STUDY ON A MULTILEGGED INTERSECTION USING VISSIM IN BENGALURU CITY

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ABSTRACT

Bangalore Urbanization and industrialization there is an increase in traffic congestion. The volume capacity is increasing at peak hours in an intersection, it needs to be analyzed to provide a suitable solution. The congestion of the traffic demand in an intersection is based on dealy, low speed, excess travel time, and queue length of vehicles in urban areas. To perform analysis the selected junction is JSS CIRCLE. The required data i.e., geometric data, classified volume data, signal data, etc, are collected injunction. Theoretical collections are done by using INDO-HCM and HCM on volume data. The collected data is uploaded into the software and traffic modeling is done followed by calibration and validation to get accurate results as much as possible by VISSIM. The simulation is run through the software followed by the evaluation of the results. After getting the result, the main reason for causing the problems is found out and the possible alternatives are done to overcome the problem faced by the proposed junction. By implementing the alternative route or signal Timing injunction.

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Keyword: - *Traffic capacity, Signal timings, Signalized intersection, Level of service, PTV Vissim, HCM AND INDO-HCM*

1. INTRODUCTION

Bangalore one of the faster-growing cities, also known as India's Silicon Valley, there is a number of IT sector workers surviving. Since November 2014, Bangalore announced officially around a population of 11 million, making it the fifth most populous urban agglomeration in India. The number of vehicles registered in 2019 is somewhere at 82,53,218. The roads all around the city weren't built to handle such a huge influx of daily traffic. While the number of cars increased after the 'IT sectors in the city, the transport infrastructure didn't cooperate up with it. The majority of the people do not prefer public transportation. The drastic growth of the major issue facing in Bangalore in peak time hours there is rush in traffic its big problem for the works, students, etc. Delays are least caused in highways and rural road stretches, they are quite often experienced in the urban transport system. Hence urban traffic forms the concerned region to study delays caused for vehicles and pedestrians. Traffic delays are caused due to numerous factors like scarcity in road width, driver and pedestrian characteristics, vehicle composition, lack of road infrastructure, road condition and geometry, traffic signal management, and many more. Among the above factors contributing to delays improper signal timing or its management forms the main theft for the delays at a signalized intersection. Bangalore implemented the metro for public transportation to reduce traffic congestion but also facing the same problem in traffic.

2. OBJECTIVES OF THE STUDY

- ∞ Inventory survey of the location
- ∞ Traffic data collection- Geometric survey of road, traffic flow, existing signal timings
- ∞ Analysis of traffic data- signal timings
- ∞ Simulation modeling in PTV VISSIM
- ∞ Using INDO-HCM and HCM

3. METHODOLOGY

In this present study, the methodology is followed by a flowchart. Identification of problem along with the road network is determined, location for traffic survey is finalized, road inventory and condition survey is carried out. The traffic data is collected from the intersection by video graphic survey. The vehicular data and signal timings needed for the modeling in VISSIM software are then collected fed for the traffic modeling that includes calibration and validation. For the appropriate results, the simulation should be carried out. The results are obtained based on the requirements and with the results obtained, the alternative signals are installed to compare with the existing signal.

