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Rehabilitation of an Existing Intersection of Road using BIM

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Abstract : From site observations, we see that the intersection of **Chandra Shekhar Patil Bilagundi circle** is an uncontrolled intersection. Neither of the intersecting points has a rotary for controlling the traffic movement. There are no proper pavement markings. Moreover, physical dividers and channelizing islands would be required after the widening of the Junction. The situation is also affected by the encroachments and temporary vendors like tea stalls, shops on the intersection. Auto stands are located on intersection on the approach roads of junction. The vehicles are generally parked in a haphazard manner which leads to reduction of capacity of the roads. All these factors have an adverse impact on road user's behavior which enhances the possibility of accidents. Also, to accommodate a large traffic volume, there is a need to channelize the traffic. Therefore, it became imperative to re-design the intersection to provide smoother and safer traffic movement.

1. INTRODUCTION

1.1 General Introduction

This project involves design of Intersection at **Chandra Shekhar Patil Bilagundi circle** for smooth flow of traffic and also to avoid conflicts at the intersection. In recent years, the intense growth of vehicles has caused heavier traffic congestions on the roads and intersections, which are even worse during the peak traffic time. An intersection which is not proper designed as per IRC guidelines, will increase the travel time of the vehicles cause delays and also cause more traffic accidents or conflicts. Besides, if the channelization of the intersection is not reasonable, road surface deterioration will be more serious within the intersection area due to many factors such as frequent start-stop, slow speed. Therefore, it is necessary to make the design of the intersections more accurate and efficient. The basic principles considered for the design includes the principles of uniformity & simplicity, minimize conflict points, and alignment & profile. A detailed survey of the study area was conducted to determine the entry, and exit radius of rotary and peak hour traffic volume was estimated through traffic volume survey which is calculated manually Traffic volume is incrementing at an alarming rate, so it becomes extremely difficult for traffic police to control the traffic manually at the intersections. For proper management of traffic stream at the Chandra Shekhar Patil Bilagundi circle intersection and to reduce the accidents at the crossing, there seems to be an urgent need to design a rotary intersection at the junction.

Classification of Intersections

Intersections may be classified into two broad groups:
(i) At Grade Intersection and
(ii) Grade Separated Intersection.

1.1.1 Intersection at-grade

These include all roads which meet at more or less the same level. The traffic manoeuvres like merging, diverging and crossing are involved in the intersections at grade. The intersections at grade are further classified into three categories:

1.1.2 Un-channelized intersections

In these types of intersections, the entire intersection area is paved and the vehicles are free to use any part of intersection area. They can be of several types like tee (plain), tee (flared), cross (plain), cross (flared on one end) and skew (plain). These types of intersections are generally suitable for very low traffic volume. As the traffic volume increases, the intersection will have to be upgraded to a channelized intersection.

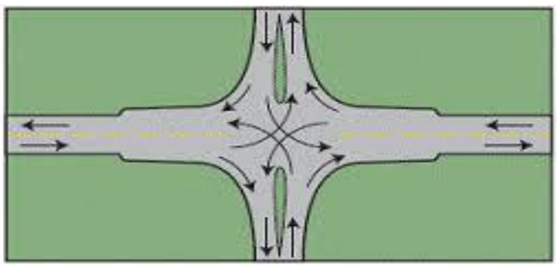

Fig:1.2.2 Channelized intersection

1.1.3 Channelized intersections

It is achieved by introducing islands into the intersection area in order to channelize the traffic flow into appropriate streams. Channelizing islands 'channelize' the turning traffic into appropriate paths, control the angle of approach of vehicles coming from different legs, reduce the relative speed and decrease the conflict area at the intersections. If the relative speed of two vehicles is low then the chances of collision between them is less.

