Traffic Regulation
&
Control Devices

In order to have safe traffic operations on roads, it is desirable to impose adequate traffic regulations and traffic control with the help of standard traffic control devices. It is essential that the traffic regulations and controls should have the legal backing by enacting appropriate.

The various regulations imposed through the traffic control devices should fulfil the requirements such as:

i) clear visibility during the day and night

ii) easy to recognise and understand

iii) sufficient time for the driver driving at the design speed or within the legal speed limit to react and follow the regulation

Traffic Regulations

The traffic regulations should cover all aspects of control on vehicles, driver and all other road users. The regulations should also cover various aspects with respect to traffic flow.

Traffic regulations and laws give legal coverage for strict enforcement. The traffic laws implemented by legislative laws are obligatory on all road users. The laws should however be uniform and clear.

Traffic regulations and laws cover the following four phases:

(a) Driver controls

(b) Vehicle controls

(c) Traffic flow regulations

(d) General controls

a) Regulations and controls on drivers

The controls on drivers include eligibility for driving motor vehicles, issue of driving licenses and other regulations on the drivers during the act of driving.

As per the Motor Vehicle Act, the minimum age for getting a driving license to drive a non-geared two-wheeler is 16 years and the minimum age for driving a geared two-wheeler or a four wheeler is 18 years.

b) Regulations and controls on vehicles

Various regulations and controls on vehicles have been specified. They include vehicle registration, requirements of equipment and accessories of motor vehicles, maximum permissible dimensions and weight, vehicle fitness, inspections, etc.

c) Regulations and controls on traffic flow

Regulations of traffic flow have been laid down in every country. For example in India, the specified flow regulations for normal travel along a roadway are 'keep-to-the-left", 'overtaking from the right', etc. Other flow regulations on identified roads/road stretches and junctions include direction of flow, restrictions on turning. overtaking, etc.

d) General regulations and controls

Some other general regulations and provisions are made. They include reporting of accidents, recording and disposing traffic violation cases, etc.

Reduction in conflicts at un-controlled intersections at-grade

Different types of conflicts at an un-controlled intersection are:

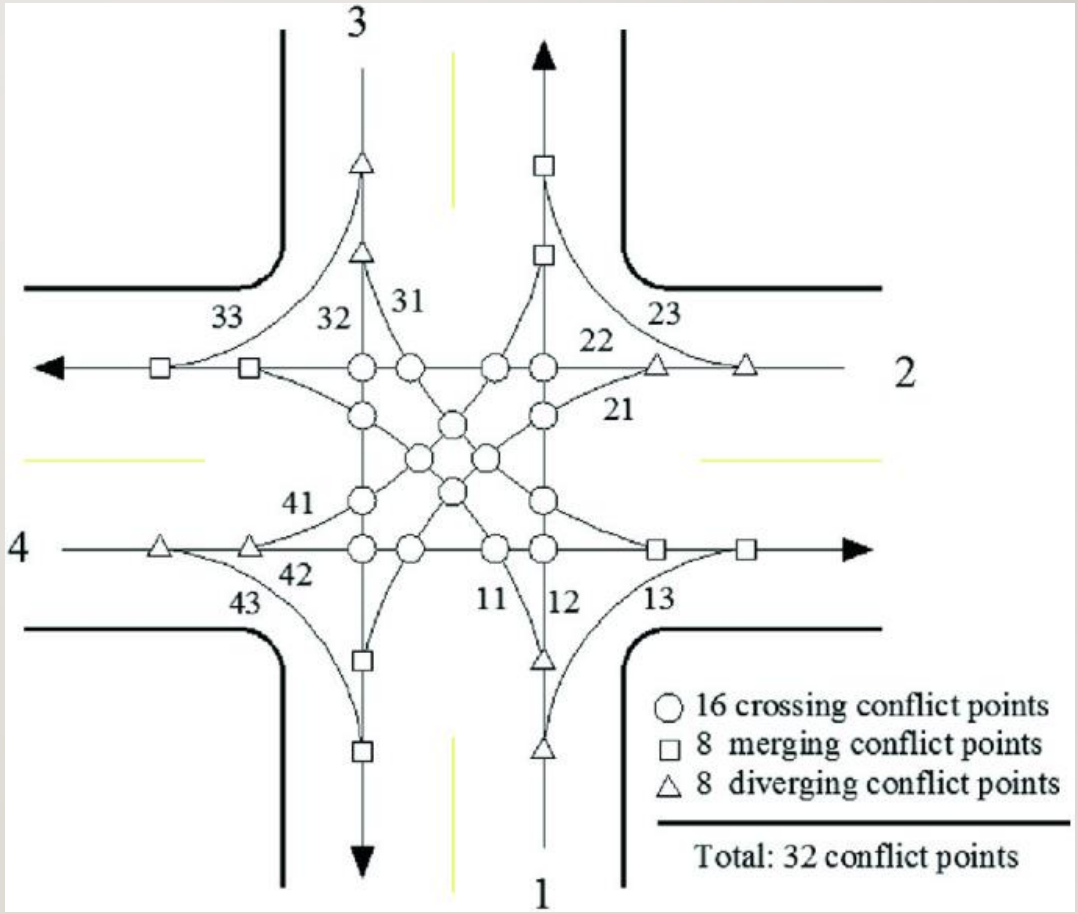
(1) Crossing conflicts

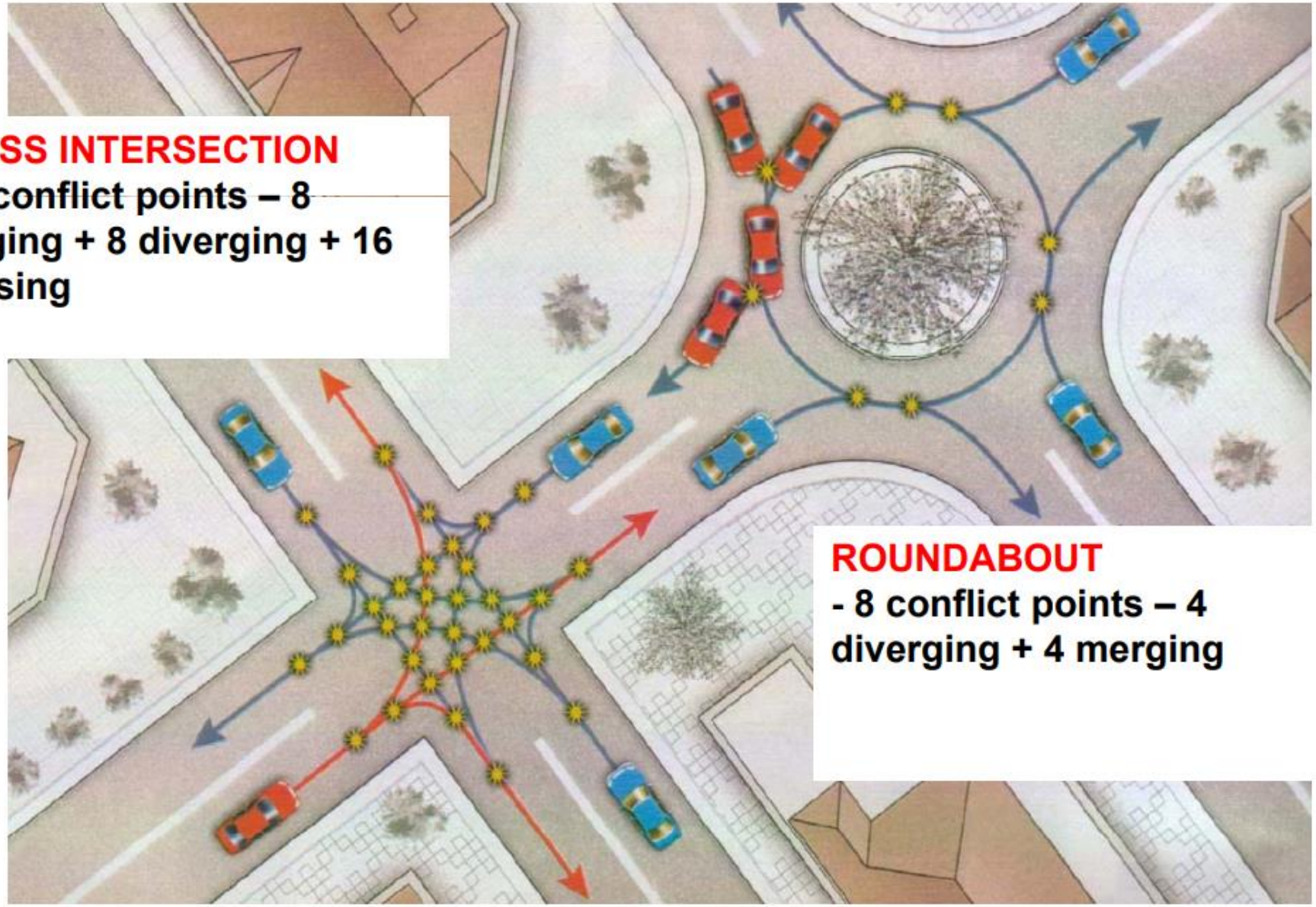
(2) Merging conflicts

(3) Diverging conflicts

When two vehicles cross the path of each other at an intersection at-grade, unless one of the vehicles stops or slows down, there is a possibility of a major conflict or collision between the two crossing vehicles. Thus crossing or major conflict may occur on intersections at-grade, unless the crossing traffic movements are alternately stopped on each cross road by traffic signals lights.

Merging and diverging conflicts are considered as minor conflicts, as the merging or diverging angles as well as the relative speed of the pair of vehicles involved is generally very low; therefore the severity of the collision if any, will also be low. Further the vehicles slow down while approaching intersections at-grade





CROSS INTERSECTION

- 32 conflict points – 8 merging + 8 diverging + 16 crossing

ROUNDABOUT

- 8 conflict points – 4 diverging + 4 merging

Number of lanes		Number of potential conflicts		
Road A	Road B	Both roads Two-way	A - One-way B - Two-way	Both-roads One-way
2	2	24	11	6
2	4	32	17	10
4	4	44	25	18

Traffic Control Devices

The various aids and devices used to control, regulate and guide traffic may be called traffic control devices. The general requirements of traffic control devices are: attention, meaning, time for response and respect of road users.

The traffic control devices installed along the road should be well within the field of vision of the drivers who are driving their vehicles at the design speed or at legal speed limit, these devices should distinctly draw the attention of the drivers and should convey the meaning without any ambiguity. The most common among the traffic control devices are:

(a) Traffic signs

(b) Traffic signals

(c) Road markings and

(d) Traffic islands.

TRAFFIC SIGNS

Types (Motor Vehicle Act 1939)

Warning signs

- To warn the road users of hazardous conditions
- Equilateral triangle with its apex pointing upwards
- White background, red border & Black symbols
- Placement of sign is based on design speed

			
Straight Prohibited or No Entry	One Way Sign	One Way Sign	Vehicle Prohibited in Both Directions
			
All Motor Vehicles Prohibited	Truck Prohibited	Bullock Cart Prohibited	Tonga Prohibited
			
Hand Cart Prohibited	Cycle Prohibited	Pedestrians Prohibited	Right turn Prohibited
			
Left Tturn Prohibited	U-Turn Prohibited	Overtaking Prohibited	Horn Prohibited
			
Bullock Cart & Cart Prohibited	Length Limit	Speed Limit	Load Limit

Regulatory signs

- Inform road users of certain laws, regulations & prohibitions
- Violation is a legal offence & is punishable
- Circular in shape with two exceptions
- White interior with 60 mm red colored border with exceptions,
  - No – parking & No – stopping : Blue
  - No entry : Full red with white horizontal strip(90 mm)
  - Restriction ends : white with black diagonal strip (130 mm)
  - Compulsory direction control signs : Blue with white arrow marks within

Types of regulatory signs

- Stop & Give Way signs
- Prohibitory Signs
- No – parking & No – stopping signs
- Speed limit & Vehicle control signs
- Restriction ends signs
- Compulsory direction control signs

