Analysis of Intersection Delay of B2 Byepass A Study on Jaipur City

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***Abstract*: - This paper estimates the delays occurring at the intersection due to rapid heavy mixed traffic flow and urbanization in Jaipur city. In the meantime, there is also a need for understanding the different types of delay and how they each pitch in to the total delay of the entire intersection. In order to address these issues, this paper first examines the delay, taking into account the presence of heavy traffic flows that are frequently in developing countries, then establishes a method for calculating traffic delay and, last, proposes an approach to analyzing how much each of the various types of traffic delay contributes to the total delay of the intersection which has been applied extensively in the field traffic engineering.**

Keywords: Intersection, delay, traffic engineering, heavy traffic flow

I. INTRODUCTION

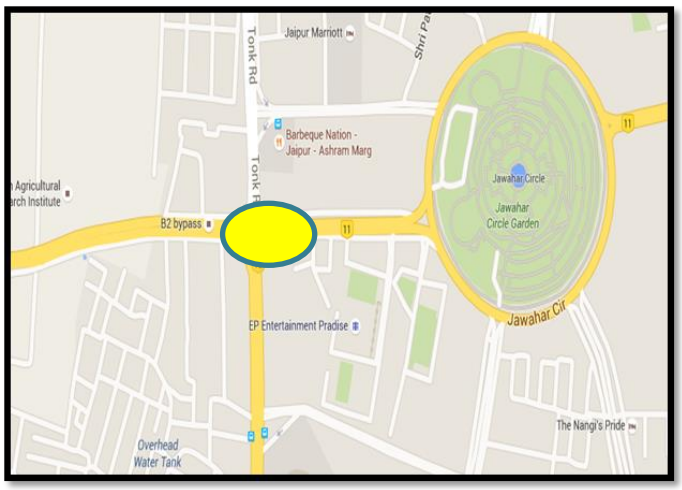
Traffic delay is defined as the additional time experienced by all the kinds of vehicle due to circumstances that obstruct the movement of traffic. It can be calculated as the time difference between actual travel time and free-flow travel time. The Intersection Delay Study is used to analyse the performance of intersections in allowing traffic to enter and pass through and turn into other route. This study will provide a detailed evaluation of delay at the intersection. The ability to accurately calculate vehicle delays at signalized intersections is a critical component for the planning, design and analysis of signal controls.

Intersection delay studies play an important role in traffic planning, signal control design and determining the level of service at signalized intersections. Signalized intersections are the important points within a system of highways. The most common measures are average delay per vehicle, and number of stops. Delay is a measure that most directly commune driver's experience and it is measure of extra time consumed in covering the intersection. Length of queue at any time interval is a useful measure, and is critical in determining when a given intersection will begin to pitch in the discharge from adjoining upstream intersection [1]. Delay is the most generally used measure of effectiveness for signalized intersections for it is directly perceived by a driver. The estimation of delay is complex due to mixed arrival of vehicles, lost time due to stopping of vehicle etc.

Very few studies only have been carried out to estimate delay at signalized intersections under mixed traffic conditions popular in developing countries viz. India. In the ongoing study, various problems related with delay estimation under mixed traffic conditions in Jaipur and the methods to minimize it and an attempt will be make to improve the accuracy estimating the same. The ability to accurately to calculate vehicle delays at signalized intersections is a captious component for the plan, design and analysis of signal controls. As a result of randomly varies in traffic flow and interruptions caused by traffic controls, delays that each vehicle experience at a signalized approach are often subject to highly probabilistic and time-dependent variation. Accurate estimation of the delays of individual vehicles at signalized intersections is also important for road design Traffic delays and queues are principal performance measures that enter into the determination of intersection level of service in the evaluation of the acceptability of lanes, and in the estimation of fuel consumption and emissions[2]. Since large no. of transport authorities decided that an acceptable Level of service is one of the basic factors to be fulfilled in signal control design, the obtained minimum delay being the most important goal to the traffic engineers.