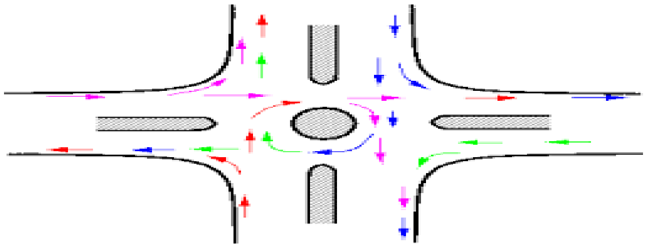

Fig:1.2.3 Channelized intersections

1.1.4 Grade Separated Intersection

The grade separated intersections have roads which are separated by a difference in level, and eliminates the crossing manoeuvres. These are also known as interchanges. Grade separated intersections cause less hazard or conflicts and also reduce the traffic delay than at-grade intersections. The transfer of routes at grade separations take place through interchange facilities consisting of ramps. They are majorly classified as flyovers and interchanges. Flyovers are sub-divided into overpass and underpass. At the crossing of two roads, when the road containing the major portion of the traffic stream is elevated to a higher grade, then it is known as an overpass and in case of depression of the major road, it is termed as an underpass an interchange is a road network in which the traffic in different roads flow at different levels. These can be trumpet, diamond or clover leaf type. The main function of grade separated intersections is to eliminate all the crossing conflict points where possible path of two vehicles does not intersect or to reduce potential hazards by reducing the manoeuvres area and to accommodate other intersecting manoeuvres by merging, diverging and weaving at low relative speed to avoid collision between the vehicles.

1.1.5 Classification of Grade Separated Intersection

One of the differences made in type of interchange is between the directional and the nondirectional interchange. Directional interchanges are those having ramps or turning roadways that tend to follow the natural direction of movement. They are preferred where two high-volume freeways intersect. They eliminate weaving movements, increase ramp speed and capacity, and reduce travel distance. Non directional interchanges need a modification within the natural path of traffic flow.

1.1.6 Rotary Intersection

A traffic rotary or a roundabout is a special form of at-grade intersections where in a unidirectional flow of traffic takes place around a large central island before the vehicles can weave out of traffic flow into their respective directions radiating from the central island. In India, 'keep to the left' regulation is followed and also clock-wise direction of flow around the central island is followed. In a rotary intersection there is a smooth and efficient flow of traffic. All traffic proceeds at a fairly uniform speed. Frequent stopping and starting of vehicles are avoided. Crossing movements are converted into weaving or merging and diverging operations. Direct conflict is eliminated. Thus the journey is more consistent and comfortable. The design of rotary elements needs special considerations, depending upon each site requirement. No standard design can be fitted into any given set of site conditions.

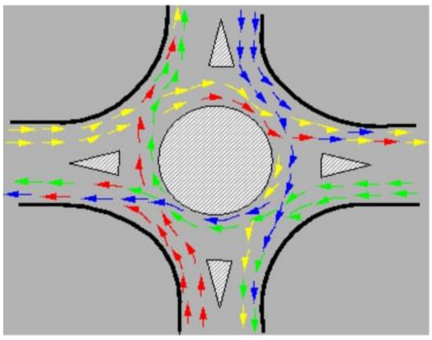

Fig:1.2.6 Traffic maneuvers in a rotary

1.1.7 Advantages of Rotary Intersection

- The vehicles entering a rotary are gently forced to reduce the speed and continue to move at slower speed which prevents the stopping of vehicles at the intersection.
- Traffic flow is regulated to only one direction of movement, thus eliminating severe conflicts between crossing movements.
- They are ideally suitable for moderate or high traffic, or intersections with a minimum of three or four approaches.
- Rotaries are self-governing and do not need practically any control by police or traffic signals.
- Due to decrease in the speed of vehicles, severe conflicts and accidents are eliminated and their severity are much less in rotaries.

1.1.8 Limitations

- All the vehicles are forced to slow down and negotiate the intersection. Therefore, the cumulative delay is higher.
- Rotary construction is not justified for low traffic volume.
- Rotary requires a large area of land which involves a high total cost.
- At rotary, vehicles do not usually stop. They speed up and exit the rotary at relatively high speed. Therefore, they are not suitable when there is high pedestrian movements and large number of cyclists.

- Rotaries are unsuitable when the angle of intersection of two roads is too acute or when there are more than seven intersecting roads.