REGULATORY SIGNS

STOP

STOP

NO PARKING


NO ENTRY FOR ALL TYPES OF VEHICLE


NO LEFT TURN


NO RIGHT TURN


NO U TURN


NO OVERTAKING


PEDESTRIAN PROHIBITED


NO BLOWING OF HORN


TRICYCLE PROHIBITED


ANIMAL PROHIBITED

WIDTH LIMIT

LENGTH LIMIT

HEIGHT LIMIT

MAX SPEED


NO SMOKING


CELLPHONE PROHIBITED


CYCLE PROHIBITED


PUSH CARTS PROHIBITED


NO CAR

LOAD LIMIT


TONGAS PROHIBITED


NO FOOD AND DRINKS


TURN LEFT


TURN RIGHT


PASS EITHER


KEEP LEFT


KEEP RIGHT

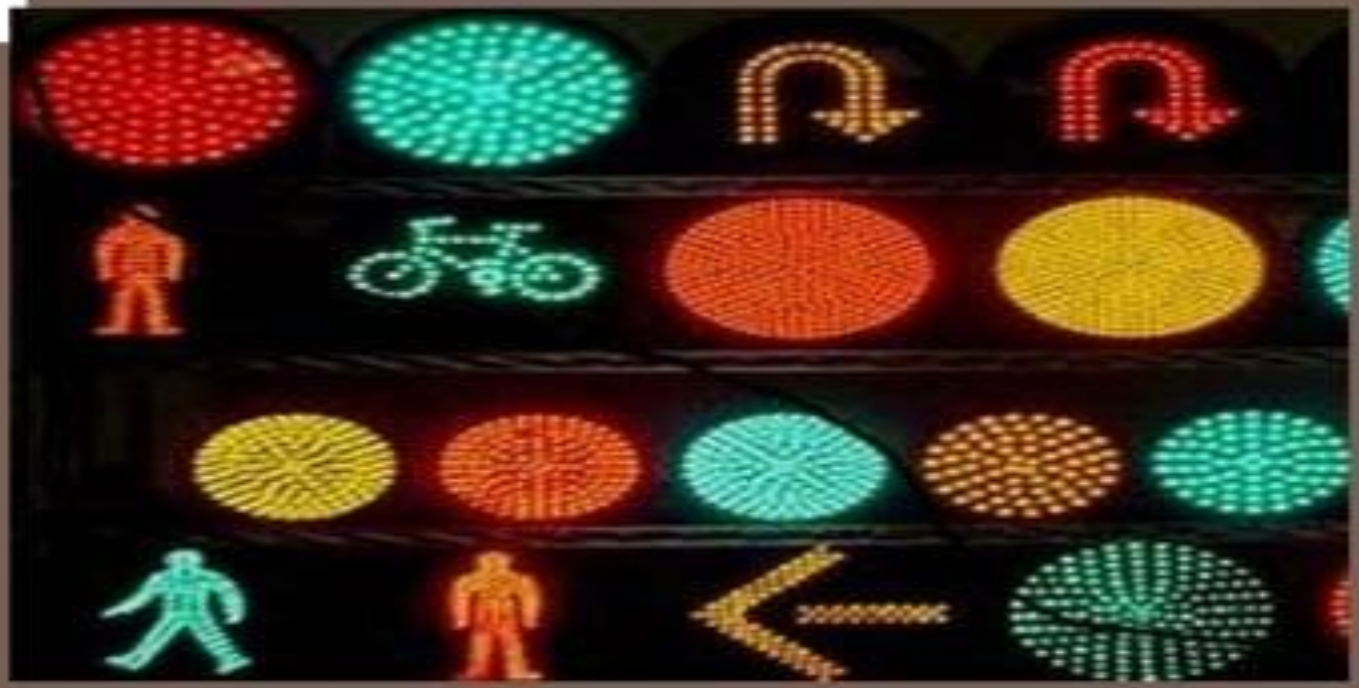
Informatory signs

- To guide, indicate and inform the road users
- Color depends on category of roads
  - NH & SH – green background with borders, legends & Word messages in white color
  - All other roads – white background with details in black

- Types of informatory signs
  - Direction & Place identification signs
  - Facility information signs
  - Other useful information signs
  - Parking signs
  - Flood gauge

Traffic Signs

 Stop	 Give way	 No parking	 No stopping or standing	 No entry	 One way
 One way	 No way both direction	 Right turn prohibited	 Left turn prohibited	 u turn prohibited	 Over taking prohibited
 Horn prohibited	 No entry for cars and motorcycles	 Trucks prohibited	 Bullock cart prohibited	 Pedestrians	 Speed limit
 Y - intersection left	 Y - intersection right	 Y - intersection	 Right hand curve	 Left hand curve	 Narrow bridge ahead
 Slippery road	 Pedestrian crossing	 Falling rocks	 School ahead	 Cross road	 Men at work
 Public telephone	 Petrol pump	 Hospital	 First aid post	 Resting place	 Parking both side



TRAFFIC SIGNALS

Objectives

- Time – segregation of traffic flow
- Draws attention of the road users
- Enable them to understand the meaning of light signal
- Provide sufficient time to respond
- Ensure minimum waste of time

Terminology

Cycle

- A signal cycle is one complete rotation through all of the indications provided.

Cycle length

- Time in seconds that it takes a signal to complete one full cycle of indications
- Time interval between the starting of green for one approach till the next time the green starts

Interval

- Indicates the change from one stage to another
- Two types – change interval and clearance interval
- Change interval(yellow time) indicates the interval between the green and red signal indications for an approach
- Clearance (all red) included after each yellow interval indicating a period during which all signal faces show red and is used for clearing o the vehicles in the intersection

- Green interval G_i
  - Actual duration the green light of a traffic signal is turned on
- Red interval Ri.
  - Actual duration the red light of a traffic signal is turned on
- Phase
  - It is the green interval plus the change and clearance intervals that follow it
- Lost time
  - Time during which the intersection is not effectively utilized for any movement

    For example, driver's reaction time

Merits

- Provide orderly movement of traffic
- Quality of traffic flow is improved
- Reduction in accidents due to crossing conflicts
- Increased traffic handling capacity
- Safe pedestrian crossings at intersections
- Maintain reasonable speed along major roads
- Automatic signals are more economical

Demerits

- Rear – end collisions may increase
- Improper design lead to violation of the system
- Failure of signals due to electric power failure may cause confusion to the road users
- Sometimes waiting time increases

Warrants for installation

Traffic signals should not be installed unless one or more of the following are met

- Minimum vehicular volume
- Interruption of continuous flow on major roads
- Minimum pedestrian volume
- Accident experience
- Combination of above – up to 80 %

Types of traffic signals

- **Traffic signals**
  - **Traffic control signals**
    - Manually operated signals
    - Fixed time automatic signals
    - Automatic vehicle actuated signals
  - **Pedestrian signals**
  - **Special traffic signals**

Traffic control signals

- Three coloured lights – green, red, amber

Pedestrian signals

- Installed at intersections controlled by traffic signals
- At mid – block sections with proper warning signs

