

# DESIGN OF MODERN ROUNDABOUT AT RAJENDRA PARK CHOWK, DURG

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**Abstract** - The present paper deals with the study on design of modern roundabout at Rajendra Park Chowk which is situated in Durg, Chhattisgarh which provides connectivity between Durg junction, Indira market and Bus stand. The regulation of traffic will become very difficult in peak hours at this chowk the traffic increases by 40% to 50% than normal regular traffic. The main focus of this study is aimed at understanding the traffic pattern and congestion, its measurement and how to overcome from this problem. Rajendra Park square is one of the busiest rotary intersections in Durg, serving as a junction through which numerous vehicles enter and leave the city. This further aggravates the traffic problem of the rotary intersection. The study is based on the traffic signal position, timing, traffic volume, pattern and behavior of people. The aim of this project is to assess and study the rotary intersection at Rajendra Park square. This will include site investigation, measuring the present geometry of the intersection, followed by traffic volume count. Based on the above data, we will suggest a new design for the modern roundabout that can handle the present and anticipated traffic scenario at Rajendra Park square in Durg.

**Key Words:** Modern roundabout, Peak hour, Traffic volume count, Traffic congestion.

## 1. INTRODUCTION

In our nation, particularly in urban areas, traffic conditions are extremely mixed. Excessive flow of vehicles is one of the main reasons behind traffic congestion at megacity road and intersection sites. With increased numbers of vehicles, the capability and efficiency of junctions drop. To cure these problems and improve the level of service quality for road customers, efficient traffic regulation is urgently needed. Traffic congestion, especially caused by bottlenecks at intersections, is a major problem in urban areas. Intersections are important components of the road network of a city from the viewpoints of capacity, traffic flow, and safety and are usually the target of public frustration with traffic control in big cities.

Traffic congestion on main urban roads, caused mainly by recurrent bottlenecks at intersections, presents a challenging issue—mainly in big metropolitan areas. Intersections are the most crucial components of an urban

road network since they affect capacity, level of congestion, and overall safety. In addition, the performance of such junctions essentially determines both the social life and economic functionality of a city.

This is a case study of a Rajendra park chowk in Durg, Chhattisgarh. Which was n't handed with rotary junction in past. So, we study the traffic pattern and volume to make a rotary intersection.

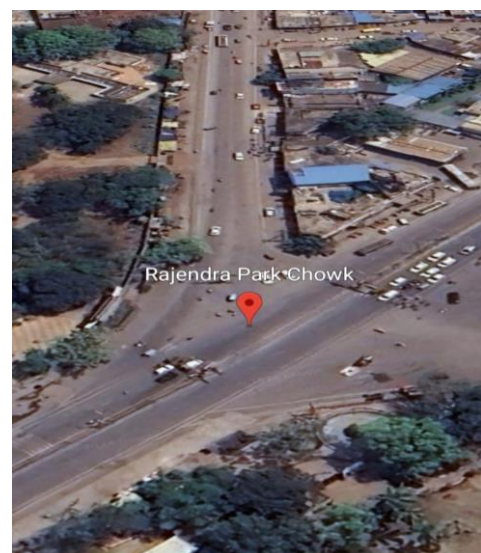


Fig -1: Google earth view of Rajendra park chowk

### 1.1 Modern Roundabout

It is a specific kind of unsignalized, one-way intersection designed to improve road safety and reduce delays in traffic. Roundabouts are generally between 45 and 200 feet in diameter and are intended for use by vehicles traveling at speeds of 15 to 25 miles per hour. Modern roundabouts are different from traffic junction or intersection and traffic circle. Classic traffic circles and intersections, which were typically over 0.057 mile in diameter, fell out of favor in the 1950. This was primarily because driving speeds increased (over 30 mph) and the complicated, frequently confusing weaving maneuvers they necessitated—particularly because entering cars were usually given priority, so the system became inefficient and dangerous.

## 2. LITERATURE REVIEW

There are several studies in other parts of the world regarding rotary intersections or roundabouts, and these studies have proved that roundabouts are more efficient when dealing with the traffic flow for a particular range of volume.

