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A PATH FOR HORIZING YOUR INNOVATIVE WORK

STUDY OF ROUNDABOUT FOR HETROGENEOUS TRAFFIC CONDITION

MOHAK B BHAMARE, KISHOR BAMBODE

Dr. Rajedra Gode Institute of Technology and Research Amravati, INDIA.

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Abstract — This paper primarily concerned with Roundabout study that providing effective measures to control traffic at intersections .By providing easy way to pass the traffic without congestion problems in less time. Problems like high traffic congestion, waiting time on signals, low safety and level of service of road can be solve as per the traffic study. Its aim to providing easy ,simple way for reducing waiting time on signal, redcing accident rate by providing roundabouts.

Keywords: Roundabout, LOS (level of service), Degree of Saturation, Delay, Capacity, Queuing.

Corresponding Author: MR. MOHAK B BHAMARE

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INTRODUCTION

A roundabout is an alternative form of intersection traffic control. Roundabouts are generally circular in shape, characterized by yield on entry and circulation around a central island. Roundabouts are appropriate for many intersections including locations experiencing high number of crashes, long traffic delays, and approaches with relatively balanced traffic flows. Roundabouts have the potential to resolve various traffic flow problems. Traffic volume on one approach is significantly higher that it prevents vehicles at any other approach from entering the roundabout especially at a downstream approach or the next following approach. Evaluation of junction capacity of roundabout is very important since it is directly related to delay, level of service, accident, operation cost, and environmental issues. The design and capacity evaluation of the roundabouts, no one knows knows their capacities or level of services. Tanner models use the gap-acceptance theory (or critical headway) to simulate the behaviour of entering vehicles and vehicles circulating within the roundabout. Finding a safe gap (or headway) within circulating traffic stream to enter the roundabout is the controlling variable that determines the ability of approach vehicles to enter the roundabout. Current research work on roundabout models mostly concentrates on determining the capacity of an approach based on the entering and circulating flows. Approach capacity is calculated as a mathematical function of critical headway and follow-up headway. This method is not sensitive to roundabout geometric parameters such as inscribed circle diameter, entry angle, etc. In addition, the level of traffic stream performance itself can influence driver behaviour and increasing the complexity of modelling roundabout operations.

LITERATURE REVIEW

Reference [1]", examines the effect of heavy vehicles (trucks) on entry capacity of roundabouts. The movements of vehicles were observed at 11 roundabouts in Vermont, Ontario and Wisconsin. Gap-acceptance parameters were estimated for cars and trucks separately; consistent with previous studies, it was found that critical headway and follow-up time were longer for trucks than cars. Follow-up times for truck-involved vehicle-following cases were found to be associated with central island diameter and entry angle. Gap-acceptance parameters for all entering vehicles were adjusted to a volume-weighted average of the gap-acceptance parameters for cars and trucks. Entry capacity was estimated using existing capacity models with the adjusted gap-acceptance parameters, and compared with the observed capacity at three roundabouts. The capacity models with adjusted gap-acceptance parameters estimated capacity more accurately than the models with unadjusted parameters. Microscopic traffic simulation model was also effective in representing truck characteristics and their impact on roundabout operation.

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Reference [3]", presented the effect of heavy vehicles (trucks) on the entry capacity of roundabouts. Vehicle movements were observed at 11 roundabouts in Vermont, Wisconsin, and Ontario, Canada, and gap acceptance parameters were estimated for cars and trucks separately. Consistent with previous studies, it was found that the critical headway and the follow-up time were longer for trucks than for cars. It was also found that the follow-up times for truck-involved vehicle-following cases were associated with the central island diameter and the entry angle. The gap-acceptance parameters for all entering vehicles were adjusted to a volume-weighted average of the gap-acceptance parameters for cars and trucks. The capacity was estimated with the existing capacity models with the adjusted gap-acceptance parameters and compared with the observed capacity at three roundabouts. It was found that the rate of reduction in the observed capacity with an increase in the circulating flow was lower at the roundabouts with a higher truck percentage.

Reference [4]", Roundabouts are becoming more widely recognized for their capacity and safety advantages over traffic signals for moderate to high traffic flows. Accordingly, the city of Hamilton considered the feasibility of establishing roundabout at the intersection of Wilson Street, Meadowbrook Drive and Hamilton Drive in the Town of Ancaster.Wilson Street, a former Provincial secondary highway, connects the village of An caster to the City of Brantford. SRM Associates, also branded as Roundabouts Canada, performed a preliminary analysis of the potential operational performance of a modern roundabout for this intersection. The evaluation criteria determining whether a roundabout is feasible at any one intersection required the comparison of traffic capacity performance between a roundabout and a traffic signal and cost benefit comparison of a signalised intersection versus a roundabout including lifecycle cost analysis.

