

## Comparative Studies between T-Junction and Rotary Junction and Alternate Method to Minimize the Traffic Flow

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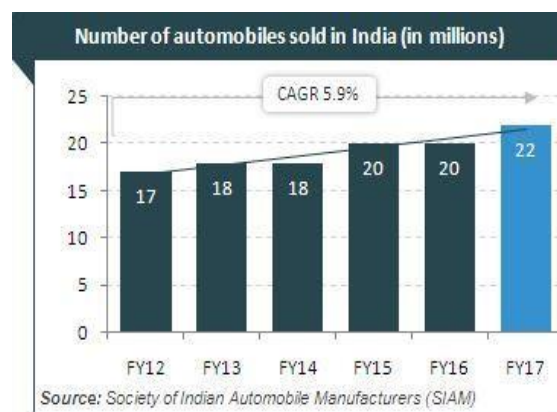
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**Abstract:** As we all know that the situation of traffic flow in metropolitan cities is getting deteriorated day by day, Traffic management is the only key for the having better results. Our study now deals with a similar kind of issue; the study area which was taken is a stretch between the two T- junctions which lies in the vicinity of the IT corridor Hyderabad, Telangana. The study deals with traffic flow counting, analyzing the peak hour volume, designing signals for the junctions, creating a model in VISSIM Software and trying to understand the delays. As an alternate arrangement the T-junctions are replaced with U-turns and it will be analyzed and since the data we have received meets the need for a Rotary too, the signals are being taken away amidst the stretch and is replaced by a rotary. The main objective of our study is to make comparative studies between the junction when replaced with U-turn and Rotary. Our study tries to suggest a way to reduce on the delays caused by the vehicles in the junction which in return paves a way for sustainable urban cities.

**Keywords:** Comparative studies, T-junction, IT Corridor, Delays, VISSIM, Rotary, U-turns

### 1. Introduction

The issue of traffic is the most pressing issue in the metropolitan cities. As the population of India is growing at a rate of 1.1% of the total population per year, so it the scenario for the need for vehicles that are coming on to the road. Even though the modern India is making its way towards sustainable green and energy efficient cars eg; electric vehicles, solar vehicles as a result good amount of increase in the trends in these kinds of areas, as shown in Fig.1 and Fig 2 nevertheless the need for traffic management is need of the hour.



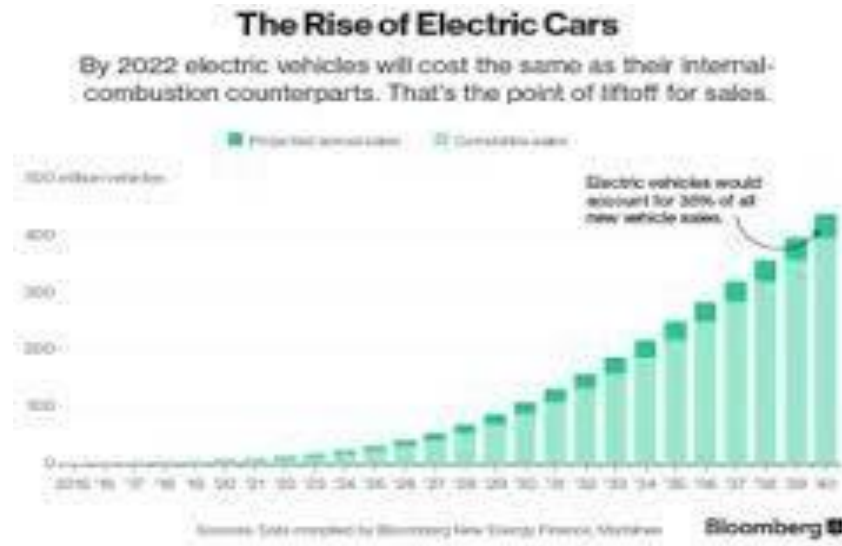


Fig 1 & Fig 2 Statistics showing the trend in rise of vehicles

## 2. Role of Roads in Urban Cities

### A. Transportation in urban metropolitian cities

The classification of roads is very much important in the urban cities. In the emerging metropolitan cities like Hyderabad, Telangana optimization of the traffic flow and making alternate routes as per the requirement is essential and creates a vast difference in congestion. In Hyderabad which is an epicenter for the IT corridor, a vast number of companies have been planted in this region as a result traffic management and reduction of congestion is very much required.

### B. Alternate method as a solution

As we have known the problem statement we have to find out way and means to reduce this amount of traffic flow. In most of the cities the delays near the junction are being reduced by the arrangement of U-turns in the respective and also by providing a rotary intersection. These alternate methods are used rapidly by replacing the signals with successive U-turns and rotary junctions as shown in Fig 3.

The key to the solution of the congestions that are being caused are due to the age old traditional method of signal system. These new techniques now pave a way for the easy access of the vehicles and transition of commuters from one place to other.



