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Improvement of Various At-Grade Intersections of Shivamogga City

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ABSTRACT

An intersection is a place where two or more roads meet. The roads may meet at the same elevation or at different elevations. When the approach roads of an intersection meet at the same elevation, it is called an "At-grade intersection". When the approach roads meet at different levels or elevations. Such an intersection is called a grade separated intersection. A lot of intersections especially in built-up areas are not properly designed or constructed because of variety of problems such as space constraint; lack of funds etc., Hence there is a need to re-design those intersections whose designs are not as per codal provisions. In the present study, four intersections of Shivamogga city have been selected which are designed or constructed as per codal provisions. The intersections which were selected are Mahaveera Junction. In order to redesign intersections, the existing CAD drawings were collected from Shivamogga Municipal Corporation. Using existing CAD drawings the codal provisions were incorporated in the design. Two intersections viz., Mahaveera. The cost estimates for the proposed improvements were calculated and they were found to be Rs. Eighty lakh for Mahaveera Junction.

Keywords: Intersection, Signal Design, Highway Capacity.

I.INTRODUCTION

1.1 Intersection

An intersection is defined as the general territory where at least two parkways or streets join or cross, inside which are incorporated the roadway and street side offices for activity developments around there. At the convergence there are through, turning and intersection activity and these movement developments possibly taken care of in various courses relying upon the kind of crossing point and its plan. The proficiency of operation of Highway and the wellbeing there-of depends on number and types of intersections en-route and the efficiency of the design of these intersections. The efficiency, safety, speed, operational cost and road system capacity are all based on the planning and intersection design. Intersections used by the walkers will cause increase in traffic delay and accidents.

1.2.Classification based on elevation of roads

These are further sub-divided into two sorts

i) Intersections at grade ii) Grade separated intersections

1.2.1 Classification based on type of control.

These are further sub-divided into two types

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i) Controlled intersection.

ii)Un-controlled intersection.

1.3 Forms of Road Intersections

1.3.1 Three-Way Intersection

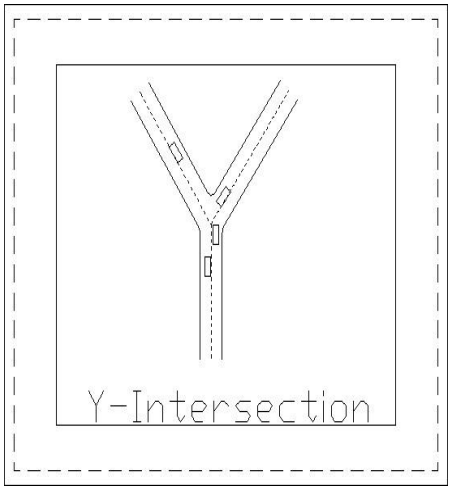

Fig 1.1 Y- intersection

1.3.2 Four-Way Intersection

It is the two roads which meet at the common point or perpendicular come under this type of intersection. On the basis of angle by which the two roads connect each other is further divided into Skewed and Regular intersections.

