

DESIGNING OF ROTARY INTERSECTION USING AUTOCAD CIVIL 3D SOFTWARE

Akhilendra Bahadur Singh¹, Dr. R.K. Pandey², Er. Atul³, Shivam Pandey⁴

^{1,4}PG Student Department of Civil Engineering, Vaugh Institute of Agriculture Engineering and Technology
Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, U.P, India.

² Professor, Department of Civil Engineering, Vaugh Institute of Agriculture Engineering and Technology
Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, U.P, India.

³ Assistant Professor, Department of Civil Engineering, Vaugh Institute of Agriculture Engineering and Technology
Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, U.P, India.

Abstract— *The problem of transportation has been going on for centuries. A lot of improvements have also been made in it. Highways have been built to make transportation easy and convenient so that one can easily go anywhere and easily accessible from one place to another. Vehicles run very fast on the highway, due to the speed, there is an accident and a problem of jam. To make it work, intersection is described in this paper about rotary intersection. Traffic and accidents can be reduced by making rotary intersections. Due to the intersection, the pedestrian will also be able to cross the road. The aim of the paper is to demonstrate how easily and accurately rotary intersection design can be performed in a very short period of time.*

The intersection design process using AutoCAD Civil 3D is presented. Manual intersection design of the same road has also been demonstrated. In this paper, I am designing Intersection with the help of AutoCAD Civil 3D software. Due to AutoCAD Civil 3D, you can design good intersection in less time and in less money. Manual design takes a lot of time and a lot of money and accurate reports are not available. AutoCAD Civil 3D is very used in the future. Today, AutoCAD Civil 3D software is being used for road design so that we can do good design in less time and less money. This helps visualize the design in the 3D scene, reducing time and budget. It also has a lot of benefits of using AutoCAD civil 3D.

Keywords — *Highway, Rotary Intersection, AutoCAD Civil 3D, Cutting and Filling Report, Volume Report*

INTRODUCTION

The population in India is increasing a lot and due to this the traffic problem is increasing a lot, nowadays everybody has started buying their own vehicles. This has led to congestion on roads and squares in the city. Highway is very important in our life for travel. It is very important for every type of travel such as for some work or for moving goods from one place to another or for vacation holiday travel. Many companies ship their goods from one place to another by road. It helps us in every kind of development whether it is social or health related or science. Divide the highway into lanes, we can provide 2 lanes, 3 lanes and 4 lanes According Design Place. Given as IRC 65 guidelines rotary intersection at a place with a maximum of 3000 PCU / hr and a minimum of 500 PCU / hr. So if I got more than 3000 PCU / hr traffic at the Medical Crossroad Rotary Intersection at Peak Hour also, it creates traffic congestion due to sometime traffic jam in the rotary.

Traffic congestion problems are the highest in many urban areas of Prayagraj city. These problems are the main hurdles at the intersection along with the movement of vehicles on the roads. Running vehicles on the highway causes traffic problems and high speed vehicles cause accident problems and traffic problems. To reduce the problem of traffic and accident, we give intersection. The area location in this paper is a very traffic problem, hence the help of AutoCAD Civil 3D, which is designing intersection to reduce the traffic So that the traffic problem there is much less than before. Intersection divides a road into two parts so that the vehicle can easily make a right turn or left turn. It is very difficult to give intersection on the highway because vehicles at very high speeds pass in different directions. All traffic flow performance depends on intersection. Rotary intersection is also called traffic rotary. It is very large and vehicles cross here at low speeds without interruption. All the vehicles come via multiple routes and go through single direction from Central Island and need go out towards the road.

Traffic congestion has become a huge issue and it is increasing day by day. Due to the congestion problem, the services of vehicles are costing a lot and there is also a delay in going anywhere. Due to the intersection, the vehicles will cross the intersection at a lower speed and exit the required direction. AutoCAD Civil 3D software is a civil engineering design and documentation tool developed by Autodesk. AutoCAD Civil 3D software is used in designing roads, rails and building. AutoCAD Civil 3D is used by civil engineers and professionals. With this software, any project can be easily described at one place. Due to AutoCAD Civil 3D, we can design better intersection in less time and in less money. With this software, we can create accurate data and reports. Due to AutoCAD Civil 3D we can edit any project by editing it. Redesign can be done in less time and less money. With this software we can update our project.

DESIGN METHODOLOGY

A. STUDY AREA AND LOCATION

The study area is Medical Chauraha is located in Prayagraj (Allahabad) district Uttar Pradesh. Existing area consists of flexible road. The intersection point link two roads one is Mahatma Gandhi Marg and second is Lowther Road.