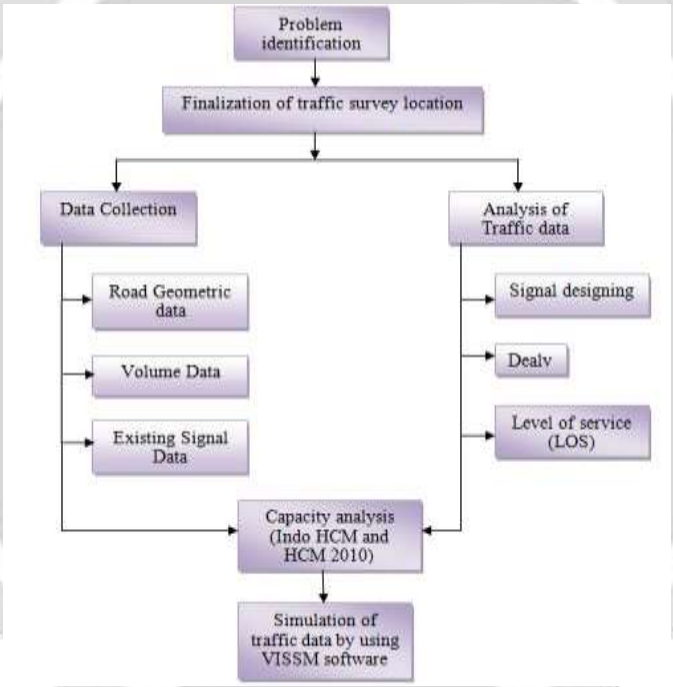

Fig-1: Flow chart of the map

3.1. STUDY AREA OF MAP

The site selection is based on the congestion of the traffic from the JSS circle along with its connection to multi-legs, and this is a signalized intersection. As the road connected more routes with commercial and industrial areas. In this stretch, huge traffic movement is there at peak hours in the morning and evening which leads to being delays in vehicular traffic.

Fig -2: Study area of the map

4. DEALY AND LEVEL OF SERVICE OF INDO-HCM AND HCM

The difference of dealy and LOS in the intersection by using some methods of INDO-HCM and HCM. After calculation, the results showed in below table

Table 1: Difference of Delay and LOS

DIFFERENCE OF DEALY AND LOS OF	INDO HCM	HCM
Intersection Delay in sec/PCU, D	**44**	**312**
Intersection LOS based on Delay	**C**	**F**

5. SIGNAL TIMINGS OF BOTH EXISTING AND RE-DESIGNED

5.1 EXISTING SIGNAL TIMINGS:

Collecting each phase green, amber, and red at 6 phases but one of the legs is a one-way moment. In the below fig we can see the collected information of signal phase

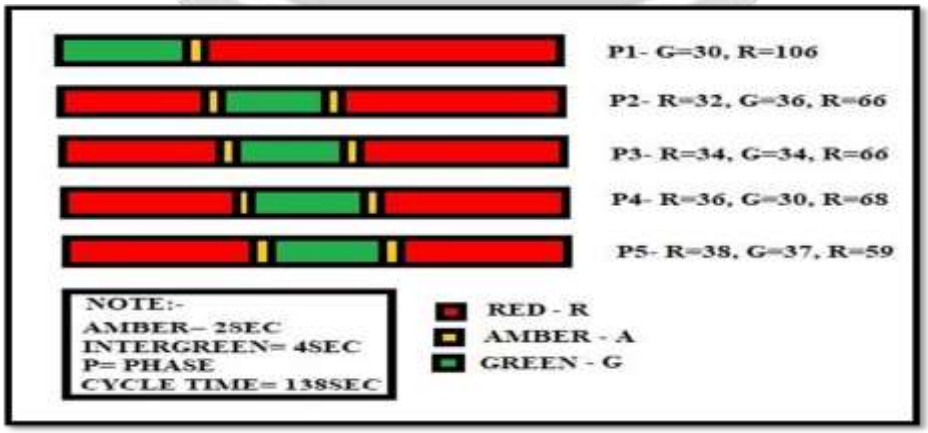

Fig-3: Existing signal phase

5.2 REDESIGNED OF THE SIGNAL TIMING

The signal design is done based on collected data using Webster's method. Each phase timing diagram is shown as red, green, and amber in seconds. In below figure mentioned the timings and cycle time.