II. STUDY AREA

Jaipur, a city located at the middle part of Rajasthan, is in rapid urbanization and industrialization. The capital of Rajasthan State in India is the tenth most popular city of the country. The study area is b2byepass because of more traffic flow and congestion



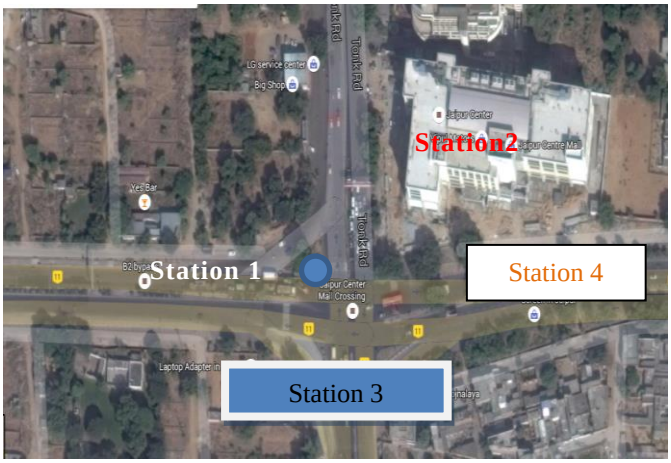


Fig1. Study Area

The above figure (1) shows intersection which is divided into 4 stations:-
Station 1 – Mansarovar
Station 2 – Durgapura tonk road
Station 3- Sanganer tonk road
Station 4 - Jawahar circle road

III. METHODOLOGY

Several steps are involved in this method are,when conducting this study at an intersection, the number of vehicles stopping should only be those vehicles that stopped completely. Vehicles which move through the stop should be counted in the Not Stopped sub-column. The study includes counting vehicles stopped in the intersection approach at successive intervals. A duration for these intervals range between 10 and 20 seconds long [3].

It is recommended to use four observers with the following tasks:

Observer 1 counts the number of vehicles which are completely stopped in the red phase at the intersection in the successive interval.

At the selected sampling interval (15 sec), the observer should record the number of stopped vehicles. A stop watch can be used with the proper intervals for counting the stopped vehicles. The vehicle is counted more than once in the delay determination if it is stopped during more than one sampling time. A particular vehicle will continue to be counted in all sample time periods during which it remains stopped at the intersection.

Note down the vehicle in queue counts in the study period should be assumed initially. At the end of the study period, the observer should continue following any queued vehicles until they exit the intersection.

Observer 2 holds the stopwatch and counts the successive interval to provide the correct data in a particular interval to the observ.

Observer 3 counts the number which crosses the intersection in the green phase in the successive interval.

Observer 4 performs a successive vehicle count of the approach volume by differentiating the vehicles as stopped or not stopped. Vehicles stopping multiple times should be counted once. This vehicle counting is conducted for the whole study.

A sample sheet is given below:-

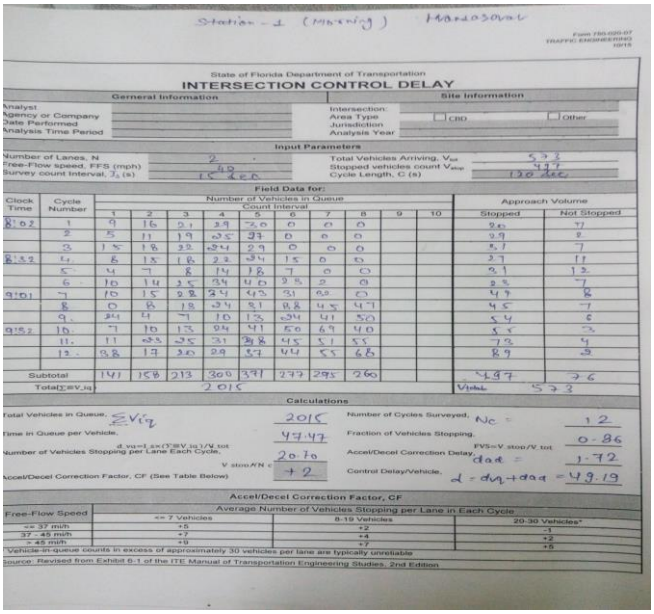


Fig. 2 Sample Data of Survey

IV. RESULT

Delay at intersections has been individually calculated are as follows:-

TABLE 1. DELAY AT INTERSECTION

Station	Time	Total delay per vehicle
1	8-10 AM	46.93
	4-6 PM	54.44
2	8-10 AM	51.40
	4-6 PM	56.80
3	8-10 AM	47.55
	4-6 PM	40.83
4	8-10 AM	42.50
	4-6 PM	43.77

The total delay time in seconds per vehicle is shown for the various stations and the time interval.