Fig. 1 Google map image of the study area

B. DATA COLLECTION

The ground surface data are required for designing the geometry of highways and Intersection. The point Cloud file surface file was obtained from the firm handling the development of the road. The survey information is in the form of point cloud file having the file extension as point cloud.

C. DESIGN CRITERIA

INTERSECTION

- Design Speed=30kmph
- Number of Lanes =4
- Entry Radius=20m
- Exit Radius=40m
- Radius of central Island=26m
- Entry Width=7m
- Exit Width=7m
- Carriageway Width=16m
- Weaving Width=11m
- Weaving Length=30m

D. DESIGN PROCEDURE

- Import the cloud file into the Civil3D software
- Create Surface
- Create Alignment on the surface
- Create Alignment Profile
- Create Assemble for corridor
- Create Corridor for Alignment
- View in object viewer

The below figures shows the design procedure of Intersection

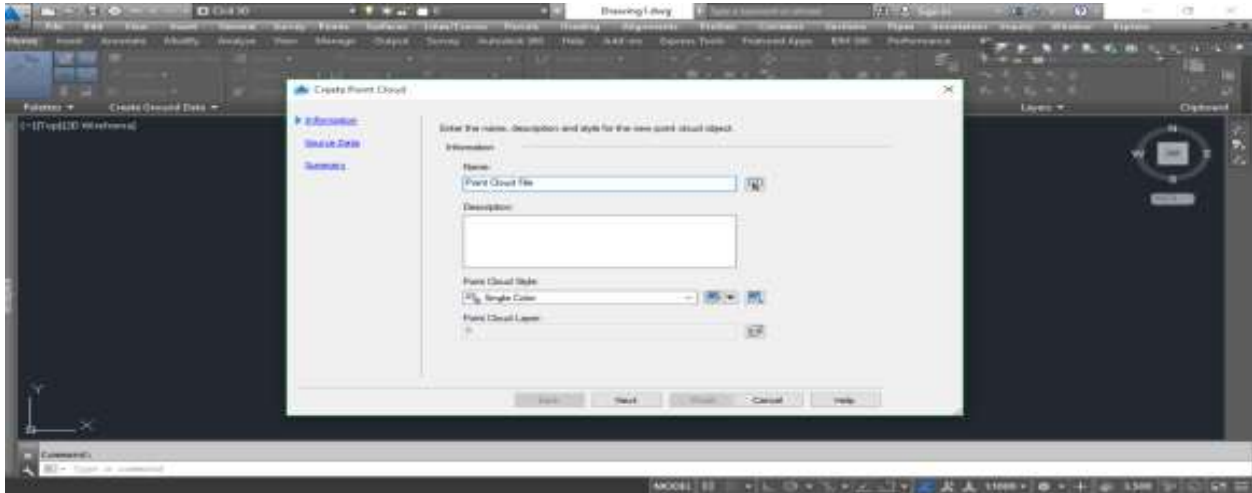


Fig.2 importing file into Civil3d software

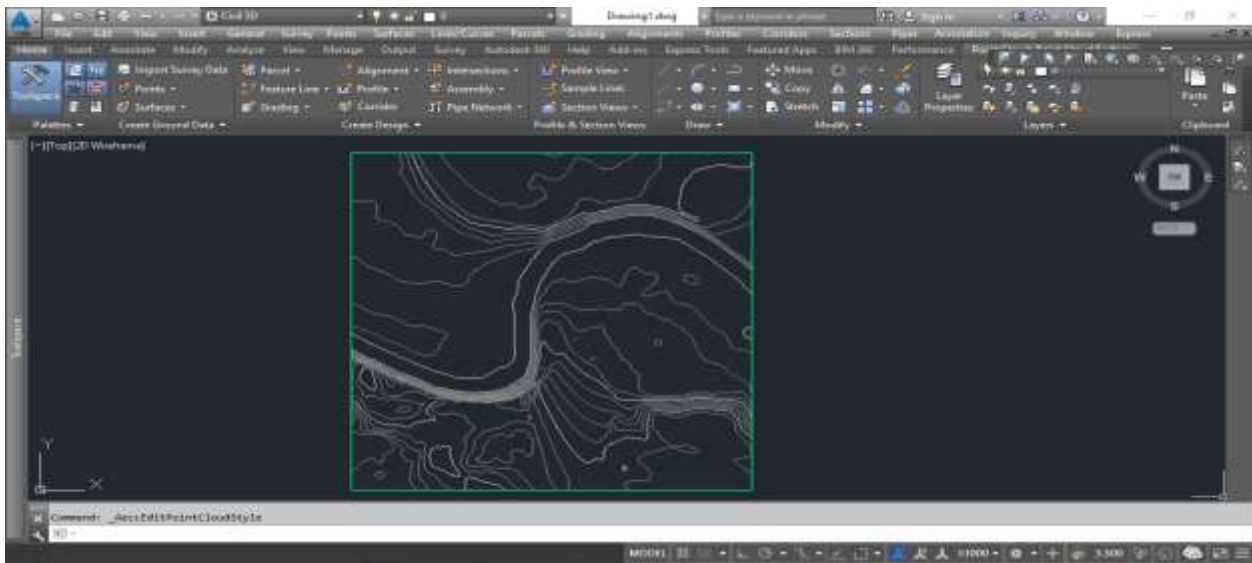


Fig.3 Point Cloud Surface

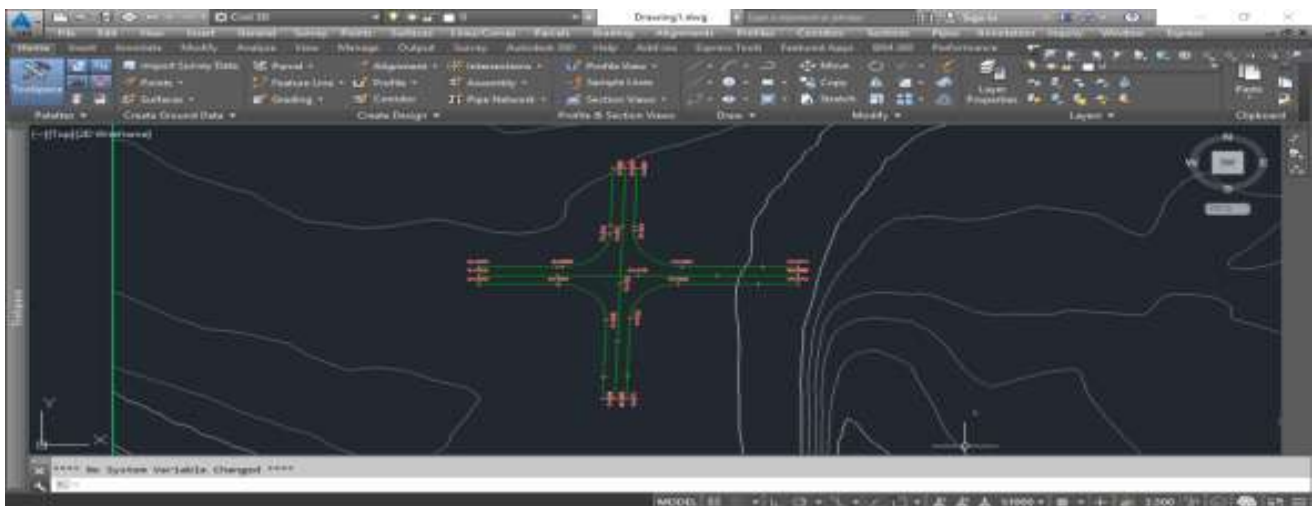


Fig.4 Alignment of intersection

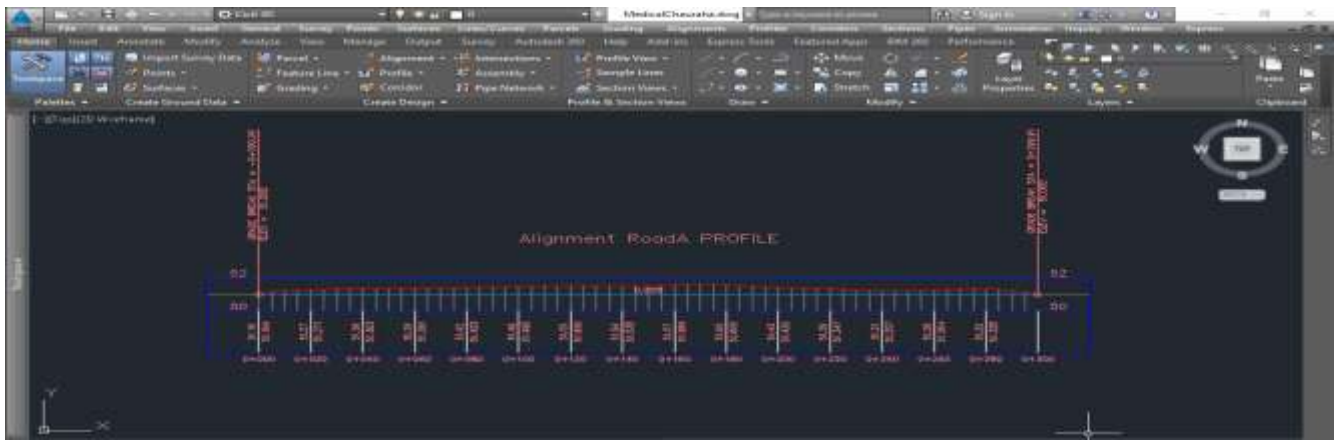


Fig.5 Profile of Alignment Road A

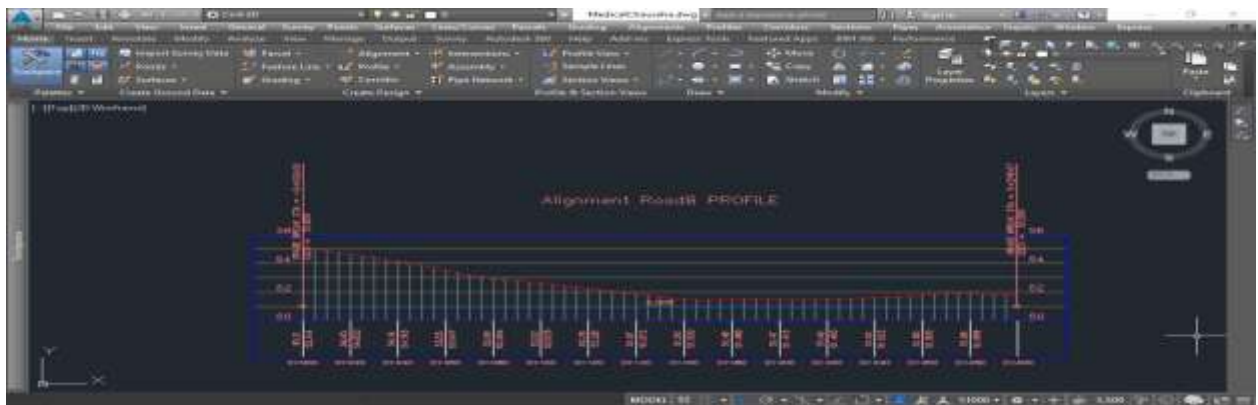


Fig.6 Profile of Alignment Road B

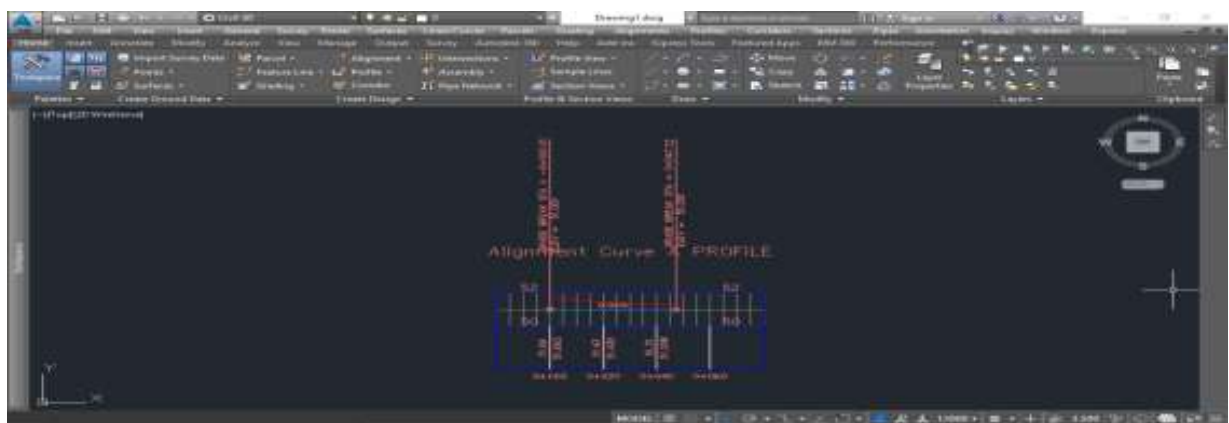


Fig.7 Profile Of intersection alignment

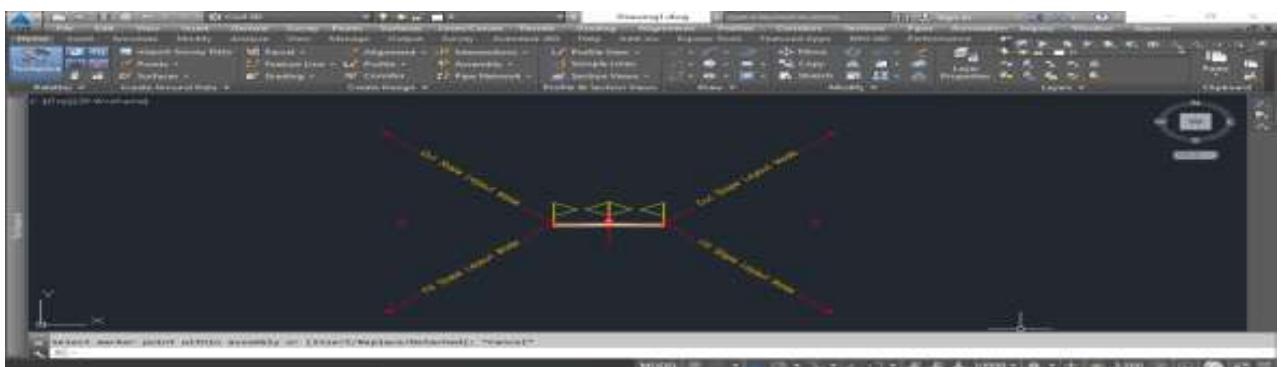


Fig.8 Assembly

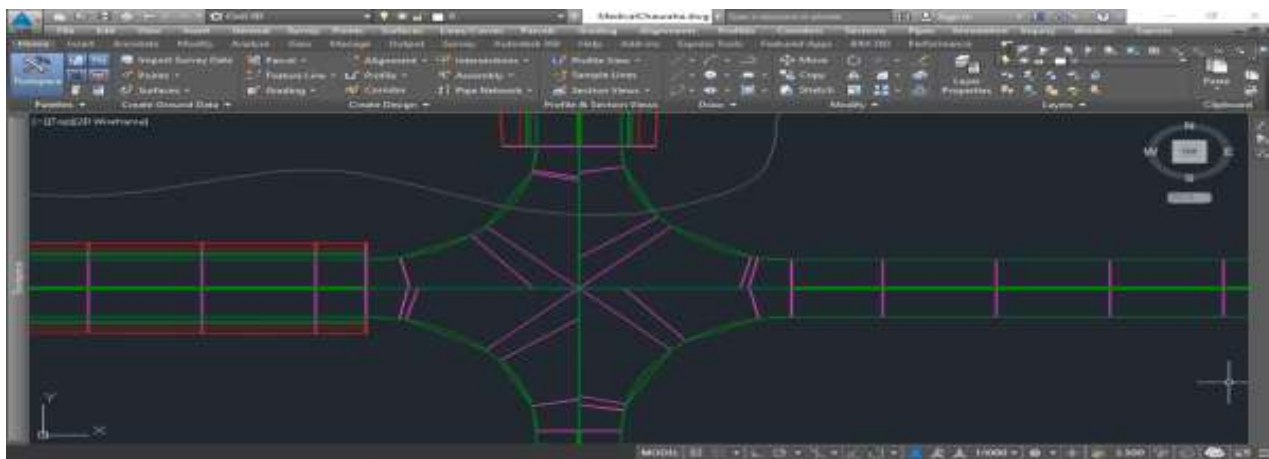


Fig.9 Corridor of the Intersection

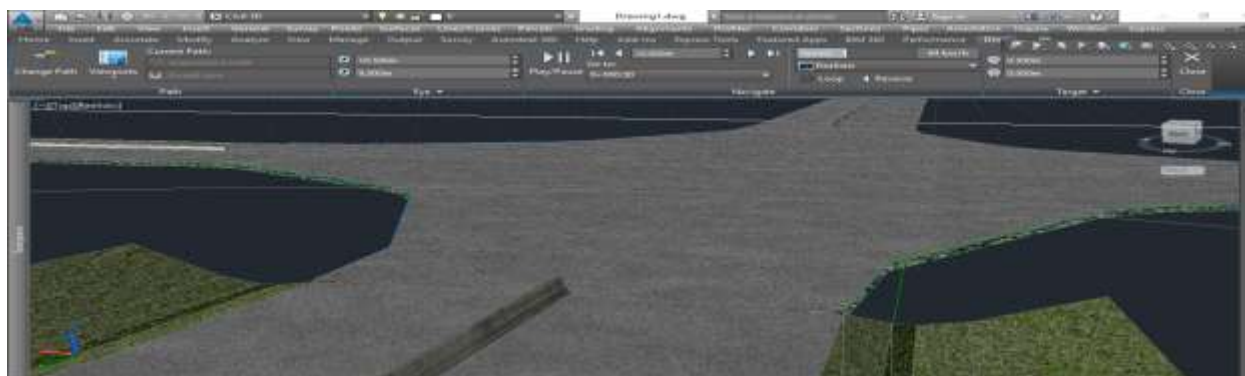


Fig.10 Perspective view of the Intersection

OUTPUT

TOTAL VOLUME REPORT

Station	Cut Area (Sq.M.)	Cut Volume (Cu.M.)	Reusable Volume (Cu.M.)	Fill Area (Sq.M.)	Fill Volume (Cu.M.)	Cum. Cut Vol. (Cu.M.)	Cum. Reusable Vol. (Cu.M.)	Cum. Fill Vol. (Cu.M.)	Cum. Net Vol. (Cu.M.)