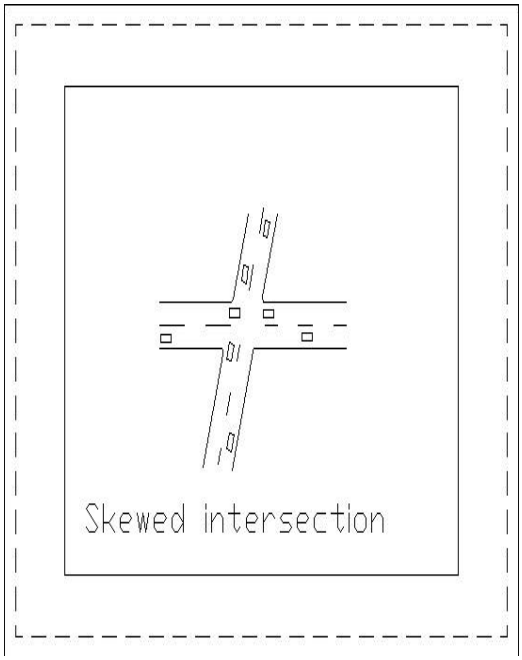

Fig 1.2 Skewed intersection

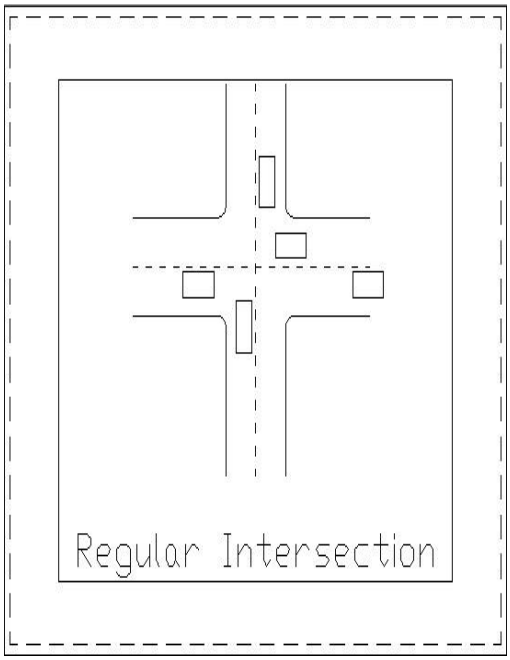

Fig 1.3 Regular intersection

At the point when the two joining streets converge each other oppositely, it is named as a standard convergence. At the point when the two streets cross at an alternate edge the intersection is known as a skewed convergence.

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1.3.3 Multiple Roadway Intersection

When five or more roads intersect the intersections are known as multiple roadway intersections.

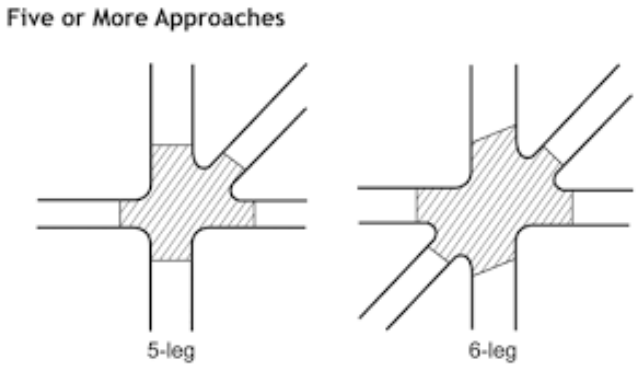

Fig 1.4 Multiple roadway intersections

II. PRESENT STUDY

3.1 Selected Intersections

For the present study, the following at-grade intersections have been selected. They are:

i) Mahaveera Junction.

ii)B. R. Ambedkar Junction.

The figures 3.1 to 3.4 show the google pictures of the selected intersections.Of thesefour junctions selected for the present study, three junctions viz., Mahaveera, Ambedkar and Prof. B Krishnappa junctions are four legged junctions where as B.G.S junction is a three legged junction.

Fig 3.1 Mahaveera Junction

3.2 Field Studies

Field studies were carried out to obtain the geometric details of selected intersections to find out whether the design is as per geometric design standards.

3.2.1 Mahaveera Junction

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3.2.1a Problems observed at Mahaveera Junction

The following observations were made during field studies. They are,

1. Trees are obstructing free left hence they have to be cut down.
2. Since there is poor visibility in free left, the shop located in the free left has to be shifted.
3. As the islands are not as per codal provision, they have to be re-designed.
4. Since all the roads have sharp turning radii, they have to be increased to facilitate smooth turning movement.
5. Roadway width has to be increased to avoid congestion.

Fig 3.5 Trees obstructing free left Fig 3.6 Poor visibility in free left

The above details indicate that the design is not as per standards. Hence, there is a need to redesign the same. The code book used for the design of at-grade intersection is IRC:SP 41-1994.

IV. DATA ANALYSIS

4.1 Observations

From the present study it is found that all the four junctions selected for the present study have defects in their design. Hence there is a need to design them as per codal provisions.

4.2 Mahaveera Junction

4.2.1 Codal provisions according to IRC: SP 41-1994 "Guidelines for the design of At-grade intersections in rural and urban areas"

Following are the design details;

- Design speed = 30kmph
- Minimum inner radii = 32m
- Turning radius = 13m
- Two lane width = 9m
- Minimum visibility distance = 15m
- Safe stopping sight distance = 30m
- Area of island = $4.5m^2$
- Offset from normal vehicle path = 0.3m to 0.6m
- Corner radius of island = 0.3m to 0.45m
- Width of median = 1.5m to 2m

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V. DISCUSSIONS AND CONCLUSIONS

From the present study the following conclusions were drawn;

1. Many intersections are not designed according to codal provisions because of non-availability of land, lack of funds etc.
2. Hence there is a need to improve such intersections as per codal provisions.
3. Improper design of intersections leads to various problems such as traffic congestion, accidents, obstructions to sight distance, difficulties to movement of pedestrians etc.
4. Depending on the problems at site various improvement measures were suggested for different approach roads to intersections such as widening the existing roads providing medians, footpaths, increasing radii etc.
5. The cost of improvement for redesigned junctions was calculated using schedule of rates-2015-2016, Shivamogga circle.
6. The cost of improvement of Mahaveera Junction was calculated to be Rs. Eighty Lakh.

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