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Efficiency of Traffic Rotary at Intersection in Urban Area

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ABSTRACT: Traffic Rotary at road intersections is special form of grade change of lanes to channelize movement of vehicles in one direction around a central traffic island. With rapid growth of traffic it is experienced that widening of roads and providing flyovers have become imperative to overcome major conflicts at intersections such as collision between through and rightturn movements. In this way, major conflicts are converted into milder conflicts like merging and diverging. The vehicles entering the rotary are gently forced to move in a clockwise direction. They then weave out of the rotary to the desired direction. The crossing of vehicles is avoided by allowing all vehicles to merge into a stream around the rotary and then to diverge out to the desired radiating road. Thus the crossing conflicts eliminate and convert into weaving manoeuvre or a merging operation from right and a diverging operation to the left.

KEYWORDS: Traffic management, Traffic Rotary, Intersection, Traffic congestion.

I. INTRODUCTION

Intersection is an area shared by two or more roads. This area is designated for the vehicles to turn to different directions to reach their desired destinations. Its main function is to guide vehicles to their respective directions. Traffic intersections are complex locations on any highway. This is because vehicles moving in different directions have to occupy the same space at the same time. In addition, the pedestrians also seek the same space for crossing. Drivers have to make split second decisions at an intersection by considering his route, intersection geometry, speed and direction of other vehicles etc. A small error in judgment can cause severe accidents. It also causes delay which depends on type, geometry, and type of control at the intersection. Overall traffic flow depends on the performance of the intersections which affects the capacity of the road. Therefore, both from the accident perspective and the capacity perspective, the study of intersections is very important for the traffic engineers especially in the case of urban scenarios.

A real time problem of the main multi leg junction of Yavatmal city known as Main bus stand square has some issues regarding traffic management. It is necessary to survey, analyze and design a traffic system pertaining to engineering. A roundabout is an alternative form of intersection for traffic control. Roundabouts are circular in shape generally and they are 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 than it prevents vehicles at any other approach from entering the roundabout especially at a downstream approach or the next following approach. Rotary intersections or roundabouts are special forms 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.

Aim and Objective: To the design traffic rotary for smooth operation and traffic movement and improve the traffic flow in multi leg junction considering a study area.

Within this context the objectives of this project were:

- i. To survey and investigate the study area for gathering data for analysis.
- ii. To analysis and design the traffic engineering system applicable for Safety operation.
- iii. If possible implementation of the design with prior permission of concern authorities and identification of its effectiveness.

- iv. To analyze the necessary design improvements of rotary junction.
- v. To decrease the traffic delays and accidents.
- vi. To design of rotary or roundabout junction.

Scope of Study: The Road Intersections are the critical elements of the Road sections and the function of a designed intersection is to control conflicting and merging streams of traffic, to minimize the delay including pedestrian and bicycle traffic. The pattern of the traffic movements at the intersection and the volume of traffic on each approach, during one peak period of the day determine the lane widths required including the auxiliary lanes, traffic control devices and channelization, wherever necessary. The arrangement of the islands and shape, length of the auxiliary lanes also differs based upon the type of intersection.

The general design principles of intersection design are the approach speeds, restriction on available land, sight distance available and the presence of the larger volume of all the road users in urban areas, although it is necessary for the users of these guidelines that there should be an application of the knowledge about the local conditions while interpreting and arriving at the solution in terms of design. The design details are applicable for the given site, roadway and traffic conditions. However, the design features being of general nature can be applied to other intersections having more or less similar roadway and traffic conditions.

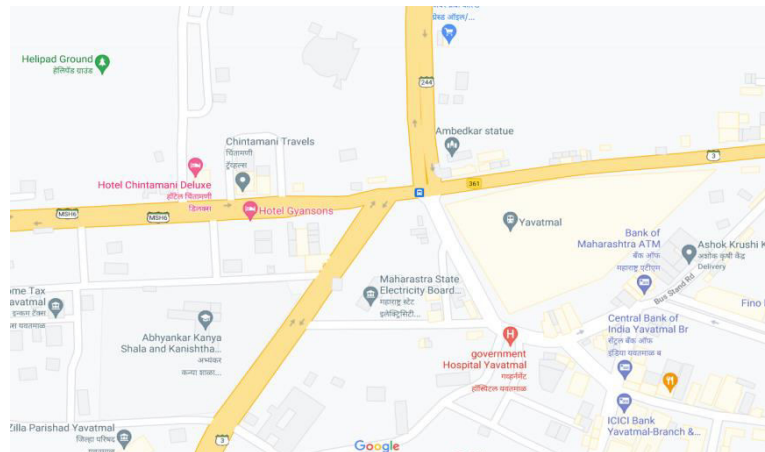


Fig No.1 Study Area In Multi Leg Junction at Main Bus Stand Square, Yavatmal.

