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Design of Rotary At Janglatmandi Anantnag to Reduce Traffic Conjection at The Intersection

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Abstract
Traffic is increasing day by day, so it is almost impossible for traffic police to control the traffic manually at the intersection. In order to improve the traffic conditions at the Janglatmandi Anantnag intersection and also reduce the accidents at the crossing, we suggest todesign the rotary at the said intersection keeping in view high traffic and conditions favouring the rotary. For this traffic volume studies is done and the design is done accordingly.

Keywords
Rotary Design, Traffic Condition, Traffic Volume

I. Introduction

Population in the India is increasing tremendously and this is leading to traffic problem as, all people nowadays have started purchasing their own vehicles. This has led the city to be congested on road and on intersection. Indian cities are facing the crisis of urban transportation. Despite of investments in road infrastructure and plans for transport development, users face the problem of congestion, accidents and pollution. Accident is a major problem, especially at the intersection of national highway and other roads, as the vehicles on the national highway move at very high speed. Also due to traffic jam, lot of time is wasted. Pedestrians face troubles in crossing the road. Due to congestion, pollution increases and it causes harmful effects on human health living adjacent to the area. National highway traffic delay and improper management as well as poor control over the flow of traffic increases rapidly. The traffic at the Janglatmandi intersection comes from four ways Kastiwar road, Lalchowk road , verinag/kokernag road and Pahalgam/khanabal road. Along with the Public transport runs the private transport whose number is increasing day by day.The manual survey is done in morning to night morning time 8:30am to night 8:30pm. The peak house of evening time at 4:30 p.m. to 5:00 p.m. for data collection to knowFlow of traffic on lanes.

Traffic Volume Studies

Manual method use filed personal to count and classify traffic flowing past a fixed point. Automatic devices enable a count of traffic to be taken at any given location and a record to be kept of the count. A combination of manual and mechanical methods involves the services of field personal who operate mechanical devices to count and record the arrival of vehicles at any given point across a road. The moving observer methods is a special traffic engineering technique which result in the collection of data on the flow speed of traffic, travel time, delay at junction and parking and has been considered .Photographic method for measurement flow and other traffic characteristics are becoming powerful tools in the hands. Study area selected is Janglatmandi intersection which is surrounded by shopping complexes and flow of traffic varies during peak and off peak hours in Anantnag study. The flow of traffic includes two wheeler, car, bus, and trucks.Traffic data collection from manual count method which are then converted into PCU/hour. It was found that maximum number of vehicles passing through Janglatmandi intersection is in Right direction The data collection for traffic flow:

Table 1: Traffic flow in Janglatmandi average maximum PCUs/hour

Approach	Left turning	Straight ahead	Right turning
Verinag/ kokernag PCU	388.6	470.4	210.5
Sherbagh PCU	196.8	216.6	317.8
Kishtiwar PCU	109.2	195.2	228.8
Lalchowk PCU	247.4	92.2	330.4

Conditions justifying traffic rotary at Janglatmandi, Anantnag

1. IRC Suggests that a maximum volume that a rotary can handle efficiently is 3000 PCU/hr ,
entering from all legs of intersection , however , if proportion of traffic is turning traffic ,
provision of rotary even outside these limits is justified.
At the concerned intersection , the traffic volume is

less than 3000 PCU/hr.
Traffic volume at intersection is = 2856 PCU/hr
Proportion ofRight turning traffic is almost 30%
As a large proportion of traffic entering the intersection is turning traffic ,
so traffic rotary is justified according to the traffic volume point.
2. It is recommended by the Indian Roads Congress that traffic rotaries may be provided where the intersecting traffic is about 50% or more of total traffic on each leg .
%age intersecting traffic at leg A = 405/808 = 50.1%
%age intersecting traffic at leg B = 473/918 = 51.5 %
%age intersecting traffic at leg C =286/512 = 55.85%
%age intersecting traffic at Leg D = 301/618 = 48.70%
This justifies the traffic rotary according to the intersecting traffic is about 50%.
3. Besides this, there is low pedestrian traffic crossing the intersection at different points .
Pedestrians crossing leg A = 36 Ped/hr
Pedestrians crossing leg B = 40 Ped/hr
Pedestrians crossing leg C = 32 Ped/hr
Pedestrians crossing leg D = 29 ped/hr
So traffic rotary is suitable according to the Pedestrian point of view .
4. Construction of traffic rotary needs large area.
As the concerned intersection is present on a Highway & its ancillary highway, the roads are sufficiently wide and large space is available at the intersection.
So traffic rotary is justified according to the area point of view.
So all the conditions are justifying the traffic rotary at the Janglatmandi Anantnag