1.1.9 Guidelines for the selection of rotaries

- A rotary intersection is effective when the traffic volume ranges between 500-3000 vehicles per hour.
- Rotaries are suitable when there is a minimum difference in traffic entering from each of the approach roads.
- Rotaries are suitable when there are more than three or four approaches or if there is no separate lanes available for right-turn traffic.
- A rotary is incredibly helpful when the proportion of the right-turn traffic is incredibly high, (if around 30 percent).

1.2 Traffic operations in a rotary

The traffic operations in a rotary are of three types: diverging, merging and weaving. The conflicts are converted into these three less severe conflicts.

1. **Diverging:** It is an activity operation in which the vehicles moving in a single direction are dispersed into various streams as per their destinations.

2. **Merging:** Merging is the opposite of diverging. It is the process of joining the traffic coming from different directions and meeting into a single stream.

3. **Weaving:** Weaving is the combined operation of both merging and diverging movements in the same direction. Crossing manoeuvre is changed over into weaving or merging and divergent operations. It is basically a type of crossing manoeuvre in which the angle of intersection is quite less.

The weaving manoeuvre consists of:

(i) A merging manoeuvre from the left and diverging out to the right.
(ii) (ii) A merging from the right and a diverging out to the left.

1.3 Scope of the Project

The scope of this project is to Re-design the intersection efficiently, to deal with the increasing traffic volume and reduce the number of conflicts, accidents and their severity at the junction of **Chandra Shekhar Patil Bilagundi circle**. It extends up to taking into consideration the changes in the traffic volume of the roads at the junction. The project extends up to the determination of the capacity of the intersection in terms of traffic volume. If the capacity of the junction exceeds after the widening of the Junction then it would be necessary to design an efficient signal system for the intersection or design a grade separated intersection (if the traffic volume is increased abnormally).And To aids the process of developing a precise data rich, virtual 3D representation of existing and proposed elements belonging to programmed construction projects.

1.4 Study Area

The area of study for this project is **Chandra Shekhar Patil Bilagundi circle**, district Kalaburagi. There exists a Four-way intersection in which one road stretches towards Kalaburgi Govt District Hospital, the other towards Sedam and the third one towards Humanabad and fourth one towardsJewargi.

Fig:1.6.1 Traffic manoeuvers at Chandrashekar Patil Intersection

3. OBJECTIEVES

1. To design the intersection on the basis of outcomes of traffic volume survey.
2. To check whether the road has adequate capacity to accommodate future traffic volume.
3. To minimize the number & severity of potential conflicts.
4. To provide a digital representation of the physical and functional characteristics of the intersection.

4. METHODOLGY

4.1 Field Data collection

Following are the field data collected at **Chandra Shekhar Patil Circle**

Approach width on SedamRoad: 22 mtr
Approach width on Govt Hospital Road: 22.60 mtr
Approach width on JewargiRoad: 17.1 mtr
Approach width on HumanabadRoad: 17.1 mtr
Area Available for Roundabout is=996 sqm

4.2 Traffic Volume Study

The traffic survey is conducted manually on alternate days of week i.e.,Monday, Wednesday, Friday. converted in PCU considered the peak hours traffic i.e **2710 PCU/Hr** for the design of intersection. Details of traffic survey and PCU values are Shown Below from Table 4.2(a) to 4.2.(f) and the Directional Distribution of Traffic Across Rotary is shown in Fig 4.2

Table 4.2(d) Traffic Data (Date: 23/06/2021(Wednesday)Time: 4:30 PM to 5: PM)

