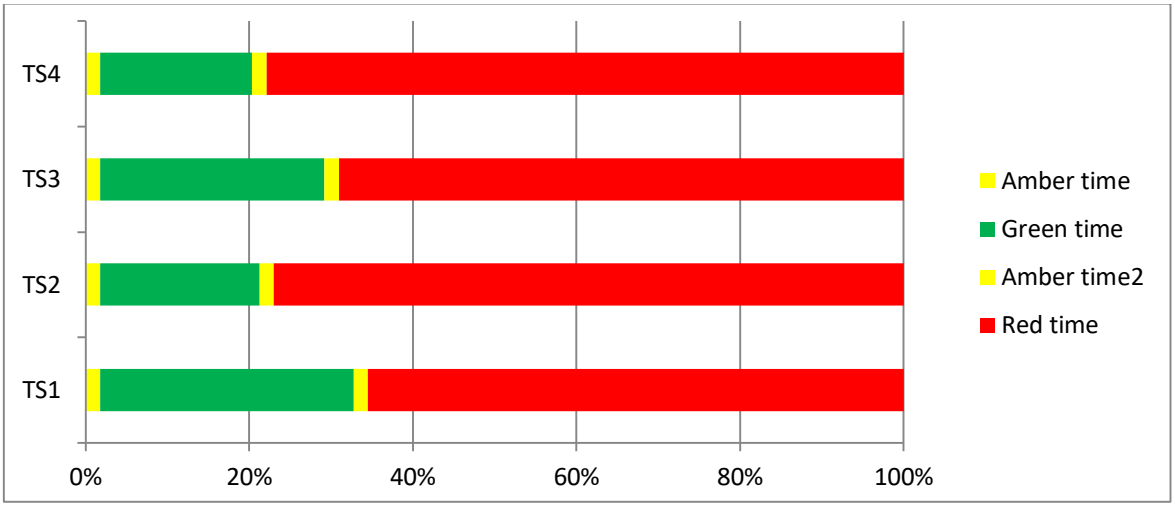
VIII. RESULT

The study shows the following results

- The entire traffic problem is occurring due to the high traffic volume of vehicles.
- The rotary is receiving an extremely high volume of 4200PCU/hour which is more than its practical capacity.
- The rotary parameters cannot be increased as it is located in constructed area.
- Four phase signal can be designed to allow the movement of one street in both directions by stopping the other street movement.
- IRC method is more efficient because it uses the main parts of both Webster and approximate method & pedestrian timings are also considered in this method.
- By using IRC method we can check our signal timing whether it is correct or not.
- The analysis of traffic volume shows that the rotary is experiencing the problem of high traffic volume that can cause various problems to the movement of vehicles and safety of vehicles and can cause conflict and fatalities of vehicle.

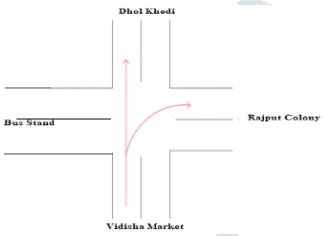
So, For the four phase signal the signal timing for Ramleela Square will be

Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 1	2	35	2	78	117
Street 2	2	22	2	91	117
Street 3	2	31	2	82	117
Street 4	2	21	2	92	117



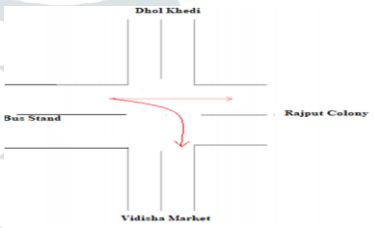
Graph Showing the Phase diagram of traffic signal

Phase 1



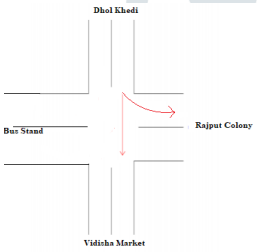
Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 1	_	35	2	–	117
Street 2	_	–	–	34	117
Street 3	–	–	–	12	117
Street 4	2	–	–	32	117

Phase 2



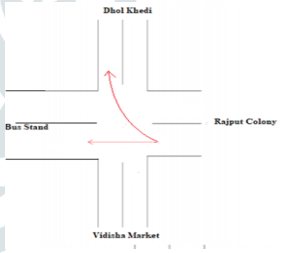
Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 1	2	–	–	17	117
Street 2	_	22	2	–	117
Street 3		–	–	29	117
Street 4	–	–	–	45	117

Phase 3



Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 1	–	–	–	8	117
Street 2	2	–	–	34	117
Street 3	–	31	2	–	117
Street 4	_	–	–	40	117

Phase 4



Street	Initial Amber	Green	Clearance Amber	Red	Cycle length
Street 1	_	–	–	22	117
Street 2	–	–	–	44	117
Street 3	2	–	–	26	117
Street 4	–	21	2	–	117

IX. CONCLUSION

Because of the above limitation, rotaries are not suitable for every location. There are few guidelines that help in deciding the suitability of a rotary. They are listed below.

1. Rotaries are suitable when the traffic entering from all the four approaches are relatively equal.
2. A total volume of about 3000 vehicles per hour can be considered as the upper limiting case and a volume of 500 vehicles per hour is the lower limit.
3. A rotary is very beneficial when the proportion of the right-turn traffic is very high; typically if it is more than 30 percent.
4. Rotaries are suitable when there are more than four approaches or if there is no separate lanes available for right-turn traffic. Rotaries are ideally suited if the intersection geometry is complex.

To study traffic operation at intersection and to verify and improve the existing characteristics where possible, one of the two important aspects investigated was the existing condition of intersection and its capacity and the second was the traffic load on the intersection. We have found that our proposed solution is most efficient solution for this type of problem in intersection

Conclusions

i. The intersection is receiving high traffic which cannot be handled by the existing system. Hence it is needed to increase its capacity. But the intersection is already at the level of the maximum capacity it can handle.

ii. It is also not possible to increase the parameter of intersection as the location does not allow this.

iii. Then the solution is that we have to reduce the traffic by applying any means.

iv. The noble way to reduce the traffic is to divide the traffic entering in the Intersection area.

v. Traffic can be divided by means of traffic signals. So it is suggested to install signal.

vi. The signal time of a four phase signal is calculated in the study.

vii. The existing road plan cannot handle the high traffic volume, so we have changed the plan of the existing roadway.

Major Conclusion:-

Utility:-

- This signal helps in reducing the traffic congestion of the intersection.
- It increases the traffic capacity of the area.
- This study helps in maintaining efficient traffic flow.
- The traffic signal will reduce the conflicts between the intersection.
- As the conflicts are reduce, so the chances of accidents also gets minimum.
- The auto rickshaw which stands on Rajput Colony road can be shifted to the Ramleela ground.
- The fruits and vegetables jam can also be shifted to Ramleela ground.
- Many shops in Ramleela Square advance their area beyond the proper limits which in terms reduces the road width and traffic congestion occurs.
- Some proper arrangements of parking can be provided in Ramleela ground.

X. REFERENCE

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