Fig 3. Showing the U-turn and Rotary junction

## 3. Litreature Review

### A. Comparative studies on signalized intersection and rotary et.al Prof. C.N.Gawali[1]

Comparative study on signalized intersection and rotary is basically a case study project where the traffic situation in Nagpur city is evaluated at specific place where the roads have 5 intersections. Then the study is carried out by vehicle volume count on the square by means of videos. Then the recording data is analyzed and the number of two wheelers, three wheelers, four wheelers and heavy vehicles are calculated at peak hours of the day. Then by using VISSIM software the delay is calculated on signalized intersection and is compared with that of the rotary.

## **B. Analysis of Rotary Intersection at Vadora . et.al Prof. Siddharth Gupte[2]**

The capacity of the roadway rotary depends on the flow at different legs approaching the rotary. The present traffic scenario is usually used to characterize the present traffic condition to access the different parameters at different types of intersection. In the vicinity of a rotary intersection, road users must co-adjust their performance by reduced speed or change of path to avoid collision with each other. The purpose of the rotary intersection design is primarily to reduce the zone of conflicts within the intersection the main objects of providing a rotary are to eliminate the necessity of stopping even for crossing streams of vehicles and to reduce conflict. The crossing of vehicles is avoided by allowing all vehicles to merge into the streams around the rotary and then to diverge out to the desired radiating road. Thus the crossing conflict is eliminated and converted into weaving maneuver or a merging operation from the right and diverging operation to the left. Researchers have worked on the estimation of the capacity of a rotary intersections using different approaches. Four rotary intersections are taken up for capacity analysis. The capacity studies on these four intersection was calculated based on the established norms of Indian road congress ( IRC: 65, 1976 ).Rotary intersections are studied based on weaving traffic and entry volume

## **A. Design of Rotary Intersection as an Alternative to Four ARM Signalized Intersection of Urban Area Et.al Pande Karli.[3]**

Roundabouts have many advantages compared to

other regular signalized intersections. The main advantages are traffic safety, operational performance, environmental factors, pedestrian safety, and aesthetics. Signalized intersection has 32 conflict points whereas roundabout with one circulating lane and one entry lane has 8 traffic conflict points. But the number of conflicts increases to 16 in the case of roundabout with two circulating and two entry lanes. The traffic operations at a rotary are three;

- Diverging
- Merging
- Weaving.

Conflict points at signalized intersection and Roundabout with one circulating and one entry lane are The reduced number of conflict points at a roundabout indicates the reduction of crash propensity. The increased use of roundabout as a traffic facility needs an overall assessment on potential accident rates. For the safe movement of the vehicles, it is essential to understand the operational performance of the roundabout. Capacity is one Such parameter which explains the operational performance, Traffic scenario and Level of Service (LOS).

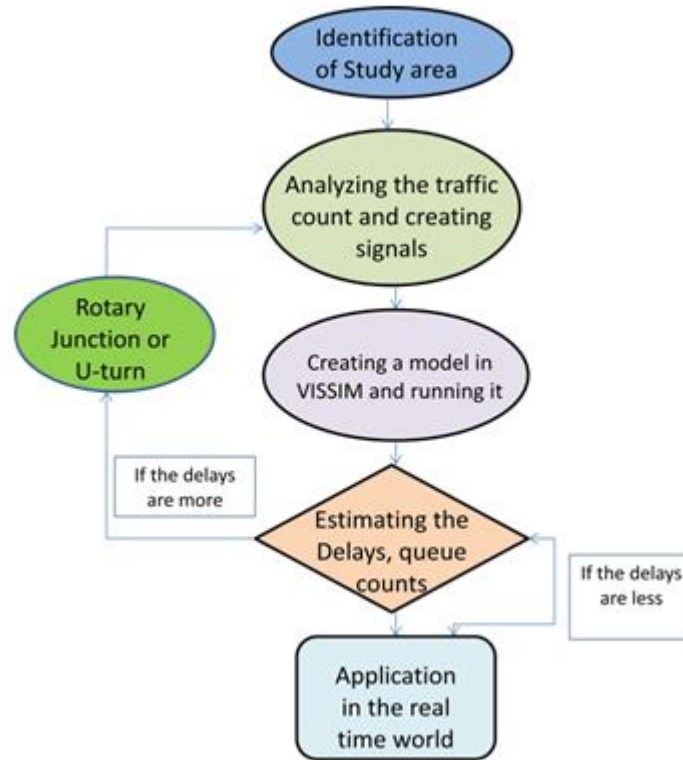
## **3. Work Flow (Methodolody)**

From the Literature review we have understood the need for research in this wide areas and transforming the same into real world scenario the need for alternative method is very much important at this point of time. The placement of U-turns at successive junctions and rotary junctions at various places which are required is the need of the hour now

### **A. Flow chart showing the workflow of the study**

A study area is taken and the junction the vehicle counts are taken and the traffic count is taken and the peak hour volume is taken from the traffic data which is been acquired. Then their respective signals are calculated with respect to Webster's method and the delays and the queue counts are known by analyzing the model in VISSIM as shown in Fig 4 If the delays are less then we would optimize the same and apply it in the real world scenario but if the delays or queue counts are more then the alternate method either U-turn or Rotary junction is suggested depending upon the availability.