Manoveure	Two-wheeler	Car / Auto	Bus / Truck	Net PCU in Single Manoveure
	0.5 PCU	1PCU	3PCU	
SEDAM ROAD				
Sedam Road to Jewargi Road	110	48	21	**166**
Sedam Road to Govt Hospital Road	382	316	12	**543**
Sedam Road to Humnabad Road	81	116	46	**294.5**
JEWARGI ROAD				
Jewargi Road to Govt Hospital Road	42	41	4	**74**
Jewargi Road to Humnabad Road	156	96	51	**327**
Jewargi Road to Sedam Road	63	65	15	**141.5**
GOVT HOSPITAL ROAD				
Govt Hospital Road to Humnabad Road	29	28	6	**60.5**
Govt Hospital Road to Sedam Road	268	152	7	**307**
Govt Hospital Road to Jewargi Road	98	62	4	**123**
HUMNABAD ROAD				
Humnabad Road to Sedam Road	82	86	18	**181**
Humnabad Road to Jewargi Road	193	116	63	**401.5**
Humnabad Road to Govt Hospital Road	46	59	3	**91**
			Total PCU	**2710**

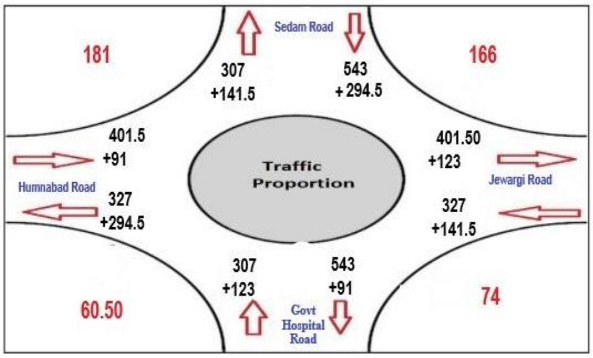

Fig 4.2 Directional Distribution of TrafficAcross Rotary

4.3 Theoretical Design of Rotary

The design procedure for rotary intersection at **Chandra Shekhar Patil Bilagundi circle** is given in Table no 4.4(b) and design parameters calculated in Table no 4.4(c)

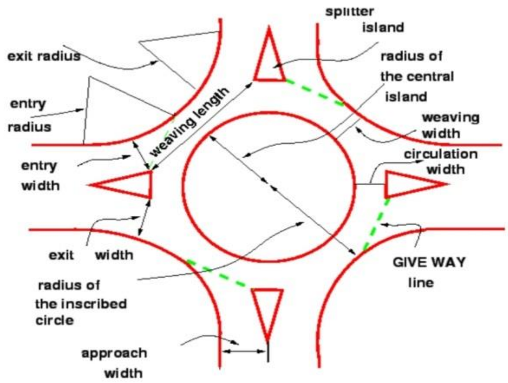

Fig. 4.3.A typical rotary intersection.

4.4 Calculation of Design Parameters as per IRC-65,1976

a) Shape of Central Island

The shape of Rotary Island depends upon the number and layout of the intersecting roads. There are various shapes for Central Island like circular, elliptical, tangent, turbine. But for our design we provide circular shape for Central Island because all the radiating roads are symmetrical also in circular shape there is a proper speed control.

b) Design Speed

The design speed for national highways is 80kmph. In urban areas at plains, the speed at the rotary is restricted to 30 kmph as per IRC-52:2001. So it is found that in plains, the speed of vehicles at the rotary is reduced by 37.5% of the design speed.

c) Minimum radius of horizontal curve

The minimum radius of horizontal curve is calculated from the formula given in the design table step 3. But in this formula the superelevation (e) is taken zero because in a rotary it is not possible to provide adequate superelevation so it is safer to neglect the superelevation and consider only friction factor.

d) Value of friction coefficient

The value of friction coefficient 'f' is taken as 0.43 and 0.47 in rotary intersection for the speeds 40 kmph (for rural area) and 30 kmph (for urban area).

e) Radius of Central Island

The radius of Central Island is 1.33 times of entry radius as perIRC-65:1976.

f) Radius of entry curve

Entry radius depends on various factors like design speed, super-elevation, and coefficient of friction. Entry to the rotary is not straight, but a small curvature is introduced, this will force the driver to reduce the speed. The IRC has given the radius of entry curve to be 20-35 m for speed of 40 kmph and a radius of 15-25m for speed of 30 kmph.