DATA REQUIREMENT AND METHODS

To compile available information regarding capacity analysis of roundabouts through literature review

To select the appropriate methodology to evaluating the capacity of roundabouts for a mid-sized cities in Indian context

To define the capacity and service levels of roundabout junctions for a mid-sized cities in Indian context

RESULTS AND DISCUSSION

Volume to Capacity ratio at the roundabout.

Queuing.

Delay.

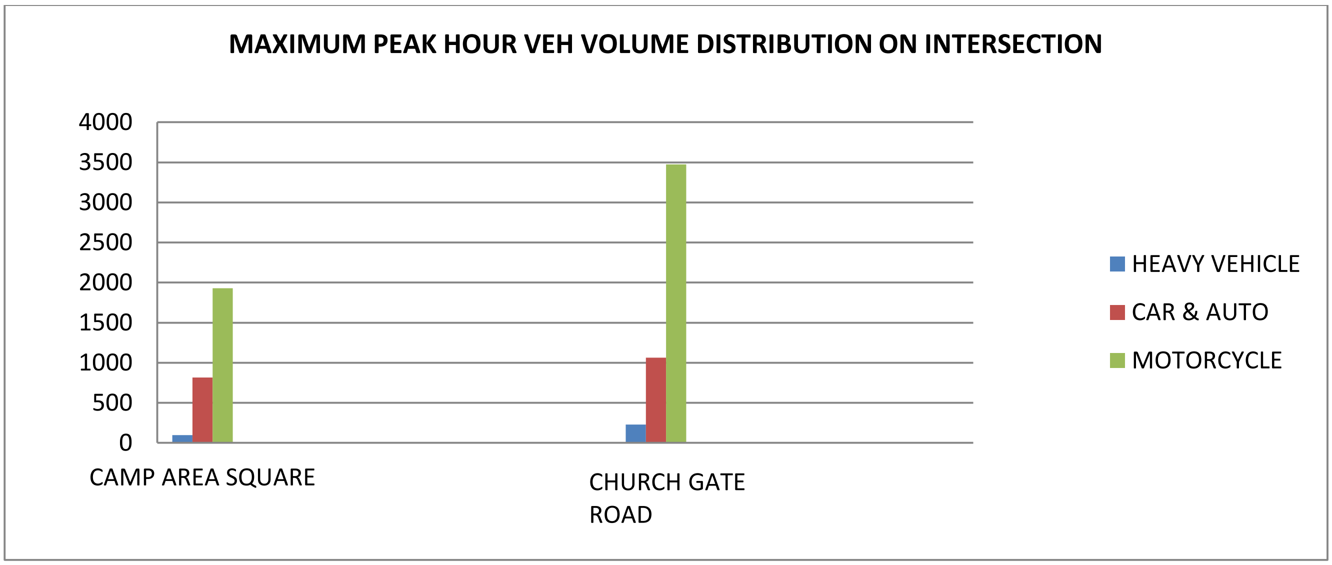
Level of Service.

Spot Speed study.

LOS	Control Delay (s/veh)	comments
A	d ≤10	Usually no queue or conflicting traffic
B	10< d ≤20	Occasionally more than one in the queue
C	20< d ≤35	Not uncommon to have a standing queue of at least one vehicle
D	35< d ≤50	Delay is long enough to be an irritation to
E	50< d ≤70	Delay approaches most drivers tolerance level
F	d >70	Approximate at capacity

VEHICLE VOLUME ON INTERSECTIONS AT PEAK HOUR

ROUNDABOUT	Heavy Vehicles	Light Vehicle			Total Number Of Vehicles	Total Traffic in PCU
		Car & Auto	Motorcycle	Total		
CAMP AREA SQURE	99	818	1929	2747	2846	2129
CHURCH GATE SQURE	231	1065	3475	4540	4771	3611