0+020.00	1,185.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
0+040.00	1,217.91	24,035.54	24,035.54	0.00	0.00	24,035.54	0.00	0.00	24,035.54
0+060.00	1,225.99	24,439.05	24,439.05	0.00	0.00	48,474.60	0.00	0.00	48,474.60
0+080.00	1,233.31	24,593.09	24,593.09	0.00	0.00	73,067.69	0.00	0.00	73,067.69
0+100.00	1,245.81	24,791.29	24,791.29	0.00	0.00	97,858.98	0.00	0.00	97,858.98
0+120.00	1,252.21	24,980.20	24,980.20	0.00	0.00	122,839.18	0.00	0.00	122,839.18
0+140.00	1,181.88	24,340.81	24,340.81	0.00	0.00	147,179.98	0.00	0.00	147,179.98
0+160.00	1,061.05	22,429.22	22,429.22	0.00	0.00	169,609.20	0.00	0.00	169,609.20
0+180.00	938.51	19,995.59	19,995.59	0.00	0.00	189,604.79	0.00	0.00	189,604.79
0+200.00	810.48	17,489.90	17,489.90	0.00	0.00	207,094.68	0.00	0.00	207,094.68
0+220.00	783.85	15,943.27	15,943.27	0.00	0.00	223,037.95	0.00	0.00	223,037.95