g) Radius of exit curve

Exit radius should be higher than the entry radius so that the vehicles will leave from the rotary at a higher speed. As per IRC guidelines the exit radius is to be kept as 1.5 to 2 times the entry radius.

h) Width of entry (e1)

The width at entrance and exit of a rotary is depend on the amount of traffic entering and leaving the rotary. The IRC-65:1976 has given the values of width of carriageway at entry given in the following table 4.4.1

Table 4.4(a) Carriage Way Width

Carriage way width of the approach road	Radius at entry (m)	Width of carriageway at entry and exit (m)
7 m (2 lanes)	25-35	6.5
10.5 m (3 lanes)		7.0
14m (4 lanes)		8.0
21m (6 lanes)		13.0
7 m (2 lanes)	15-25	7.0
10.5 m (3 lanes)		7.5
14m (4 lanes)		10.0
21m (6 lanes)		15.0

i) Width of non-weaving section (e2)

The width of non-weaving section should be equal to the width of entry and should generally be less than the width of weaving section (W).

So, generally **e2 = e1 and e2<W**

j) Capacity of the Rotary

Practical capacity of the rotary is equal to the capacity of the weaving sectionwhich can accommodate the least traffic. Capacity of individual weaving section is given by:

$$Q_p \quad (PCU/hr) = \frac{280W\left(1+\frac{e}{W}\right)\left(1-\frac{p}{3}\right)}{\left(1+\frac{W}{L}\right)}$$

k) Channelizing Islands

Channelization reduces the area of conflict between intersecting traffic streamsand promotes orderly and safe movement. Channelizing islands are provided atthe entries and exits of a rotary.

4.4.1 CAPACITY OF ROTARY

The practical capacity of the rotary is dependent on the minimum capacity of the individual weaving section the capacity is calculated from the formula:

$$Q_p \quad (PCU/hr) = \frac{280W\left(1+\frac{e}{W}\right)\left(1-\frac{p}{3}\right)}{\left(1+\frac{W}{L}\right)}$$

Where,

Qp = practical capacity of the weaving section in PCU per hour.

W = width of weaving section (6 to 18m)

$W = [(e_1+e_2)/2+3.5]$

e = average width of entry e1 and width non weaving section e2

L = length of weaving section between the ends of channelizing island in m

p = proportion of weaving traffic given by

p =b + c

a+b+c+d

a = left turning traffic moving along left extreme lane

d = right turning traffic moving along right extreme lane

b = crossing/weaving traffic turning toward right while entering the rotary

c = crossing/weaving traffic turning toward left while leaving the rotary

Calculations

e = (10+10)/2 =10.00 Mtr.
W = {(10+10)/2} +3.5 = 13.5 Mtr
L = 4xW = 4 x 13.5 = 54 Mtr

1. Sedam Road

Weaving Ratio (P) = (837.50+524.5)/(166+837.50+524.5+91) = 0.84

$$Qp = \frac{280 \times 13.5 \times \{1+(10/13.5) \times (1- [0.84/3])\}}{1 +(13.5/54)}$$

Qp = 3790 PCU/hr

2. Jewargi Road

Weaving Ratio (P) = (468.50 + 634)/(74 + 468.50+ 634+ 294.50) = 0.75

$$Qp = \frac{280 \times 13.5 \times \{1+(10/13.5) \times (1- [0.75/3])\}}{1 +(13.5/54)}$$

Qp = 3948 PCU/hr

3. Govt Hospital Road

Weaving Ratio (P) = (430 + 621.5)/(60.50 + 430 + 621.50 + 41.50) = 0.84

$$Qp = \frac{280 \times 13.5 \times \{1+(10/13.5) \times (1- [0.84/3])\}}{1 +(13.5/54)}$$

Qp = 3790 PCU/hr

4. Humnabad Road

Weaving Ratio (P) = (492.50 + 448.50)/(181 + 492.50 + 448.50+ 123) = 0.76

$$Qp = \frac{280 \times 13.5 \times \{1+(10/13.5) \times (1- [0.76/3])\}}{1 +(13.5/54)}$$

Qp = 3931 PCU/hr

The capacity of rotary is the minimum of the capacity of all the weaving section. Now it is seen from the above result the therotical capacity of the rotary is 3790 PCU/hour. And the total traffic entering the intersection as per traffic survey data is 2710 PCU/hour. which is more than the required so that design is acceptable.