Special traffic signals

- Flashing beacons to warn certain situations
- Red light – to stop before entering nearest crosswalk
- Yellow light – may proceed with caution

ROAD MARKINGS

Objectives

- Means of controlling and guiding traffic
- Promote road safety and bring about smooth & harmonious flow of traffic
- Supplement the message conveyed by road signs & Signals
- No distraction of attendance of driver from carriageway

Types of Road Markings

- **Carriageway Markings**
  - Centre Line
  - Traffic lane lines
  - NO – Overtaking zone Markings
  - Pavement edge lines
  - Obstruction Approach Markings
  - Stop lines
  - Pedestrian Crossings, Cyclist crossing
  - Route Direction Arrows, Word Messages
  - Marking at approaches to Intersections
  - Parking Space limits, Bus stops

- **Object Markings**
  - Objects within the carriageway
  - Kerb Marking for visibility
  - Kerb Marking for parking restrictions
  - Objects adjacent to carriageway

MATERIALS USED

- Hot applied thermoplastic paints
  - Minute glass beads
  - Prefabricated sheet material
  - Glue down plastic strips
  - Metal & plastic insert
  - Road studs

Colour Of Road Markings As Per Indian Practice

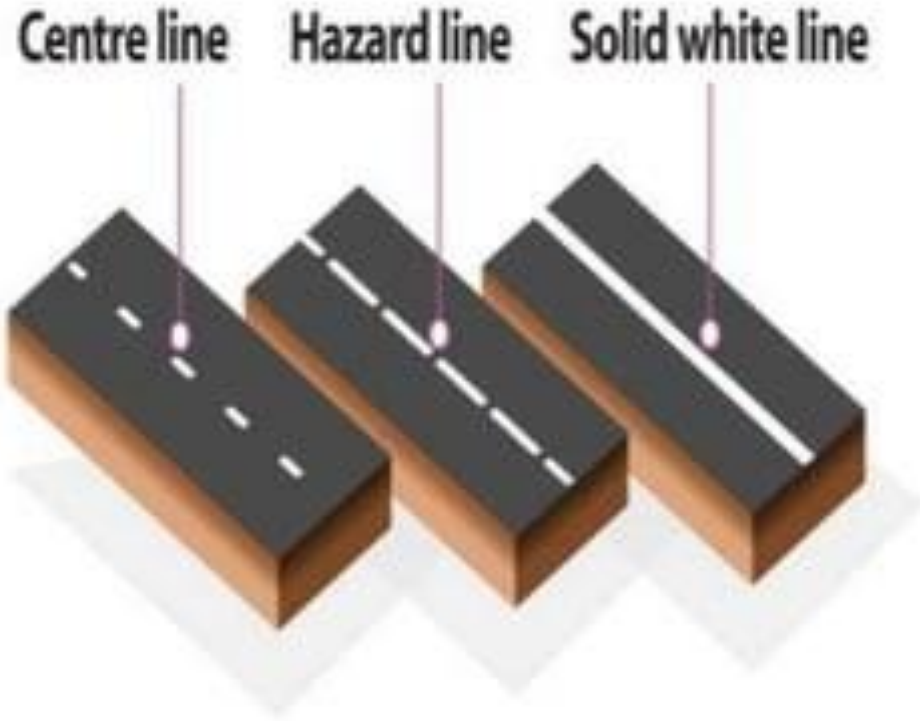
COLOUR	USES
White	All Carriageway Markings except those intended for parking restrictions
Yellow	Markings intended for parking restrictions Continuous centre and barrier line markings
Alternate band of White and Black	Kerb and Object Markings

Longitudinal Markings

- Placed along the direction of traffic on the roadway surface
- White color – separating traffic flow in the same direction and it's the predominant color
- Yellow color – separate the traffic flow in opposite direction and pavement edges
- Types
  - Centre lines
  - Traffic lane lines
  - No – passing zone markings
  - Warning lines
  - Edge lines

General Principles of Longitudinal Markings

- **Solid Lines** – restrictive in nature and it is an offence to cross
- **Broken Lines** – Restrictive but crossing can be done with safety
- **Combination** – A vehicle should not cross the continuous line adjacent to and to the left of a broken line on the right
- **Double Line** – Maximum Restrictions



Centre lines

- Separates the opposing streams of traffic and facilitates their movements.
- Not needed for roads having width less than 5 m and for roads having more than four lanes
- Line style depends upon the road and traffic requirements
- Broken line segments of 3 m long and 150 mm wide. The broken lines are placed with 4.5 m gaps
- On curves and near intersections, gap shall be reduced to 3 metres

