

Provision of Suitable Alternative in Place of a Roundabout: A Case Study of Anjali Roundabout.

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Abstract— As the time is passing the traffic of developing city is increasing So it creates congestion at intersection. Ahmedabad is the highest populated city in Gujarat .Roundabouts are constructed to maintain the traffic flow but when the flow of traffic at intersection is more than its capacity it increase the delay of travel time. The smooth flow of traffic cannot be possible at roundabout. The purpose of providing a roundabout can` t be fulfilled. Therefore it is necessary to provide a suitable alternative to overcome this situation. There is a roundabout on Anjali intersection in Ahmedabad which has traffic flow more than its capacity. So to overcome this situation as an alternative signal design is carried out in this research work.

Index Terms— Roundabout, Capacity estimation, Signal Design(3-phase,4-phase).

I. INTRODUCTION

The rate of growth of vehicles is increasing rapidly in developing cities. This situation makes the city to be congested on roads and on intersection. In Ahmedabad private vehicles are increasing. As the vehicles are increasing the congestion at roundabout also increases. This lead to redesign the roundabout or to provide suitable alternative at intersection. It is concluded that the Anjali intersection has more traffic than its capacity .therefore it is necessary to redesign it or to provide suitable alternative. But as per IRC 65:1975 the flow of traffic at intersection should not be more than 3000 veh/hour. At Anjali intersection the flow is more than 3000 veh/hour.so redesign of roundabout could not give satisfied result. So as a solution signal design is carried out. The videography survey is done at Anjali intersection in peak hours from 9 a.m. to 10 a.m. for data collection to know flow of traffic on lanes and then 4-phase and 3-phase signal design is done.

II. OBJECTIVES

Objectives for this study of Roundabout are (1) To carry out the inventory survey for the Anjali roundabout. (2) To know the flow pattern at Anjali roundabout. (3) To provide traffic signal at roundabout.

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III. DATA COLLECTION

Traffic data are collected from videographic survey, which are then converted into PCU/hour as given below. It was found that maximum number of vehicles were passing through Anjali was from Anjali to University in straight direction.

Leg towards	Left side	Straight	Right side
Gujarat University	81	798	276

Table: (vehicles in PCU/hour)

Leg towards	Left side	Straight	Right side
Anjali	315	1402	729

Table: (vehicles in PCU/hour)

Leg towards	Left side	Straight	Right side
Paldi	296	1119	230

Table: (vehicles in PCU/hour)

Leg towards	Left side	Straight	Right side
Vasna	506	1345	139

Table: (vehicles in PCU/hour)

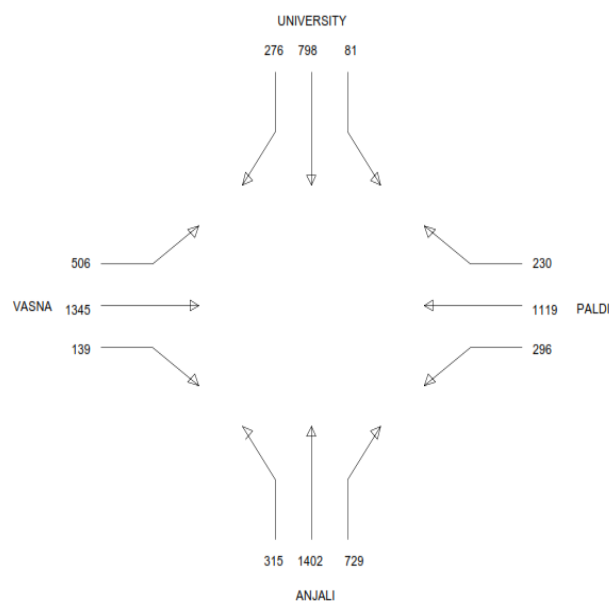


Fig: 1 Traffic data in PCU /hour at Anjali Roundabout

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IV. SIGNAL DESIGN

Signal design should be carried out as per IRC: 93-1985. The Webster method is adopted for signal design. Saturation flow (S) is measured using formulas as described Raval et al. The value of y of each phase is calculated using formula $y = q/s$.

For signal design the first alternative is taken as 4-phase signal design in which vehicles movement for all four phase is taken as straight and right direction i.e., (1) Phase-1: **University**: straight and right direction vehicles considered. (2) Phase-2: **Paldi**: straight and right direction vehicles are considered. (3) Phase-3: **Anjali**: straight and right direction vehicles are considered. (4) Phase-4: **Vasna**: straight and right direction vehicles are considered in.

Phase	Q	S1	$y = \frac{Q}{S1}$
Phase-1	1074	56017.8	0.19
Phase-2	1349	7017.18	0.19
Phase-3	2132	5601.78	0.38
Phase-4	1484	5264.78	0.28

The value of $y_1 = 0.19$, $y_2 = 0.38$, $y_3 = 0.19$, $y_4 = 0.30$ are calculated.

The $\sum Y$ is come out equal to 1.04 which is greater than 1. Hence traffic is oversaturated, so signal design cannot be done and 4-phase signal design is not possible.

Then another alternative is chosen as 3-phase signal design in which,

(1) Phase-1: **Paldi**: straight and right direction of vehicles are considered,

For **Vasna**: straight and right direction of vehicles are considered.

(2) Phase-2: **University**: Only right direction is considered,

For **Anjali**: right direction vehicles are considered.

(3) Phase-3: **University**: straight direction vehicles are considered.

Phase	Q	S1	$y = \frac{Q}{S1}$
Phase-1	1484	5264.08	0.28
Phase-2	729	2872.10	0.25
Phase-3	1402	2872.08	0.49

The value of $y_1 = 0.28$, $y_2 = 0.25$, $y_3 = 0.49$ are calculated. The $\sum Y$ is

come out equal to 1.02 which is greater than 1. Showing the oversaturated traffic. The meaning of which is that in this case also signal design cannot be done and 3-phase signal design is not possible.

V. SUMMARY:

The flow of vehicles at intersection is very much high. It cannot be maintained smoothly by providing traffic signals. In both phase of signal design i.e. 4-phase and 3-phase the condition is oversaturated. So alternatives are,

1. To provide diversion for left turners before entering the roundabout.
2. To provide flyover at cross section from Vasna to Paldi leg in order to reduce the traffic.
3. To go for provision of half cloverleaf at roundabout.

VI. CONCLUSION

Total vehicles entering into the Anjali roundabout per hour is 11594. And that is too much high compared to the suggested traffic of IRC. The traffic signal is not adequate as the traffic condition is oversaturated. In this case Fly over bridges or Underpass can be introduced for orderly movement of traffic. The traffic flow is heavy in which our intersection consists of 12% of Auto rickshaws, 2% of Buses, 75% two wheelers, 11% Cars. BRTS buses are also carried around the roundabout. As arrival of BRTS is every 2 minute to 3 minute, it affects the main traffic across the roundabout at

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