A Case Study of Radisson Square Indore for Design of Signalized Roundabout

Rupesh Rathore[1], Lalitesh Sinha[2], Anand Kumar Raghuwanshi[2]

[1] Assistant Professor in IIST Indore, Email – rathore.rupesh108@gmail.com

[2] Assistant Professor in IIST Indore, Email –sinhalalitesh22@gmail.com

[3] Assistant Professor in IIST Indore, Email – andi.rag22@gmail.com[Contact no. +919806346802]

Abstract— 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 Indore private vehicles are increasing. As the vehicles are increasing the congestion at roundabout also increases. This study leads to redesign the roundabout or to provide suitable alternative at intersection. We have just study about a site (Radisson square Indore) and concluded that the Radisson square intersection has more traffic than its capacity .therefore it is necessary to redesign it or to provide suitable alternative.

Keywords— Roundabouts, Saturation flow, Cycle Length, Grade intersections.

INTRODUCTION

In recent years, roundabouts have become an increasingly popular traffic management option in urban areas. The ability of a roundabout to reduce vehicle delay under certain conditions is fairly well known within the traffic operations community. Various studies have demonstrated a reduction in congestion and delay after the implementation of a roundabout. However, existing literature is lacking in terms of details regarding under what conditions a roundabout is proposed alternative, and what factors might preclude the implementation of a roundabout. The vast majority of existing literature considers only intersections with four approaches intersecting at right angles. Analytical models have not yet been fully developed to explain roundabout operations. Instead, most models rely on empirical evidence.

Rotary intersections or roundabouts are special form of at-grade intersections laid out for the movement of traffic in one direction around a central traffic island. Essentially all the major conflicts at an intersection namely the collision between through and right-turn movements are converted into milder conflicts namely merging and diverging. The vehicles entering the rotary are gently forced to move in a clockwise direction in orderly fashion. They then weave out of the rotary to the desired direction.

STUDY AREA & METHODOLOGY

For the present study, Radisson Square is selected. The road section is shown in Fig. The traffic on the road consists of the bike, car, three wheeler (Auto rickshaw, loading, tempo), and cycle, heavy vehicle (Multi axle Bus, Truck) etc.

There are two methods used for the analysis of rotary design.

Manual method

In this method a team of surveyors goes to the field and survey in a peak hour. The traffic moving in different directions should be calculated and using this calculations design capacity and other rotary dimensions should be determined.

Advantages of manual method

- Survey for longer period is possible.
- Possible to conduct in bed weathers.

Mechanical method

The devices used in mechanical methods are:

- Magnetic detector
- Ultrasonic device
- Photoelectric cells

Advantages of mechanical method

- Survey for longer period is possible.
- Possible to conduct in bed weathers.

We use manual method at the Radisson square for the rotary design

DATA COLLECTION

The data collection includes the vehicle count, Cycle length. The data is collected for the time period of one hour in the peak time. The data collections at section are shown in Table.

Traffic Count by Manual Method at Radisson Square:-

| APPROCH	LEFT TURNING			STRAIGHT			RIGHT TURNING		
	CARS	HEAVY VEH	TWO WHEE-LER	CARS	HEAVY VEH	TWO WHEE-LER	CARS	HEAVY VEH	TWO WHEE-LER
NORTH	33	81	84	210	45	231	78	33	183
SOUTH	183	57	264	420	69	447	126	48	129
EAST	75	27	156	189	24	342	66	156	129
WEST	144	51	178	118	48	127	81	36	163
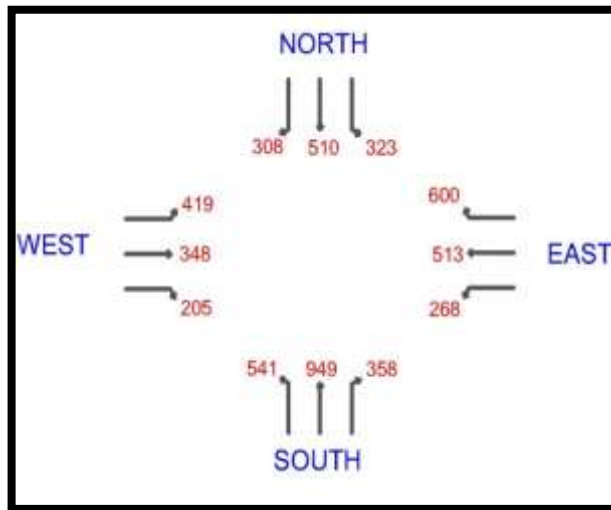
TRAFFIC APPROACHING ON ROTARY
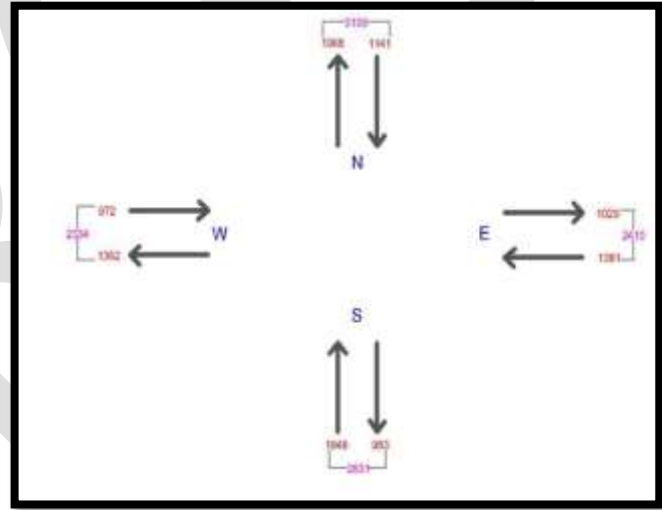
TOTAL TRAFFIC LEAVING & ENTERING THE APPROACHES