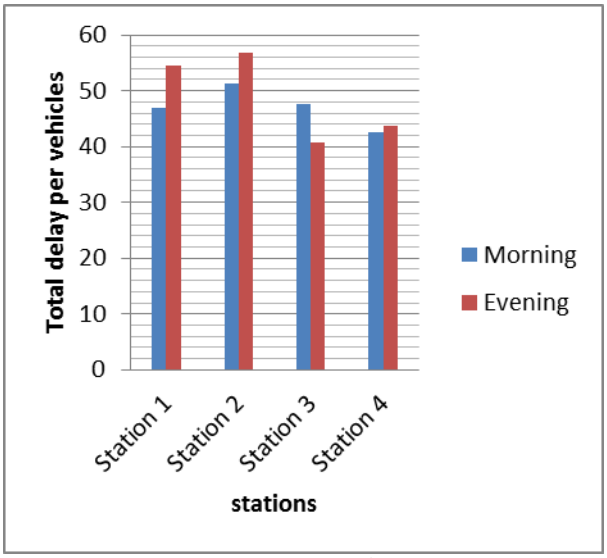


Fig 3. Graph of Delay

The figure (2) shows relation between total delay per vehicle and different stations. From above graph it can be concluded that max delay per vehicle in the evening time and in the morning time i.e., 56.80 and 51.40 respectively at the station 2.

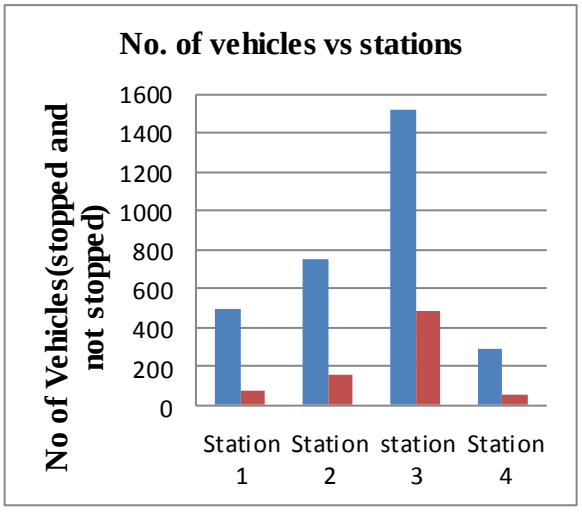


Fig 3. Graph of Number of Vehicles and Stations

The figure (3) shows variation of no. of vehicles (stopped and not stopped) and different stations in the **morning peak hours.**

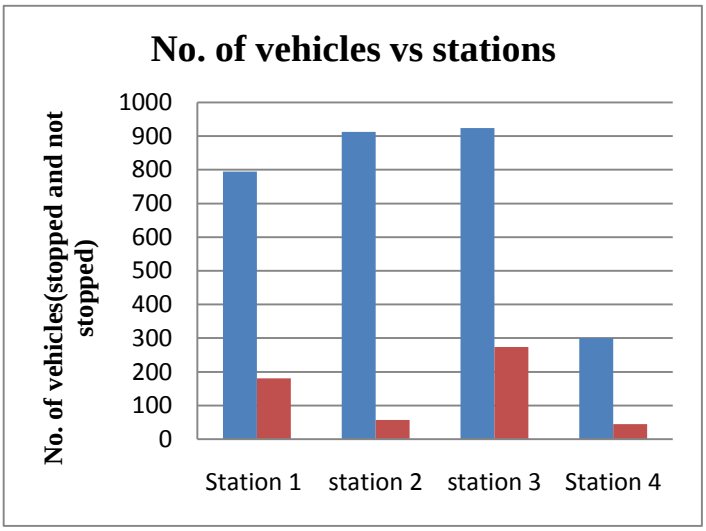


Fig 4. Graph of Number of Vehicles

Figure (4) No. of vehicles vs stations.Representation of Vehicles at different stations.

The figure (4) shows variation of no. of vehicles (stopped and not stopped) and different stations in the **evening peak hours.**

V. CONCLUSION

From above data's we can conclude that maximum delay per vehicle is at station 2 in the evening hours is 56.80 and in the morning time it is 51.40. So to reduce the delay we have to increase the green time of signal or we can provide successive signalization to reduce the delay. In the future scope we can increase the green signal time according to traffic congestion that will definitely helpful in reducing the delay.

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