By considering above Maximum and minimum P values the required design parameters of Rotary are calculated as shown in Table no 4.4(c)

Table 4.4(c) Design Parameters

Design Parameters	Evening peak traffic volume 2710 PCU/hr	
Shape of the Central Island	Circular	Circular
Design Speed	30km/hr	30km/hr
Radius of Horizontal curve	15	15
Value of friction coefficient	f=0.47	f=0.47
Radius of Entry curve	15	15
Radius of Exit curve	30	30
Width of Entry (e1)	10	10
Radius of Central Island	20.00	20.00
Width of Non weaving section (e2)	10	10
Width Of weaving section (W)	13.50	13.50
LengthOf weaving section (L)	54	54
weaving Ratio (P)	0.84	0.75
Practical Capacity of Rotary	**3790 PCU/Hr**	3948 PCU/Hr

4.4.2 Traffic Data and Pavement Design

For the design of roundabout and approach pavement the traffic data is taken from traffic data table, and the summery of traffic count is given below in table no 4.4(d)

Table no 4.4(d) Summary of 3 Day traffic count

Day	**Day-1**	**Day-2**	**Day-3**	**Average 2 hr traffic**	**CVPD**
Date	21-07-2021	23-07-2021	25-07-2021		

Two wheelers	2586	3097	2709	2797	
Car/ Auto	2049	2405	2160	2205	
Trucks/Trailers	427	478	509	471	5656
Total				**Total CVPD**	**5656**

CBR Taken as 5%

$$N = \frac{365 * (1+r)^{(n-1)} * A * D * F}{r}$$

Where,

N :- Cumulative number of standard axles to be catered in the design in terms of msa.

r :- Commercial Vehicles Annual growth rate in decimal (5% as per IRC 37-2012)

n :- Design life in years.(10 years)

D :- Lane Distribution Factor (0.75 as per IRC 37-2012)

F :- Vehicle Damage Factor (4.5 as per IRC 37-2012)

A :- Initial traffic in the year of completion of construction of interms of CVPD.

$A = P(1+r)^x$

Where,

P :- Number of commercial vehicles as per last count.

x :- Number of years between the last count and the year of completion of construction.

$A = 5656*(1+0.05)^1$

A = 5938.8

$$N = \frac{365*(1+0.05)^{(10-1)}*5938.8*0.75*4.5}{0.05}$$

N = 92 msa.

Design catalog using IRC 37-2012

For 79 msa design traffic and for CBR of 5% , following are the pavement structure thickness obtained from the code and given below in table 4.4(e) and quantity of material required is calculated in table no 4.4(f)**Table no 4.4(e) pavement tructure thickness**

Layer	Thickness (mm)
Subgrade	300
Granular subbase	300
Granular Base (WMM)	250
DBM	130
BC (VG40)	50

Table no 4.4(f) Quanity of pavement structure materials

Item	Length of pavement (m)	Breadth (m)	Thickness (m)	Quantity (cum)
Subgrade (CL)	Π*53.5=168.07	20	0.300	1008.42
(AR)	4*42.50=170	15	0.300	765
Gsb (CL)	168.07	20	0.300	1008.42
(AR)	170	15	0.300	765
WMM (CL)	168.07	15	0.250	360.26
(AR)	170	10.5	0.250	446.25
DBM (CL)	168.07	15	0.130	327.73
(AR)	170	10.5	0.130	232.05
BC (CL)	168.07	15	0.050	126.05
(AR)	170	10.5	0.050	89.25

Total Quantity = 5398.44 cum

CL – Circulatory Length

AR-Aproach Road

4.5 Workflow procedure of BIM Software

The intersection design process using AutoCAD Civil 3D is presented. Theoretical design of the same road intersection has also been demonstrated. In this Project, we are designing Intersection with the help of AutoCAD Civil 3D software. Due to AutoCAD Civil 3D, we can design good intersection in less time with more accuracy. Manual design takes a lot of time and accurate reports are not available. AutoCAD Civil 3D is very useful for the future projects. Today, AutoCAD Civil 3D software is being used for road design so that we can do good design in less time and less money.