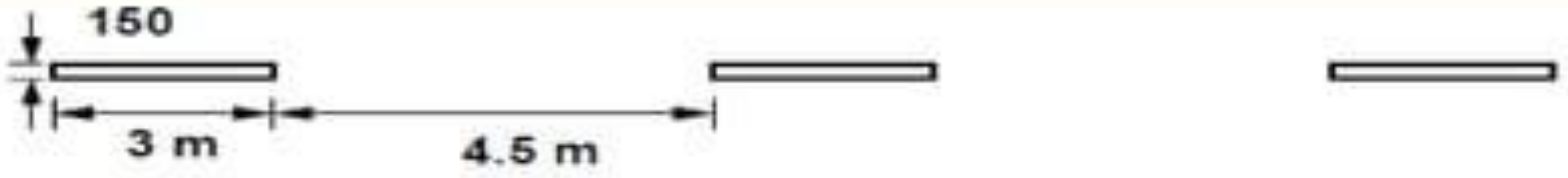


Figure 37:1: Centre line marking for a two lane road

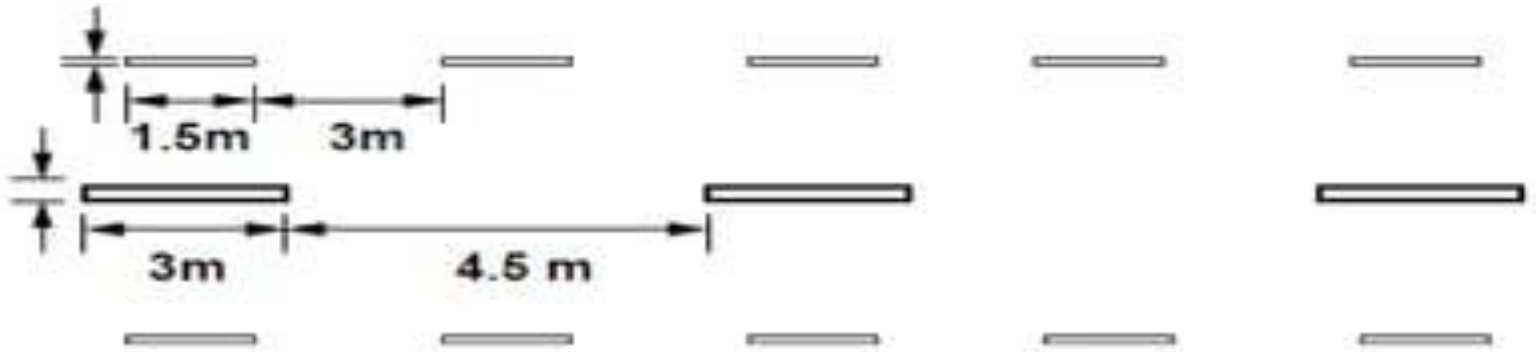


Figure 37:2: Centre line and lane marking for a four lane road

Traffic lane lines

- Lane lines on either side of the carriage way helps the driver to go straight
- Curbs the meandering tendency of the driver
- At intersections, it eliminates confusion and facilitates turning movements.
- Increase the capacity of the road in addition ensuring more safety
- Normally single broken lines of 100 mm width

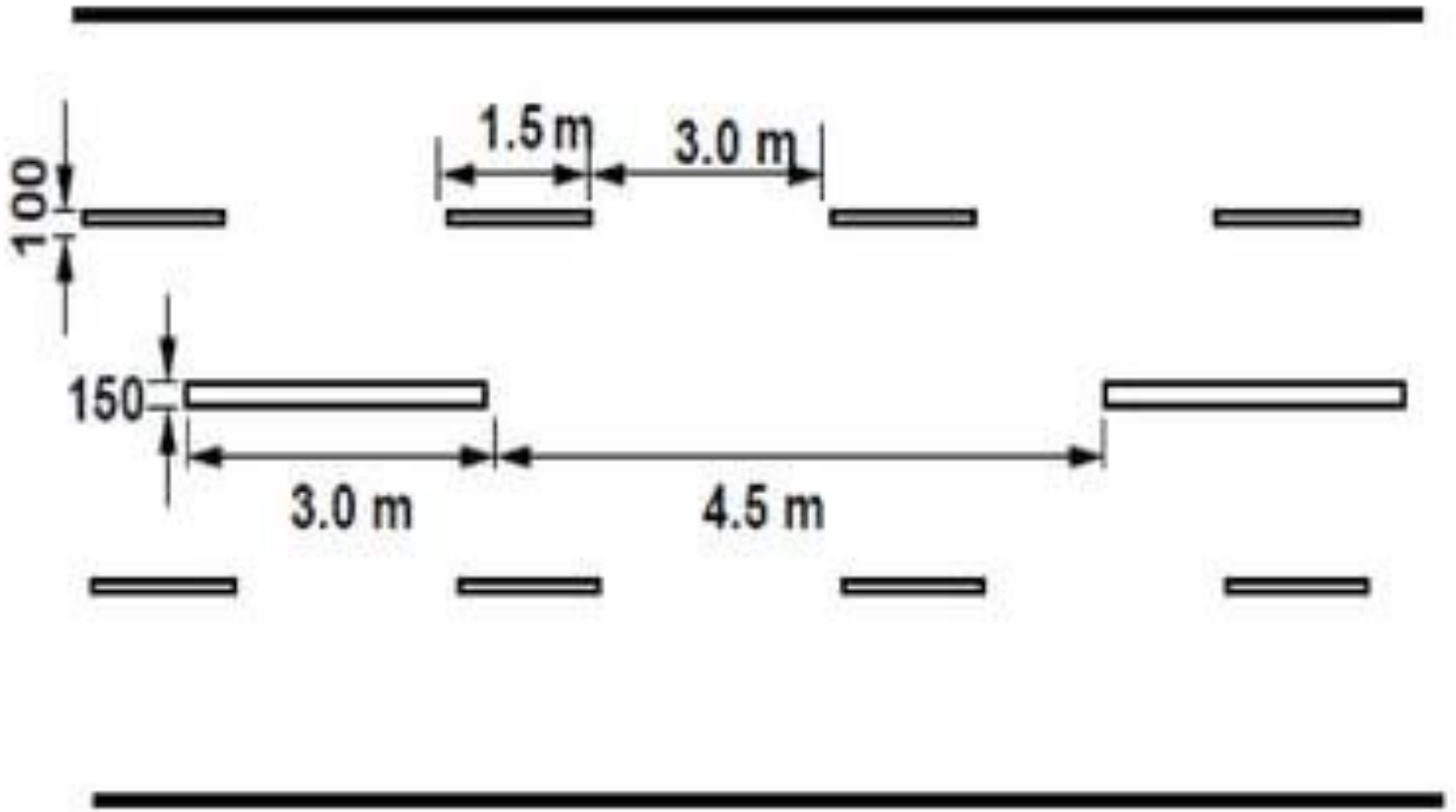


Figure 37:6: Traffic lane marking for a four lane road with broken centre line

No – Overtaking zone markings

- Established on where overtaking maneuvers are prohibited because of low sight distance
  - Eg – summit curves, horizontal curves, and on two lane and three lane highways
- Marked by a solid yellow line along the centre or a double yellow line called barrier lines
- Double yellow line – the left hand element may be a solid barrier line, the right hand may be a either a broken line or a solid line
- When a solid line is to the right of the broken line, the passing restriction shall apply only to the opposing traffic

