

DESIGN OF MULTIWAY TRAFFIC INTERSECTION

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ABSTRACT

The traffic volume is increasing day by day in cities due to growth of industrialization and urbanization of cities. Thus to manage the present traffic volume new methods were adopted to provide better, easy and safe movement of traffic. The traffic conflicts are major problem on intersections of two roads. Traffic signals are a way of control the traffic at intersection of the cities and to avoid the conflicts of the vehicles at the intersection. Traffic signals also help the traffic to move with safely and easily , which tends to minimize the collisions between the vehicles at the intersection.

INTRODUCTION

An intersection is the area where two or more streets join or cross at grade. The intersection includes the areas needed for all modes of travel: pedestrian, bicycle, motor vehicle, and transit. Thus, the intersection includes not only the pavement area, but typically the adjacent sidewalks and pedestrian curb cut ramps.

TYPES OF INTERSECTION

Intersections can be categorized into four major types, as illustrated Intersection Types.

Simple Intersections

Simple intersections maintain the street's typical cross-section and number of lanes throughout the intersection, on both the major and minor streets. Simple intersections are best-suited to locations.

Flared Intersections

Flared intersections expand the cross-section of the street (main, cross or both). The flaring is often done to accommodate a left-turn lane, so that left-turning bicycles and motor vehicles are removed from the through-traffic stream to increase capacity at high-volume location.

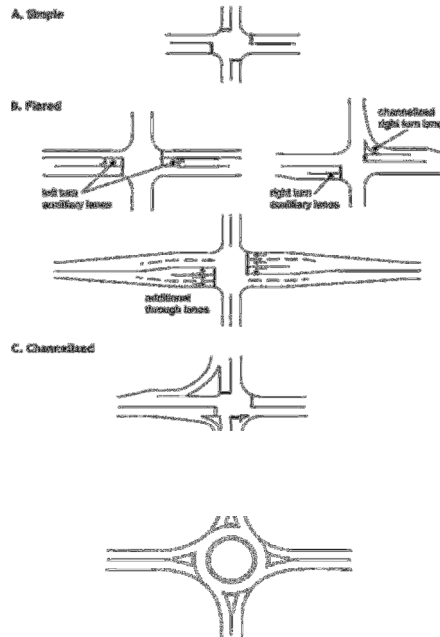
Channelized Intersections

Channelized intersections use pavement markings or raised islands to designate the intended vehicle paths. The most frequent use is for right turns, particularly when accompanied by an auxiliary right turn lane.

Roundabouts

The roundabout is a channelized intersection with one way traffic flow circulating around a central island. All traffic through as well as turning enters this one way flow. The central island of a roundabout can be oval or irregularly shaped. Single lane roundabouts have an

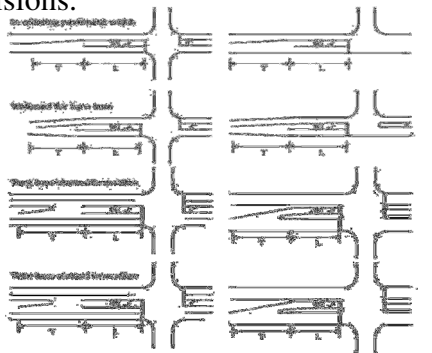
outside diameter between 80 and 140 are typically much larger with diameters as large as 650 feet.



Types of intersections DESIGN ELEMENTS

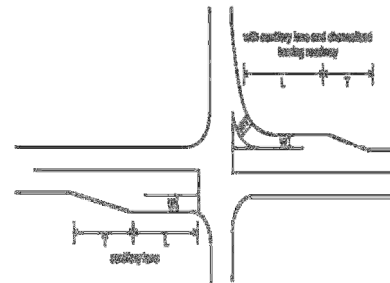
Left-Turn Lane Design Elements

Left-turn lanes remove stopped or slow-moving left-turning motor vehicles from the stream of through traffic, eliminating the rear-end crashes at intersections. The safety benefits of left-turn lanes increase with the design speed of the road, as they greatly reduce both the incidence and severity of rear-end collisions.



Left-Turn Lane Design Guidelines Right-Turn Lane Design Elements

Right turn lanes are used to remove decelerating right-turning motor vehicles from the traffic stream, and also to provide an additional lane for the storage of right-turning motor vehicles. Where the right-turn volume is heavy, this removal of the turning motor vehicle from the traffic stream can also remove a primary cause of rear-end crashes at intersections. Design elements for right-turn lanes are summarized.



Right-Turn Lane Design Guidelines

ROUNDBOUT INTERSECTION

Step 1: Design Speed

$$\text{Design Speed} = 32 \text{ KMPH}$$

Step 2: Radius of curvature at entrance

$$= 17.15 \text{ m}$$

Step 3: Radius of curve at exit

$$= 25.72 \text{ m}$$

Step 4: Radius at Central Island

$$= 22.80 \text{ m}$$

Step 5: Weaving length

$$= 39.49 \text{ m}$$

Step 6: Width of carriage way

width of carriageway at entry and exit = 10 m.

Step 7: Width of rotary carriageway

Non Weaving section= 15m

Weaving section =18.5m

Width of non weaving section < Width of weaving section

Step 8: Sight distance

Sight distance = 34 m.

Step 9: Capacity of rotary

Capacity of rotary = 5728 PCU/HR.

DESIGN FOR PILE CAP**Size of pile cap**

Size of pile cap = 2000mm

Depth of pile cap

Depth of pile cap = 725mm

Load acting on pile

Load acting on pile = 1472.33kN

Area of reinforcement

Area of reinforcement = 2281mm²

Number of bars

Number of bars = 20

Percentage of steel

% of steel = 3.38

Check for shear

Shear stress = 0.74

$0.74 < 1.5 \text{ N/mm}^2$

DESIGN FOR GROUP CAPACITY OF PILE**Unconfined aquifer**

Unconfined aquifer = 8KN/m²

Group capacity of pile

Group capacity of pile= 103.904 KN

Width of pile group

Width of pile group = 4.5m

PILE FOUNDATION

Piles are structural members made of timber, concrete, steel or other materials which are used to transmit loads from superstructure to deeper soil strata. These are referred to as deep foundations as the foundation level is much below the depth of shallow foundations. The definitions, classifications and details of pile foundations. The situations where pile foundations may have to be used are indicated below.

USES OF PILES

- To transfer loads through water or soft soil to a suitable bearing stratum (end bearing or point bearing piles).
- To transfer loads in a relatively weak soil by means of skin friction along the length of the piles (friction piles).

- To compact granular soils (thus increasing their bearing capacity) (compaction piles).

- iii. SP – 16 Design aids for reinforced concrete to IS 456-1978.
- iv. IRC 65 – 1976 Guidelines for the design of at grade intersections in rural and urban area.

FUNCTION OF PILES

- To transmit a foundation load to a solid round.
- To resist vertical, lateral and uplift load.
- Pile can also be used in normal ground conditions to resist horizontal loads.
- Piles are convenient method of foundation of works over water, such as jetties or bridge piers.

CONCLUSION

- In this project we have successfully made an attempt for design of multiway traffic intersection.
- All the drawings presented in this project report are drafted using auto cad and analysis staad pro software.
- It has been designed as per code IS456-2000. The designed has been done manually using limits state method.
- This project mainly deals with Roundabout intersection Rectangle column, Square slab and Pile foundation.

REFERENCES

- i. “Design of reinforced concrete elements”, Dr. P. Purushothama Raj.
- ii. IS 456-2000, Plain and reinforced concrete.