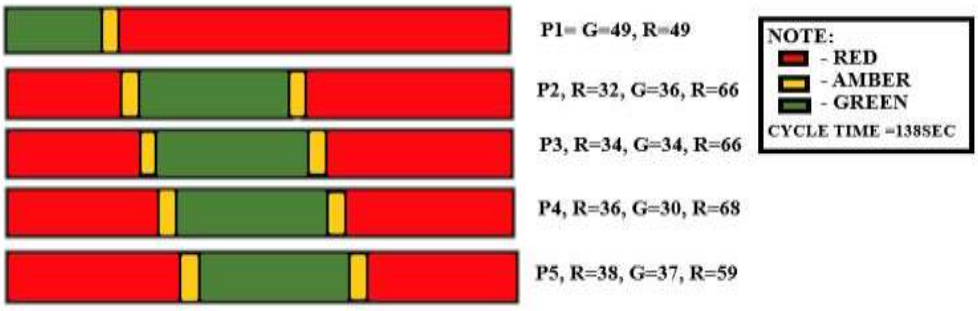

Fig -3.1: Re-design signal timing

6. VISSIM ANALYSIS OF DATA

6.1 Signalized Intersection

Fig-4: Setting of the signal timings

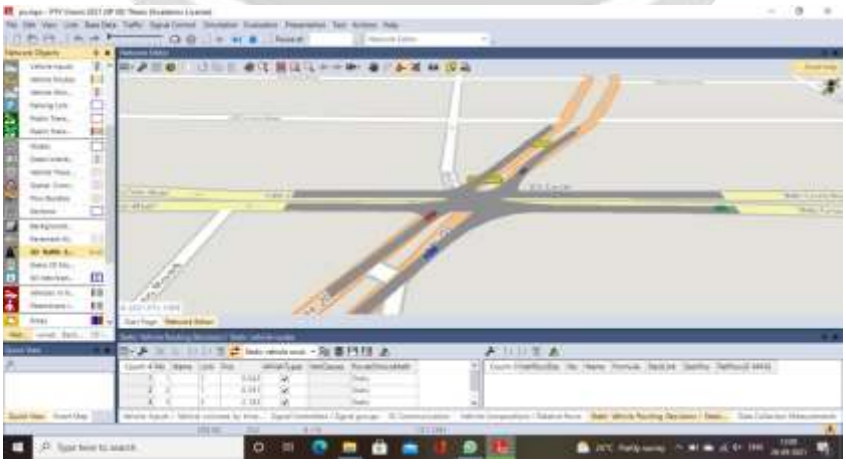

Fig-4.1: Simulation runs in 3D traffic

TABLE -2: Travel time results

Intersection Existing and proposed condition – Travel time results						
			For Existing condition		For Proposed condition	
DIRECTION	Count	Distance	Travel Time (sec)	Speed (m/s)	Travel Time (sec)	Speed (m/s)
Yediyur road	1	303.6	230.01	1.35	67.02	4.66
Kanakapura Road	1	465.09	76.85	6.45	68.23	6.95
Jayanagar road	1	331.31	245.61	1.42	38.02	8.89
BSK road	1	346.12	53.99	6.89	45.87	8.11

7. CONCLUSIONS

The comparison between signal timings, delay, and LOS of using HCM and INDO-HCM methods and also using VISSIM for better results.

- The current research focuses on short and long improvements at the JSS junction. The vehicle flow through each entry is determined by a traffic survey.
- The optimal signal cycle time corresponding to the shortest overall delay for all cars approaching the intersection is found, a signal is created using Webster's method, and two microsimulation models are developed using VISSIM utilizing these values.
- According to the simulation results, proper use of road lanes could improve the efficiency of that intersection. The first model is essentially a two-lane highway with no restrictions on left turns.
- Following the creation of these models, traffic signals are placed in each lane and the queue lengths are compared. An isolated lane for right turners reduces queue length by not interfering with straight-flowing vehicles.
- The absolute inaccuracy of the calibrated VISSIM model is minimal, fluctuating between 12 and 8 seconds/vehicle, and so it is expected to match actual field conditions.
- VISSIM underestimated the field delay by around 42 to 45 percent when the vehicle movement was modified to follow lane discipline while all other input parameters remained the same.
- Delay in the travel time has been not much difference in between F and C.

8. REFERENCES

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