A Feasible Traffic Operational System for Complicated Traffic Sites

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Abstract

The important objective of the traffic engineer is to provide safety and fluency to the traffic regulation. The paper has lighten the provision of the best possible solution for the major intersection. A seven leg intersection has been taken for the study. Due to heavy increment in traffic volume the forecasted data fails to fulfill the requirement of the safer intersection. The intersection itself is regulated on the rotary traffic control system. An attempt is being carried out to provide the best feasible solution for the real time situation.

Keywords: Roundabout, ramp metering, traffic volume, complex intersection, Signalized Roundabout, Degree of saturation

I. INTRODUCTION

On the verge of ‘Swachha Bharat Abhiyan’, Day by day India is developing rapidly. Along with the development nation is also facing the vital problem of uncontrolled population. Nagpur is not the exception for both the cases. As now days the development rate in Nagpur has been increased, the major projects can contribute the tremendous amount of population. As a result there might be an increment in number of vehicles. The increase in number of vehicles increases the traffic density of the Nagpur city. Many times it results in the traffic congestion and accidents due to this rapid growth in vehicles. In most of the cases the forecasting of the many road structures will be unable to fulfill the required demand. The same situational ongoing study work is introduced in this paper. The Ram nagar intersection situated at the center of new Nagpur which is facing such kinds of puzzles in peak hours as there are seven numbers of roads whose traffic has been carried away by this intersection. The traffic simulation of the intersection will be carried out in traffic software by collecting the required real time data and the data used while designing the intersection. It is found that the roundabout is having degree of saturation more than one. Generally the this factor should be less than 0.80 hence to maintain the fluency in the traffic regulation. All parameters are totally dependent on each other i.e in some cases they are directly proportional and in some they are inversely. The intersection will also be modeled in the traffic software for the same data and the results will be compared. The feasible alternative for the particular intersection will be suggested at the end of this project work.

II. LITERATURE SURVEY

The work regarding to the aforesaid topic has been done on very small scale previously. There are several opinions related to the roundabouts. Many times roundabout becomes a dilemma for the traffic engineer. But according to the situation it plays an important role. Some of the researchers has given their opinions regarding to the complex intersection and roundabout which is very much beneficial for this study

A. Physical Parameters of Roundabout:

Harshad C Prajapati and Subhaskumar C Singh took a roundabout situated in Ahmadabad city which used to face a traffic volume of 11590 vehicles per hour. While facing this volume the roundabout is failing to fulfill the smooth regulation of traffic. After doing the survey and data collection the author came up with the suggestions that to provide the diversions for left turning vehicles as well as modification in the physical parameters of the real time roundabout.

B. Level Of Congestion And Respective Traffic Distribution:

Akmal Abdelfatah and Anil Minhans has fluently explained the dilemma about whether to provide the roundabout or the traffic signals for at grade intersection. They have carried out the research by using the universal software’s like SYNCHRO and SIDRA. The experimental work has been carried out for different congestion levels and different percentages of traffic distribution.

In this research work the analysis is done for three different conditions.

1) 25% traffic volume on each approach
2) Peak capacity traffic volume on one road in both directions  
3) The intersection is operated at full capacity in all the directions.

After performing the above conditions the authors concluded that the roundabout performs well in first two conditions i.e percentage of delay is less than traffic signals with the volume of 3000-4500 veh/hr. whereas the third condition proved that for the volume greater than 4500 veh/hr, the traffic signals are the better alternative.

C. Roundabout with Traffic Signals:

Marian Tracza and Janusz Chodur put some advantages and disadvantages of roundabout provided with traffic signals. Signals operated at two phase system can effectively regulate the traffic without any collision up to 8000 veh/hr. whereas the traffic signals greatly affects the vehicles diverting towards left as the storage space is utilized by all vehicles. The turbo roundabout with traffic signals will definitely improve the safety and efficiency of the intersection they said.

D. Behavior of Roundabout According to the Traffic Intensity:

Joe G. Bared and Praveen K. Edara has carried out the performance study of the signalized and signalized roundabout by using the both VISSIM and SIDRA software along with RODEL emphirical model. The concept of priority rule has been introduced while simulating the data in VISSIM. While collecting the data the physical parameters of the roundabout and the real time traffic parameters are collected. The major study is carried out on the traffic parameters like critical gap, follow up time and delay. While simulating the data the authors have varied the values of these parameters. Finally they come to know that while the roundabout is at below capacity flow condition, it acted as self-regulatory while as the saturation rate is increasing the unsignalized conditions are getting worse than the signalized conditions.

E. Ramp Metering in Roundabout:

D.G. Geers, P. Tyler, B. Hengst, E. Huang and D. Quail has raised the real time problem faced by the roundabouts due to the rapid growth in traffic volume. The major problem they have discussed about is the delay parameter. According to the authors the cause of delay is due to the disintegration of entry capacity of the roundabout due to the absence of critical gaps. For the study, they have choose the Yallah Roundabout in new south walse. The leg carrying enormous volume was subjected to the metering concept. Due to this the headway has been increased which results in the maximum successful merging of vehicles from other legs. It ultimately results in the decrement in the queue length.

III. METHODOLOGY

1) Best possible literature survey by going through books, technical papers carried out to understand the basic concept of the topic  
2) Identification of need of research  
3) Data collection  
4) Simulation of data in software  
5) Interpretation of result and conclusion

The particular work will be carry out by using the best suitable traffic software’s such as VISSIM. The collected data has to be run in the software for the three times for three different traffic control measures. The measure giving the best result will be adopted as a suitable traffic control measure for the real time condition. In addition to that the forecasting for the same intersection can be done and accordingly the traffic control measure can put into the use.

IV. CONCLUSION

From the above review paper it can be conclude that very few researchers have done the work regarding to the best probable solution for the complex intersection. No paper was found regarding to the intersection having more than four legs. The aforesaid project work will definitely help to resolve the problems faced by complex intersection and will bring fluency and safety to them.

REFERENCES