- We will start with InfraWorks 360 software &import the cloud file into the Civil3D software
- Then we will move it into AutoCAD Civil 3D software for the detailed design and construction documentation phases.
- Create Surface
- Create Alignment on the surface
- Create Alignment Profile
- Create Round About for Junction
- Create Corridor for Alignment
- View in object viewer
- Validate the design components coming from AutoCAD Civil 3D software
- We will perform various types of analysis along the way to validate the design and be sure that design parameters are being met.

Figures shown beow are from AutoCad civil 3d software which showin the different parameters Views of Rondabout i.e Entry curve ,Exit curve ,Radius of Central Island, Appron wdth, Radius of Inscribed Circle Diameter, Circulatory Width, Exit Fillate Radius, Approach Fillate Radius, Splitter Island Length, Entry Fillate Radius, Civil 3D Model of Roundabout Surface, Civil 3D Conceptual View Of Roundabout, Civil 3D Model View Of Roundabout On Proposed Point,

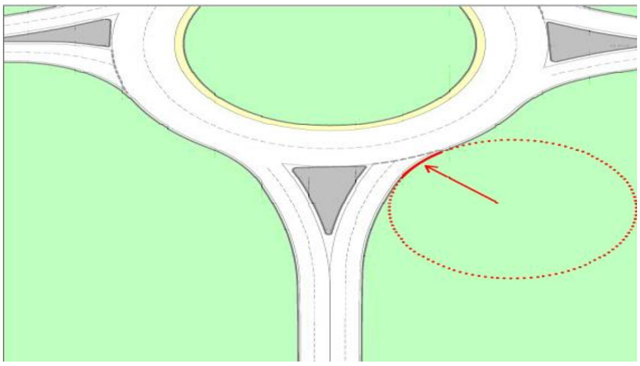

Fig: 4.5(a) Radius of Exit Curve

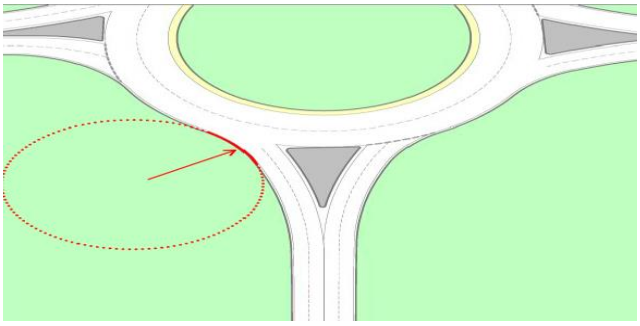

Fig: 4.5(b) Radius Of Entry Curve

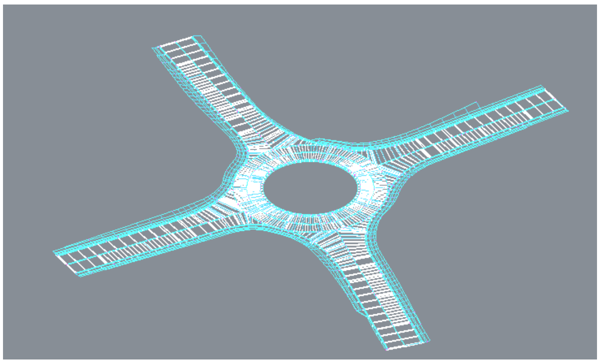

Fig:4.5(k) Civil 3D Modelof Roundabout Surface

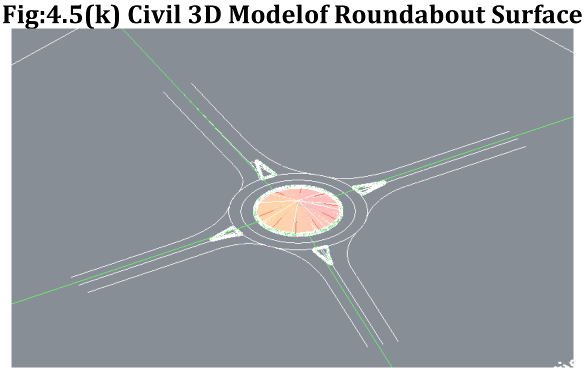

Fig:4.5(l) Civil 3D Conceptual View Of Roundabout

Fig: 4.5(m) Civil 3D Model View Of Roundabout On Proposed Point

4.6 Estimation Cost for Central Island and Approach Road:

Absract of cost estimate for construction of Roundabout calculated below table no 4.6 by obtaining the material quantity from table no 4.4.2.3 and from Civil 3d Quantity. And considering the Rates from PWD SR 2018-19 Kalaburagi circle.

Table 4.6 Abstract for cost estimation

Description	Unit	Quantity	Rate (RS)	Amount (RS)
M 20 Concrete	Cum	78.23	4716	368932.70
Steel	Kg	78	58	4524
Bitumen Concrete	Cum	215.30	6436	1385670.8
DBM	Cum	559.78	4395	2460233.1
WMM	Cum	1076.51	1875	2018456.25
GSB	Cum	1773.42	655	1161590.1
Sub Grade	Cum	1773.42	276	489463.92
Total				**7888870.85**

Add 12% GST = 946664.50

Total cost = 8835535.35

5. RESULTS

From the data collection and data analysis we obtained the fallowing results.

1. In the preliminary survey at the project site,we had discussed with traffic police personnel, street vendors and nearby shopkeepers of commercialcomplexesatChandrasekhar Patil intersection regardingthe peak hours of the traffic and found thatpeak hours of the traffic are, from morning at 8:30 AM to 11:30 AM & eveningat 3:30 PM to 06:30 PM, and by taking the traffic volume of these 6 hrs on alternate days we obtained the peak traffic.