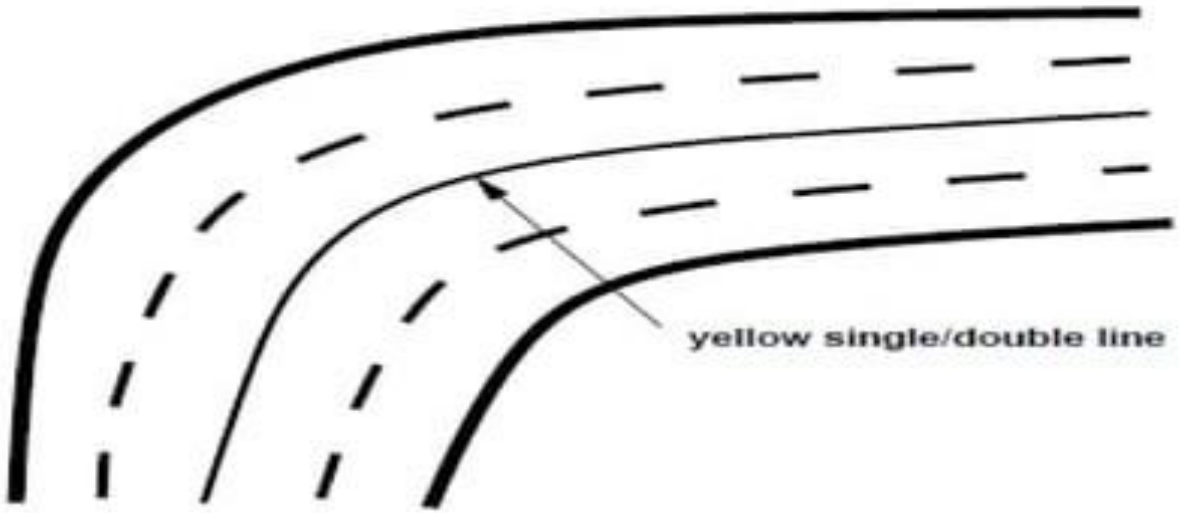


Figure 37:7: Barrier line marking for a four lane road

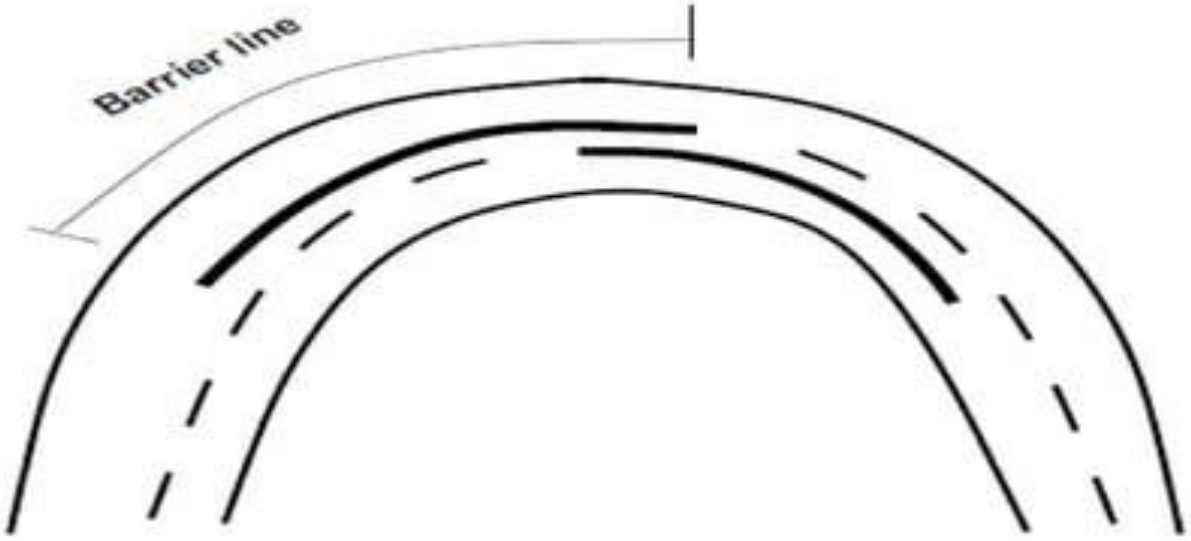


Figure 37:8: No passing zone marking at horizontal curves

Warning Lines

- Warn the drivers about the obstruction approaches
- Marked on horizontal and vertical curves
- Broken lines with 6 m length and 3 m gap
- Minimum of seven line segments should be provided