Prakash J, Supriya C B and Dr. T V malleesh are worked on rotary intersection in Tumakuru city. They observed traffic volume is 2401.4 PCU/ hr which is lower than the practical capacity 4746.67 PCU/ hr. and eventually they concluded with rotary intersection suggestion for the selected junction.

Sagar V. Parise, Dhawal S. Patil, Manish M. Lohakare and Prof. Hitesh D. Mishra they are study the LIC square, Yavatmal and they found that the traffic volume count of that area is s 4440.5 PCU/hr and according to the IRC maximum traffic volume is 3000 PCU/hr. So, they suggest to n redesign rotary intersection to avoid traffic congestion, head collision, accident.

M.V. SAI Preetham Reddy, K. Siva sankar, G. sreenivasulu reddy and Prof. k. ussenaih they study the Sreenivasa Centre and resulting project will create a rotary at intersect road for compliance with IRC norms for safety and comfort of road users. After completing the traffic volume survey, averaging out daily traffic, we have adevised a circular type rotary with the capacity of 3762 PCU/hr, entry circle radius of 20 M, and exit circle radius of 40 M for the central island of 27 m radii to enable traffic to flow correctly.

The research "Efficiency of Rotary Intersection at Authority Chowk, Greater Noida" conducted by Ms. Sonalika Maurya and Mr. Ajeet Singh (2018), was a survey of the current conditions at the Authority Rotary Intersection. Traffic volume was calculated and converted into Passenger Car Units (PCU) to estimate the functional capacity of the rotary. The study was conducted on direct manual counting techniques as per the IRC-65:1976 specifications.. After a detailed analysis of the traffic flow, they concluded that the minimum capacity of the intersection was 3306 PCU/hr and the total traffic volume count was 5230 PCU/hr. They therefore proposed that a signalized rotary system would be used to enhance traffic control at the intersection.

## 3. METHODOLOGY

The Methodology for Design of Roundabout Includes the Following Steps-

- Study of existing rotary intersection
- Traffic volume survey and data collection
- Design of modern roundabout according to the IRC 65-1976 or 65-2017 (latest)

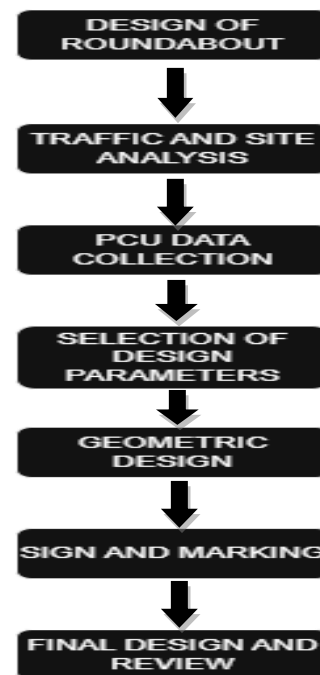


Fig -2: Flowchart of Proposed Methodology

### 3.1 Study of existing rotary Intersection

We selected the Rajendra Park chowk or intersection as a roundabout area because of their busiest traffic volume. The selected area is four legged junction that is four roads are joining and the roads are pulgaon road, durg - dhamdha road, dada dadi park road and Y bridge road.

These are the dimension of the present intersection-

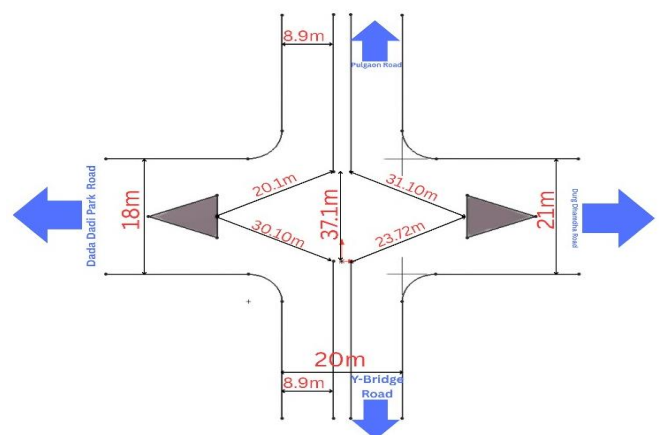


Fig -3: Road Dimension of the Intersection

### 3.2 Traffic Volume Survey and Data Collection

Traffic volume measurements were recorded continuously for a complete week (7 days) and on an hourly basis over every day. In order to find the capacity of the rotary intersection, the data was analyzed from the peak traffic time, that is, from 5:00 PM to 6:00 PM.