Following advantages also justify traffic rotary at the concerned intersection:

- The variable cost of operation of automobile is less at a traffic rotary than a signalized intersection where the vehicles have to stop and proceed.
- Though the distance to be traversed by vehicles which are to turn to the right or proceed straight is higher, still fuel consumed in the process of crossing the rotary intersection is likely to be less.
- There is no necessity of traffic police at the traffic rotary can itself act as traffic control intersection.
- Maintenance cost is nil.
- The capacity of rotary intersection is the highest of all other intersections at grade.

It can efficiently handle up to 3000 PCU/hr.

Design Of Traffic Rotary

Various design factors to be considered in traffic rotary are speed , shape of central island , radius of rotary roadway , weaving angle , weaving distance , width of rotary roadway , radius of entry and exit curves , channelizing islands , camber and super elevation , grade lighting , traffic signs , etc.

1. Design Speed

The vehicles approaching at the rotary have to considerably slow down their speed when compared to design speed of national highway.
As the intersection is located on the periphery of the Anantnag city, the design speed of traffic rotary is taken to be 40 km/hr in this case.

2. Shape Of Cental Island

It depends upon the number and nature of intersecting roads. Since there are two main intersecting roads, of which one is a Major District Road and other is an ancillary highway , so a circular rotary is provided.I suggest a circular rotary.

3. Radius of Rotary Roadway

Adequate super elevation cannot be provided on rotary roads and hence it is safer to neglect super elevation and obtain the minimum allowable radius of rotary roadway by relation

$$R = \frac{V^2}{127f}$$

R=V/127f =40*40/127*0.43 = 21.2 m
Where
R = minimum allowable radius
f = friction factor (0.43) [after using factor of safety 1.5]
V = design speed of rotary (40 km/hr)

- IRC has recommended the radius of entry curve to be 20 to

35m for design speed of 40km/hr .
So let us provide a radius of entry curve 20m which is also suitable with the available space at the intersection.

- IRC recommends the radius of rotary roadway to be about 1.33 times the radius of entry curve.

1.33*20=26.6m
Let us provide a rotary roadway of radius 28m taking into account the space available at the intersection (approx. 54m) [Let width of rotary island = 24m]
Radius of exit curves can be taken same as radius of entry curves i.e 20m or more also.

4. Weaving Angle And Weaving Distance

Weaving angle should be as small as possible , for smooth flow of traffic but not less than 15degree.
Let us use an weaving angle of 46degree (As suited to the geometry of intersection)
The recommended values of weaving length are 45 to 90m for design speed of 40km/hr.
Let us provide a weaving length of 45 to 55m.

5. Width Of Carriageway At Entery And Exit

The minimum allowable width of carriageway at entry is 5m and the entry width may be increased to 6.5,7.0,10.5&14.0m respectively.
. Since the maximum width of carriageway at the concerned intersection is 13.2m(14m), width at entry should be 8m minimum.
I propose the width of 10.5m at entry of leg khanabal&Lalchowk and width of 8.5m at entry of Verinag and kashtiwar road is sufficient.