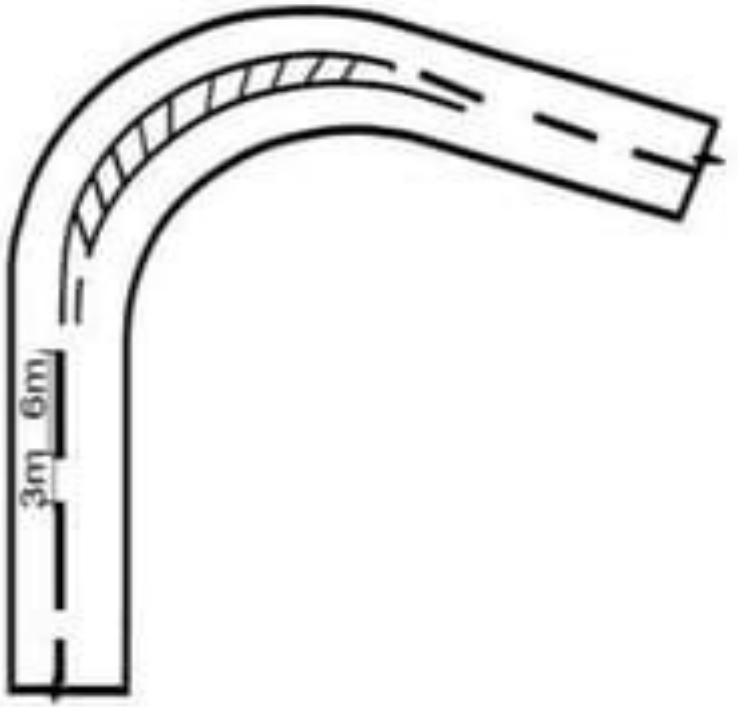


Figure 37.9: Warning line marking for a two lane road

Edge lines

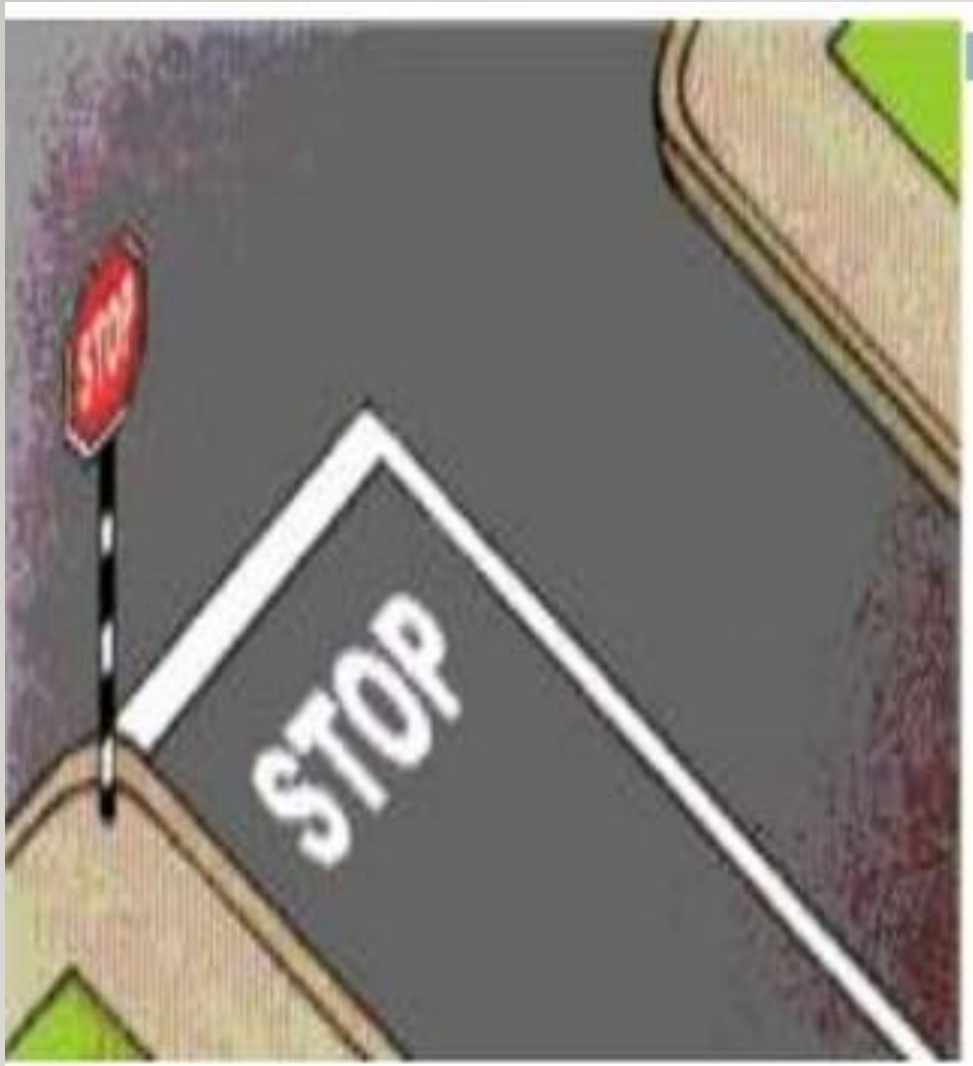
- Indicate edges of rural roads which have no kerbs to delineate the limits
- At least 150 mm from the actual edge of the pavement
- Painted in yellow or white
- Preferably light reflective, so that they will be visible
- Improved night visibility is obtained by the use of embedded minute glass beads

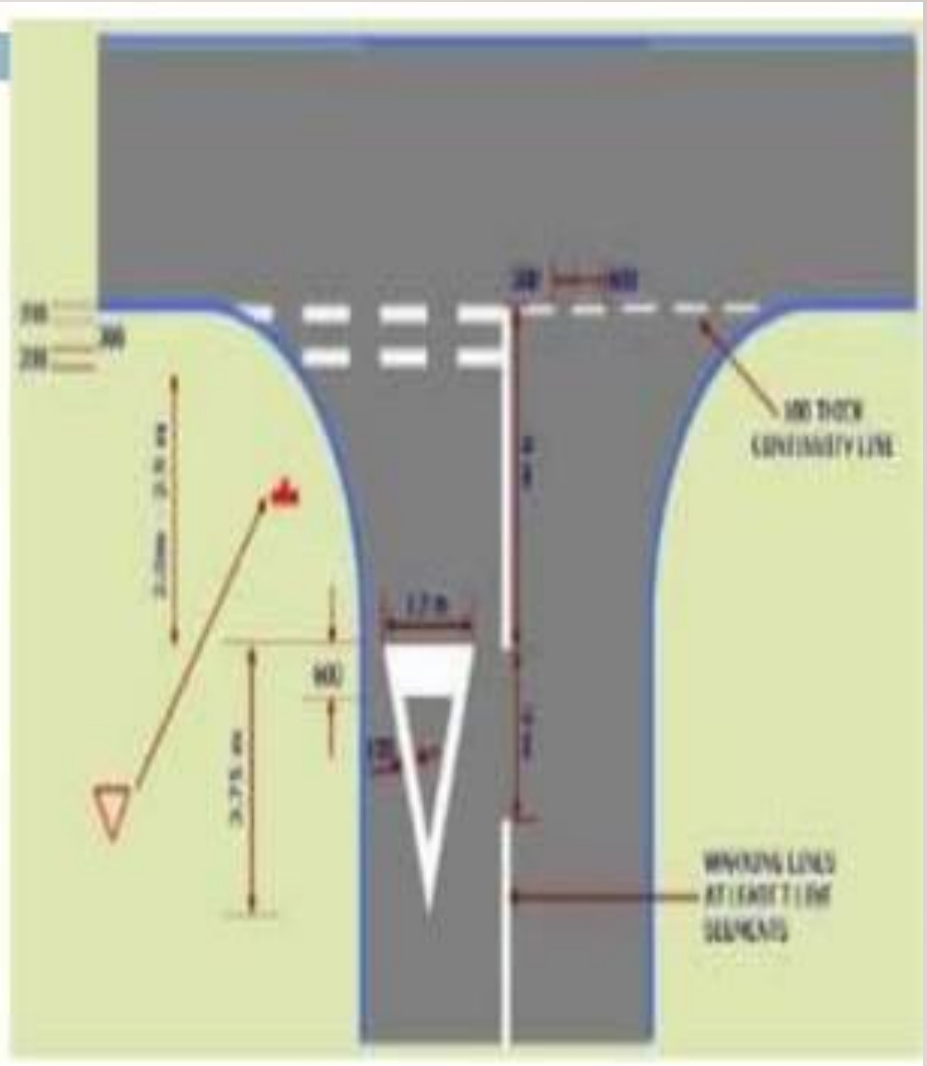
Transverse markings

- Marked across the direction of traffic at intersections
- Types of transverse markings are
  - **Stop line markings**
  - **Markings for pedestrian crossing**
  - **Direction arrows**