COMPOSITION OF VEHICLES

The compositions of the vehicles are shown by using pie chart as shown in Fig.. The percentage of four wheeler is very high means the four wheeler are forced the other vehicle to flow in slower speed, therefore the traffic congestion is depends upon the number of four wheeler.
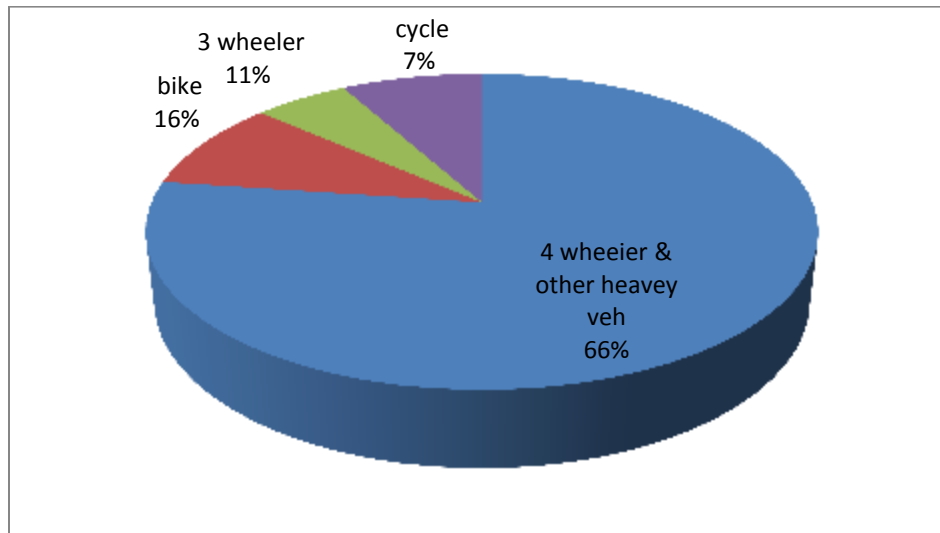
Traffic Negotiating on Rotary
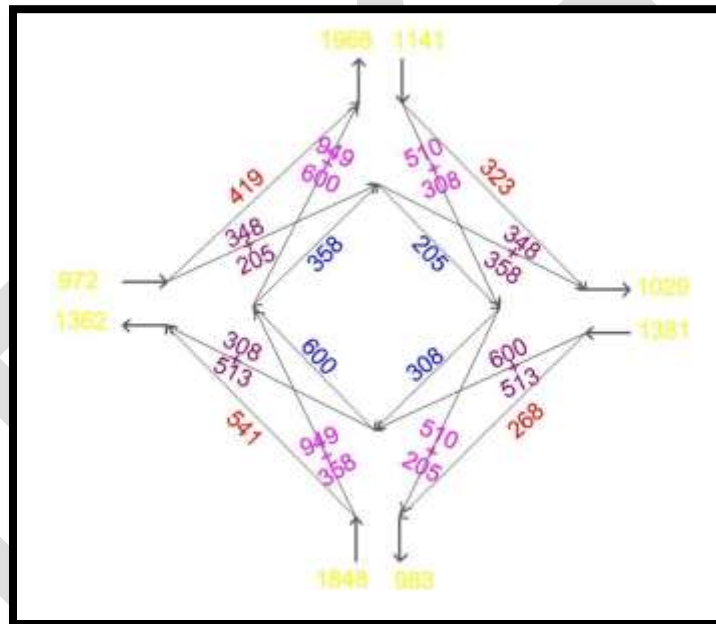
SIGNAL DESIGN

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 Ravel 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.

PHASE	Q	S	Y = Q/S
PHASE – 1	1968	5512	0.35
PHASE – 2	1848	5512	0.33
PHASE – 3	1381	5512	0.25
PHASE – 4	1362	5512	0.24

The ΣY is come out equal to 1.17 which is greater than 1. Hence traffic is oversaturated, so signal design cannot be done, and 4-phase signal design is not possible.

The flow of vehicles at intersection is very much high. It cannot be maintained smoothly by providing traffic signals. In4-phase signal design i.e. the condition is oversaturated.

CONCLUSION

- The Capacity At Radisson Square Is 3570 PCU / Hour Which Shows That The Traffic Count at Radisson Square Is Very High.

- The summation of saturation flow is come out equal to 1.17 which is greater than 1. Hence traffic is oversaturated, so signal design cannot be done, and 4-phase signal design is not possible.

- The percentage of four wheeler and heavy vehicle is very high and forced the other vehicle to flow in slower speed, therefore the traffic congestion increase on signal.

PROPOSAL

- The traffic count at Radisson square is very much high as calculated. That`s why there must be a need of traffic signal with rotary intersection.

- To provide diversion for left turners before entering the roundabout.

- To provide flyover at cross section in MR – 10 Road over the Ring Road in order to reduce the traffic.

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