II. LITERATURE SURVEY

1. Statistical Analysis of Traffic of Rotary Intersection

Sitesh Kumar Singh, Karan Prabhakar

As the evaluation of rotary junction is directly related with several traffic and motorist's parameters such as level of service, travel time, delays, accidents, operation costs, environmental factors, etc. So, there should be proper attention for the evaluation and improvements in the rotary junctions. As at the rotary junction, lots of traffic is diverted to different routes as per the travel of motorists. There should be a decrease in the congestion, accidents, etc. So, there must be improvement parameters to be followed for the improvement of rotary junctions. Improvement of rotary junction justification has been considered by evaluation of the rotary junction of Dogra Chowk, Jammu. Traffic volume study is the major study for the evaluation of the traffic condition of the rotary junction. To analyze the traffic volume, traffic survey has been considered in the peak hours on the rotary junction. A roundabout is an alternative form of intersection for traffic control. Roundabouts are circular in shape generally and they are 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.

2. Development of Guidelines for the Design of Roundabouts

Dr. S.N. Sachdeva, Professor, N.I.T. Kurukshetra June

The meeting area of two or more roads is called an intersection. The traffic movements like through, turning and crossing traffic are present at the intersection which lead to different conflicts. These conflicts may be handled in different ways depending on the type of intersection and its design. The safety, efficiency, speed, capacity and



economy of a road depend upon the intersection design. Roundabouts are a special form of channelized circular intersection in which traffic moves in one direction around a central island before exits to various intersecting roads. It is a major form of at-grade junction featuring yield control on all entry lanes, one-way flow around a central island and appropriate geometric curvature to keep circulating speeds low. Depending on the size of circular traffic intersections it may be classified as Rotary, Roundabout and Mini-roundabout. Rotaries are suitable when there are more approaches and no separate lanes are available for right turn traffic thus making the intersection geometry complex.

3.Traffic Rotaries NPTEL

Tom V. Mathew &KV Krishna Rao.

Rotary intersections or roundabouts are special forms 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. Traffic flow is regulated to only one direction of movement, thus eliminating severe conflicts between crossing movements. All the vehicles entering the rotary are gently forced to reduce speed and continue to move at slower speed. Thus, none of the vehicles need to be stopped, unlike in a signalized intersection. Because of lower speed of negotiation and elimination of severe conflicts, accidents and their severity are much less in rotaries. Rotaries are self-governing and do not need practically any control by police or traffic signals. They are ideally suited for moderate traffic, especially with irregular geometry, or intersections with more than three or four approaches.

III.RESULTS

The study of rotary junction or roundabout we see the lots of parameters were monitored, evaluated and analyzed to understand the traffic improvement necessities to be implemented or adopted. Traffic parameters are the major element for the analysis of the traffic capacity. In this study, we analyzed the traffic design elements from each of the leg of the rotary junction. After the study of the traffic capacity and volume features for the design rotary junction at Bus Stop Square, Yavatmal city.

On the basis of the result obtained for the study of rotary junction and its improvement, following recommendations have been suggested:

- a. Remove the temporary dividers from the roads and give the proper arrangement.
- b. Drainage system should be improved for the better movement of vehicles and pedestrians in the rainy season.
- c. Road margins are provided on the intersection.
- d. Provide effective parking facilities.
- e. Give the provisions about markings, signs etc.

IV. CONCLUSION

The problems faced by vehicular are overcome by this system and reduced the conflict points on the intersection.

- It improved the urban traffic safety and service quality.
- Using the IRC guide lines the design of the rotary is designed and finally a drawing showing various design elements for the proposed rotary intersection was prepared using AutoCAD software.
- It decreases the traffic delays and Accidents.
- We analyze and design the traffic engineering system applicable for Safety Operation.
- We surveyed and investigate the study area and collect all the data along with dimensions.

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