The traffic volume data sheets analysis showed that the peak traffic congestion at the chosen junction was experienced during the evening peak hour, between 5 o' clock to 6 o' clock.

For the present study, two observers per approach direction were tasked to count traffic volume. The values were then converted into Passenger Car Units (PCUs) according to IRC SP-41 guidelines. At the peak hour of the day, the overall traffic was found to be 3481 PCU/hour.

PCU data is given below-

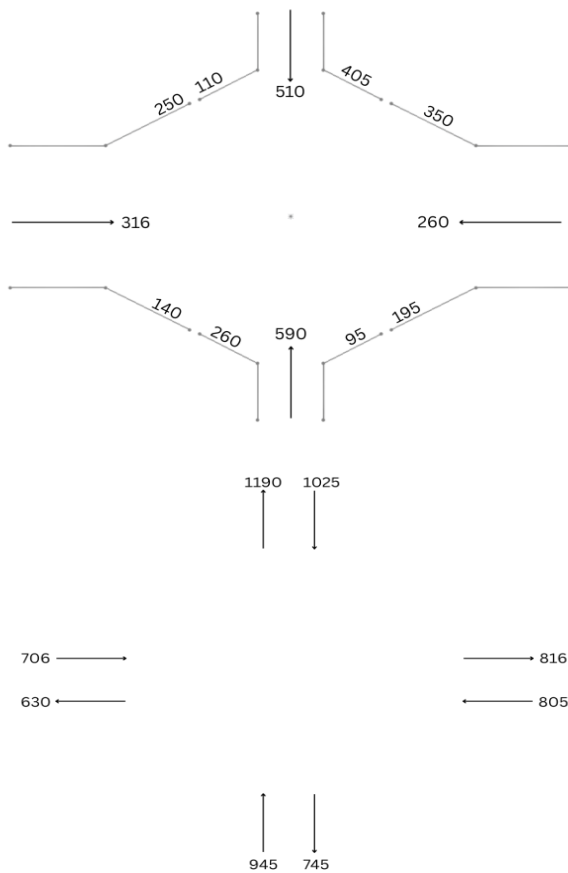


Fig -4: PCU value of Rajendra park chowk

Table-1: PCU Data for Peak Hour

Approach of vehicles	Left turning vehicles	Straight ahead	Right turning vehicles
Pulgaon Road	460	510	110
Durg-Dhamdha Road	195	260	350
Y-Bridge Road	260	590	95
Dada dadi Park Road	250	316	140

#### 4. RESULT AND ANALYSIS

Design step of modern roundabout according to the IRC 65-2017 :-

##### Step 1-

The prescribed design speed applicable to urban regions = 30 KMPH

##### Step 2-

Angles at entry = 60`

Angles at exit = 30`

##### Step 3-

Radius of curve at entrance = In urban area it should be between 15-20 m, so suitable radius for entry curve is 15 m.

Radius of exit curve = same as entrance i.e 15 m because of large pedestrian near the roundabout due to the park.