2. Peak hour Traffic volume.

- From Sedam Road peak hour volume 1003.5 PCU/hr.
- From Humanabad Road peak hour volume 673.5 PCU/hr.
- From Jewargi Road peak hour volume 542.5 PCU/hr.
- From Govt.Hospital Road peak hour volume 490.5 PCU/hr.
- Total traffic coming on Rotary intersection is 2710 PCU/hr.

3. Practical capacity of Rotary intersection is 3790 PCU/hr Which is greater than the total traffic entering the intersection as per traffic survey data i.e 2710 PCU/hour Hence the design is acceptable.

4. The approximate cost for a rotary is 88.35 Lakhs

5. The Model of Roundabout is created by using Civil 3D.

6. For Roundabout Total Required AreaApproximately is 3739 sqm, Available area is 996 sqm so Remaining 2743 sqm area has to acquired.

7. By considering 7.5% traffic growth rate per annum (As per IRC 108 2015), proposed Roundabout will sustain for 5 years, after that we should go for Signalized system.

6. CONCLUSIONS

1. In our study we performed surveys and accumulate traffic data which was required for designing roundabout, and after studying all necessary requirements and calculation we found that capacity of designed roundabout is 3790PCU/hr. whereas maximum required capacity for concerned intersection is 2710PCU/hr. hence we can conclude that designed roundabout can efficiently handle present traffic flow as well as if in future there is increase in rate of traffic flow, designed roundabout is capable for managing the traffic. Apart from this if roundabout is provided at said intersection, then traffic congestion will be reduced to some extent as well as the halt time of vehicles at intersection will be minimized. As discussed above roundabout has far less conflict points than signalized intersection so by providing designed roundabout pedestrian safety can also be achieved.

2. The design speed at the intersection is found to be 30 kmph.

3. Further by providing Channelizing islands reduces the area of conflict between intersecting traffic streams and promotes the safe movement of vehicles.
4. When the capacity of rotary increased above 3790 PCU/hr then this Rotary intersection should beprovided with a signaling system.

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