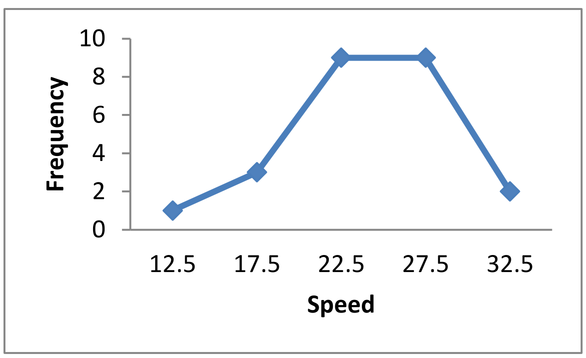


Critical gap and Follow up time of each leg of round about

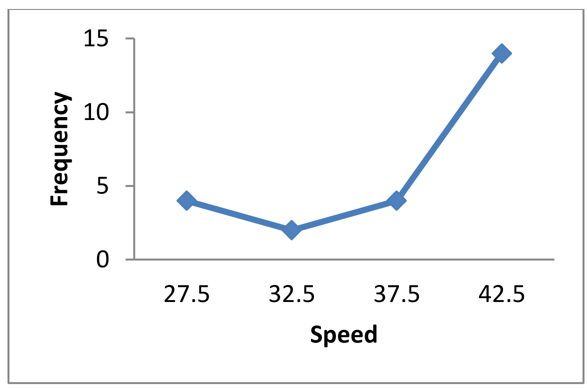
Leg No.	NB		SB		EB		WB	
Roundabout	Critical gap (sec)	Follow up time (sec)	Critical gap (sec	Follow up time (sec)	Critical gap (sec	Follow up time (sec)	Critical gap (sec	Follow up time (sec)
CAMP AREA SQURE	4.01	2.5	3.83	2.6	3.64	2.93	3.4	3.6
CHURCH GATE SQURE	3.13	2.41	3.1	2.7	3.75	2.68	4.87	3.24

ROUNDABOUT	TOTAL VEHICLE FLOW	AYANALITICAL METHODE		DELAY	QUEUE LENGTH	LOS
		VOLUME CAPACITY ©	DEGREE OF SATURATION (V/C)			
CAMP AREA SQURE	2129	3787	0.56	6.14	3.8	A
CHURCH GATE SQURE	3611	3589	1.01	57.8	83.25	E

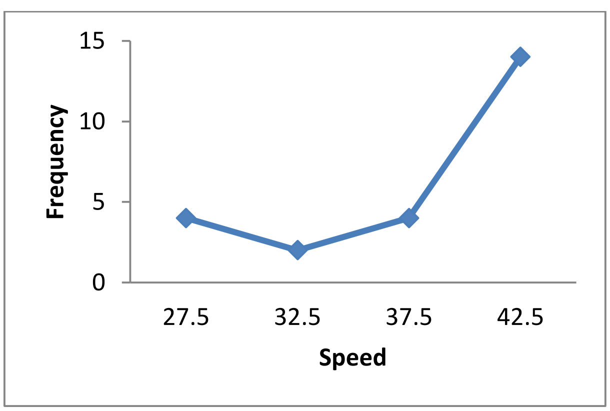
Spot Speed data:



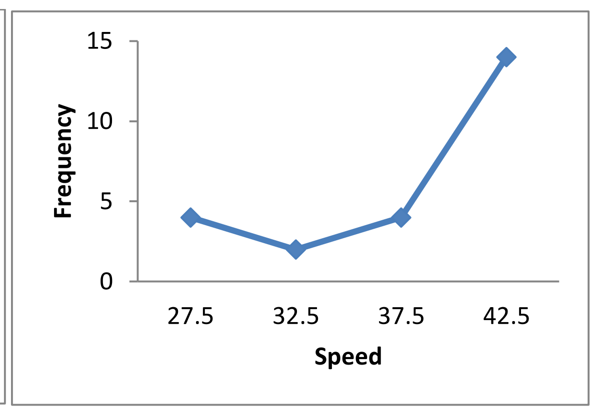
Bus and heavy vehicle



For Auto



For Car



For Motor-cycle

CONCLUSION:

Malegaon roundabouts capacity analysis results indicate the most of the legs of roundabouts are in serious problems or over saturation. Based on observed actual field conditions it is common to see that at peak hours, the traffic police need to regulate the traffic at these roundabouts since traffic control devices cannot function or regulate the traffic. As the study uncovered the real issues are identified with deficiency of number of entry lanes, number of circulatory lanes, high traffic flow and unbalanced traffic on the approaches o roundabout. Besides most of the roundabouts were built more than 15 years ago with obscure service limits. All the input parameters of empirical method for capacity study do not exist at Malegaon Roundabouts. Thus only analytical method was carryout the capacity analysis with parameter using based on HCM 2010

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