##### Step 4-

Radius of the central island = 1.3 times of radius of entry curve

$$1.3 * 15 = 19.5 \text{ m}$$

##### Step 5-

Carriage way width at entrance and exit

$$e1 = 10 \text{ m}$$

$$e2 = 10 \text{ m}$$

##### Step 6-

Weaving length (l) = 40 m

$$\text{Width of weaving (W)} = \frac{e1+e2}{2} + 3.5$$

$$= \frac{20}{2} + 3.5$$

$$= 13.5 \text{ m}$$

##### Step 7-

$$P = \frac{260+350+510+140}{260+350+510+140+195+110}$$

$$P = 0.805$$

**Step 8-**

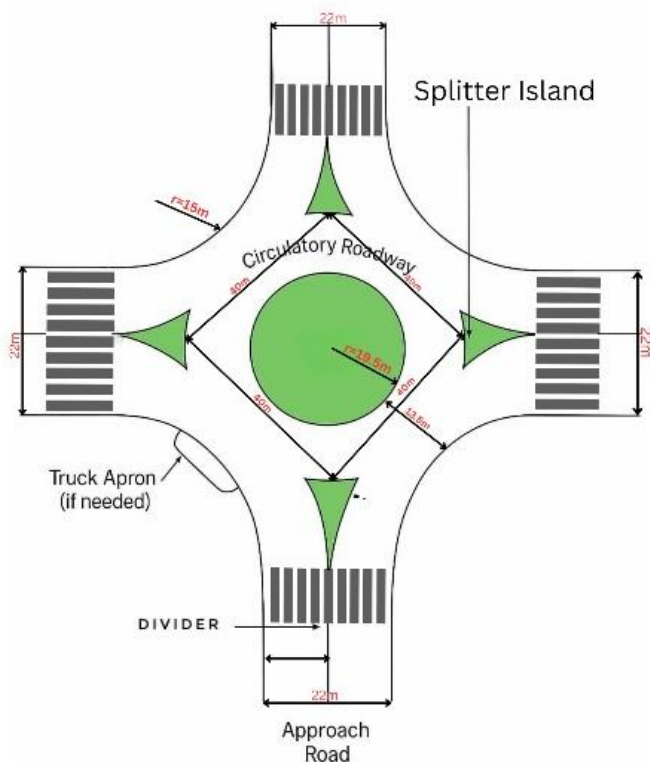
$$\text{Capacity of rotary} = \frac{280 \times 13.5 \left(1 + \frac{10}{13.5}\right) \left(1 - \frac{0.80}{3}\right)}{1 + \frac{13.5}{40}}$$

$$= 3607.72 \text{ PCU/hr}$$

Since above capacity is higher than the traffic flow 3481 PCU/hr and hence the design is acceptable.

Based on the collected data, we have obtained that the present capacity of intersection is 3481 PCU/hr. and peak hour is from 5-6 PM.

We had design the roundabout according the IRC code and these are the details of these roundabout –



**Fig -5:** Design and dimension of roundabout

**5. CONCLUSION**

- The main purpose of offering rotary intersection is to minimize the volume of traffic at a given moment since it makes continuous movement of cars possible without any collision and because of this reason there is a decline in accidents and safety increases.
- By giving Rotary intersection the vehicles approaching the junction can be slowed down

automatically since the driver see that he is reaching an intersection.

- No requirement of giving electricity signals like traffic lights and no need of using manpower like no traffic regulatory individuals are needed to look after the flow of traffic.
- Sometimes when traffic signal is not working handling the traffic at that time is very difficult due to the nearby bus stand and market and due to the high traffic volume roundabouts is better option than traffic signals because of continuous flow of traffic.
- As the speed of the cars are decreased that are coming towards the junction there is less accident caused because of flawless regulation of the traffic at that specific junction where the intersection facility is available.

The design is done on current traffic volume. If there is any traffic volume increase in future, there will be need of changes at intersection for traffic control.

**6. FUTURE SCOPE**

- I. We suggest changing the Entry Gate of the Park towards the Dada dadi Park Road Which Help in Controlling the Traffic In front Of the Roundabout.
- II. By removing the street vendor’s carts and food stall from the in front of the park and making the parking area for the bike, scooter and car for the people who came to the park.
- III. To promote safer and more accessible pedestrian movement within and the rotary, it is recommended to enhance pedestrian crossings, sidewalks, and pedestrian- friendly amenities.
- IV. If the pedestrian amount is large then we can also make a foot bridge over the road for the crossing which helps in smooth flow of traffic near the roundabout.
- V. Implementing smart traffic management systems, such as intelligent signaling, dynamic lane allocation, and real-time traffic monitoring, can optimize traffic flow and minimize congestion.

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