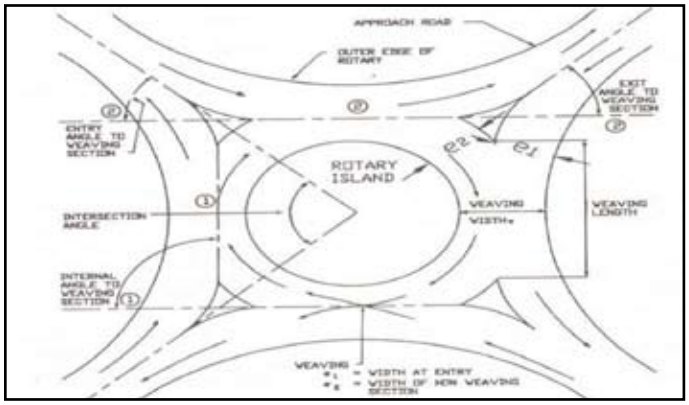
6. Width of Rotary Roadway

The width of non-weavingsection of rotary should be equal to the mean entry to the rotary and should generally be less than width of weaving section W of rotary should be one traffic lane wider than mean of entry width & non weaving section width. Since all approaching roads (legA, legB,legC and legD)have 4 working lanes. So width of non-weaving section should be minimum of l2=4/2=2 lanes width (aprox.7m)
Width of non-weaving section , provided is 7.6m which is sufficient.
. Width of weaving section (W) should be minimum of
W= [(l1+l2)/2 +3.5]m
l1 is about 8.2m
l2 is 7.6m
Wmin = [(8.2+7.6)/2 + 3.5] =11m
The width of non-weaving section , provided is 10.6m which is acceptable.

7. Capacity of the rotary

QP = Capacity of weaving section in vehicles per hour
W = Width of weaving section (6 – 18 m)
e = Average entry width
l = Length of weaving section such that 0.12 < w/l < 0.4
p = Proportion of weaving traffic
(i) b/w leg A & leg B
Qp=280*10.6(1+9.1/10.6) (1-0.73/3) / (1+10.6/36.6) =3831 PCU/ hr.
where
W = width of wearing section =10.6m
l = average width of entry l1 & of non-weaving section l2
here l=10.6+7.6/2 = 9.1

Where a, b, c and d are traffic volumes
P = proportion of weaving traffic = [Traffic which is weaving at weaving section / total traffic passing from weaving section]
P = 1286/1742 =0.73
(ii) Capacity of rotary b/w leg B & leg C :
P = 607+551 / 17+607+551+416 = 1158 / 1591 = 0.73
Qp = 280*10.6(1+9.1/10.6) (1-0.73/3) / (1+10.6/40.9) =3881 PCU/hr
Also the capacity of the other two weaving section is almost the same. So the capacity of rotary is minimum of two i.e 3831 PCU/hr.
Since the present traffic is about 2856PCU/hr , rotary will work efficiently at the intersect.



Conclusions

This paper presents the results of a literature review, data collection and analysis, and an expert review of Rotary design at Janglatmandi Anantnag according to IRC guidelines Rotary are much more than a street device. Rotary have the potential to transform an area. Not only is rotary a radical improvement to a roadway, but rotary can be used as a visual enhancement to an area as a gateway. Rotary are a tool that increases safety along the street, enhances driver attentiveness, reduces automobile idling, and efficiently streams traffic through an area. Rotary are cost effective and safe lots of money that traditional intersections require for the electricity of signals. Even though many people are skeptical about rotary—thinking they are confusing, overwhelming, and hinder traffic flow—studies have proved the opposite. The more rotary that are implemented and effective, the more drivers will be accepting. It is only a matter of time that rotary implementation in India will match the Europeans. This research topic selected for the site is mainly to bound the traffic in to traffic rules and to convert the accident prone area in to safe area. This crossing area is also lacking with any type of intersection, signs, medians, and other basics safety devices, So I am trying to sort out this problem with design of Rotary.
The capacity of weaving sections comes out to be 3821 PCU/hr .Total vehicles entering into each of weaving section are less than 3000 PCUs per hour and IRC suggests that the maximum volume of traffic that a rotary can efficiently is 3000 vehicles per hour entering from the all weaving section intersection. Hence rotary can accommodate the traffic safely.

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