0+240.00	779.62	15,634.72	15,634.72	0.00	0.00	238,672.67	0.00	0.00	238,672.67
0+260.00	781.20	15,608.18	15,608.18	0.00	0.00	254,280.85	0.00	0.00	254,280.85
0+280.00	782.58	15,637.75	15,637.75	0.00	0.00	269,918.60	0.00	0.00	269,918.60

CONCLUSION

1. AutoCAD Civil 3D helps to complete the design process in a comfortable manner within time and it conserves a lot of time and effort. This paper designs intersections using AutoCAD Civil 3D.
2. Manual design takes a lot of time and a lot of money and accurate reports are not available. . Due to AutoCAD Civil 3D, you can design good intersection in less time.
3. All the vehicles entering the rotary are gently forced to reduce the speed and continue to move at slower speed.
4. According to the IRC, intersection can be made where maximum traffic is 3000 pcu / hr and minimum traffic is 500 pcu/hr.

REFERENCE

1. Autodesk, "Highway Engineering and Road Design Software – InfraWorks. Available from: <http://www.autodesk.com/products/autocadcivil-3d/features/all>.
2. <https://www.google.com/maps>.
3. Autodesk, "Civil Engineering Design/AutoCAD Civil 3D", Available from: <http://www.autodesk.com/products/autocadcivil-3d/features/all>.
4. IRC 65: Recommended Practice for Traffic Rotaries, 1976, Indian Road Congress
5. IRC SP 041: Guidelines for the Design of At-Grade Intersections in Rural and Urban Areas.
6. <https://en.wikipedia.org/>.
7. F. Khanna, S.K., and Justo, C.E.G., (2011), "Highway Engineering", New Chand and Bros, 9th Edition, New Delhi.
8. Central Road Research Institute, (1988), "Capacity of Roads in Urban Areas", Project Sponsored by Ministry of Surface Transport, Sept, 1988.
9. IRC: 93-1985 "Guidelines on Design and Installation of Road Traffic Signals".