- U-turns in urban cities are very much useful to reduce the conflicts and studies have said that the by computing the u-turn capacity the delays can be reduced[4]and also in urban cities the alternative routes are provided as an alternative[5]
- Rotary as an alternative also helps a lot in reducing the delays that are coming onto the road by computing the capacity of the rotary and the weaving length.



**Fig 4.** Workflow for the study

**B. Study Area Analyzing**

The study area that was taken was two T- junctions near Hitex city, Telangana. The vehicle counts was taken and the signals were design based Webster’s method

$$CO = \frac{1.5L + 5}{Y} \text{ (Cycle time)}$$

$$G_{\text{per phase}} = y(CO - L) \text{ (Green time per phase)}$$

—  
Y

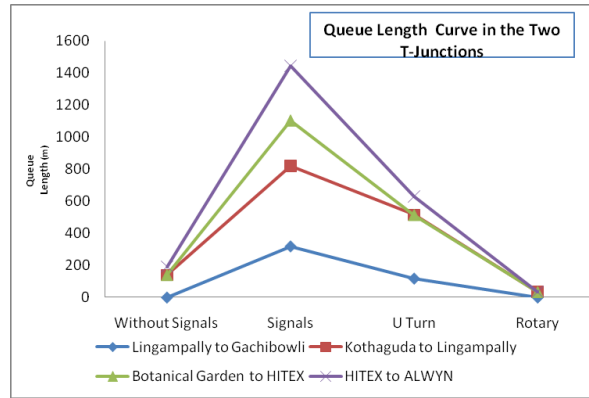
**4. Analysis And Results**

**A. Creating Model in VISSIM and suggesting alternate method**

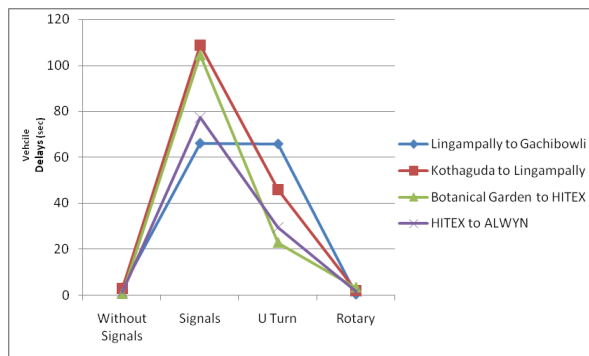
After calculating the cycle length and respective green time per phase, then the same junction are created as model in VISSIM. The simulation is run on it to get the results f or the vehicle delays, queue lengths. From the results by creating alternate methods( creating U-turns and Rotary) we try to reduce the queue lengths and vehicle delays. Here in our study we did not analyze the design for rotary junction we have created the model only.

**B. Analytical Resultsin VISSIM**

These results are taken in the legs which are having a maximum amount of vehicle delays and queue lengths, the graphical results after the provision of the alternate method, the results are shown in Fig 5 and Fig 6.



**Fig 5** Graphical representation of Queue length after Simulation



**Fig. 6** Graphical representation of Vehicle Delays after Simulation

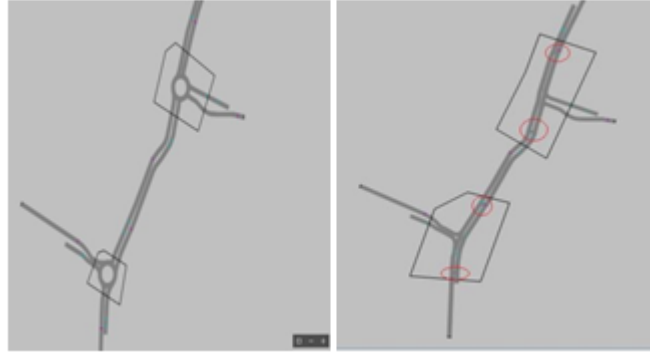
**A. Creating models in VISSIM**

The same junction were replicated and models were created in VISSIM and the alternated methods of U-turns and Rotary junctions were also been created to analyze the results. The two T-Junction with signals were created in VISSIM as shown in Fig 7



**Fig 7.** VISSIM model after adding signals for two T- Junctions

After creating the real time scenario, the alternate method of U-turn and rotary were created in VISSIM as shown in the Fig 8



**Fig 8.** VISSIM model after alternate method of U-turn and Rotary for two T- Junctions

## 5. Conclusions

1. It was observed that there was a drastic change in between the signalized junction delays and the alternate method that were adopted
2. The queue length for all the junctions were decreased at an average of 50m in all the legs, when U-turn( Alternate method) and when the rotary were provided for both the junctions the queue length was totally removed.
3. The vehicle delays also for the junction were reduced at an average rate of 60sec in all the legs when U-turn(alternate method) was used and when the rotary was provided the vehicle delays were reduced to 5sec..

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