Stop lines

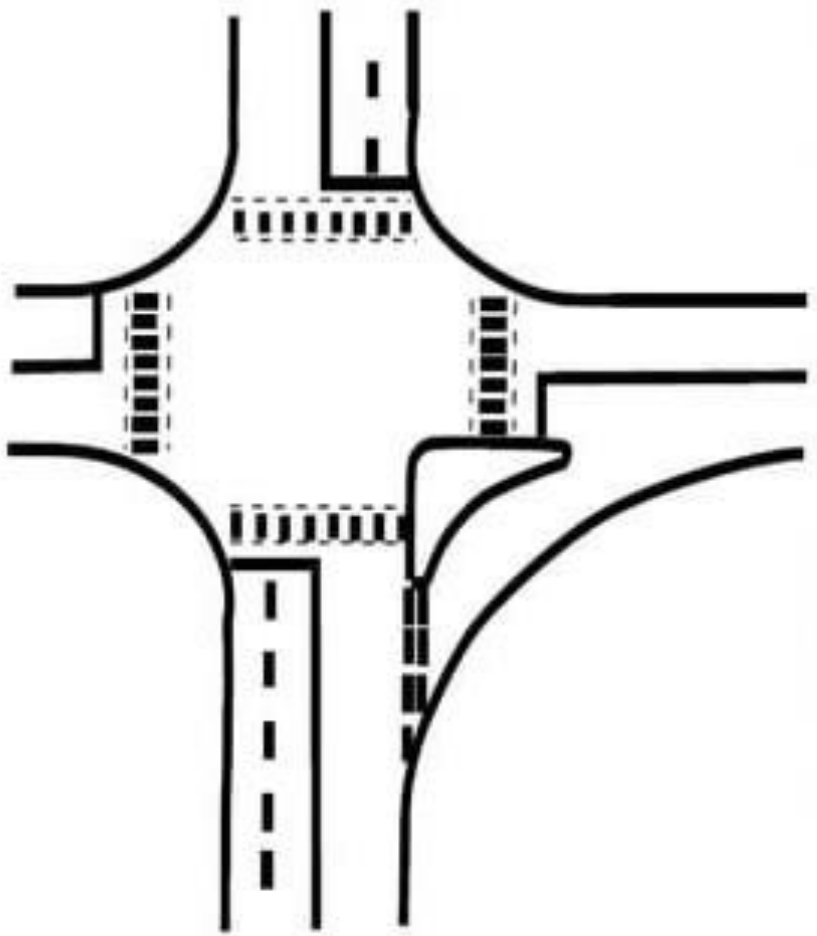
- Indicates the position beyond which the vehicles should not proceed when required to stop
- stopped by control devices like signals or by traffic police
- Placed either parallel to the intersecting roadway or at right angles to the direction of approaching vehicles


STOP
STOP



Pedestrian crossings

- Provided at places where the conflict between vehicular and pedestrian traffic is severe
- At intersections, it should be preceded by a stop line at a distance of
  - 2 to 3 m for un- signalized intersections
  - one metre for signalized intersections
- Zebra crossing consisting of equally spaced white strips of 500 mm wide.



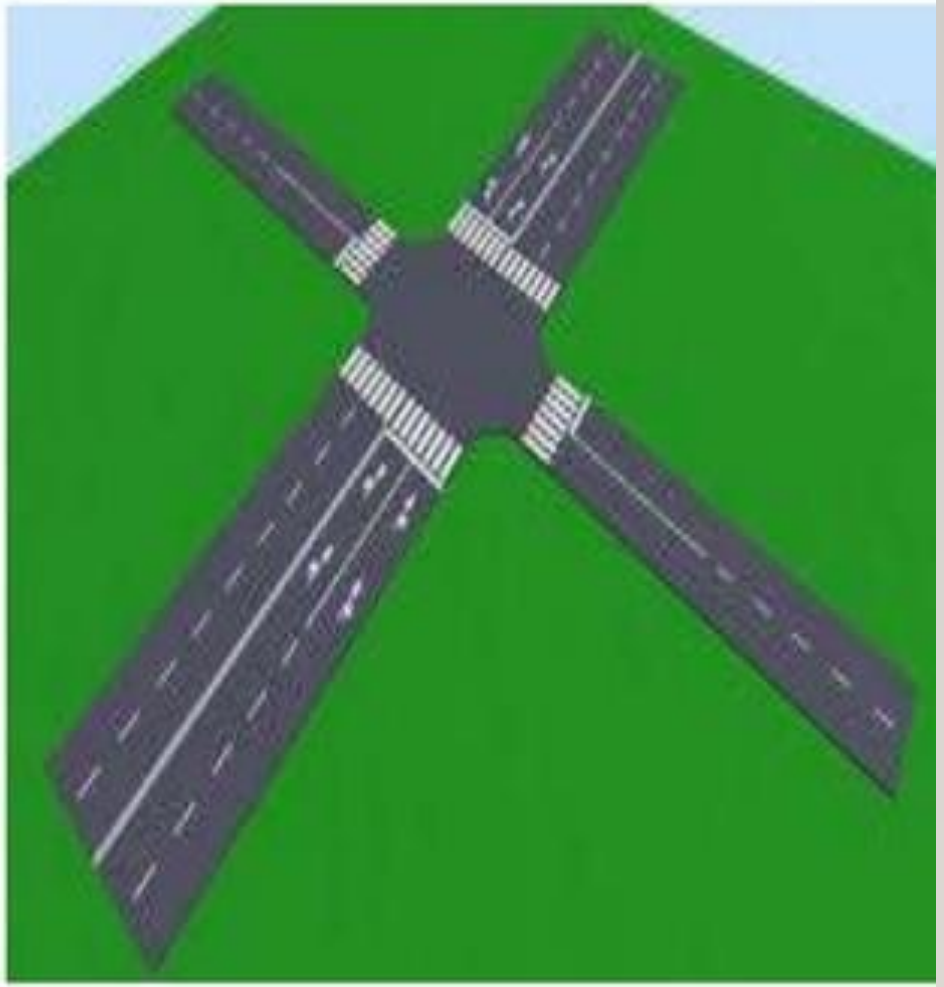


Figure 37:11: Pedestrian marking near an intersection

Directional Arrows

- Guides the drivers in advance
- Because of the low angle of the markings, Arrows should be elongated in the direction of traffic for adequate visibility
- Dimensions of arrows are very important

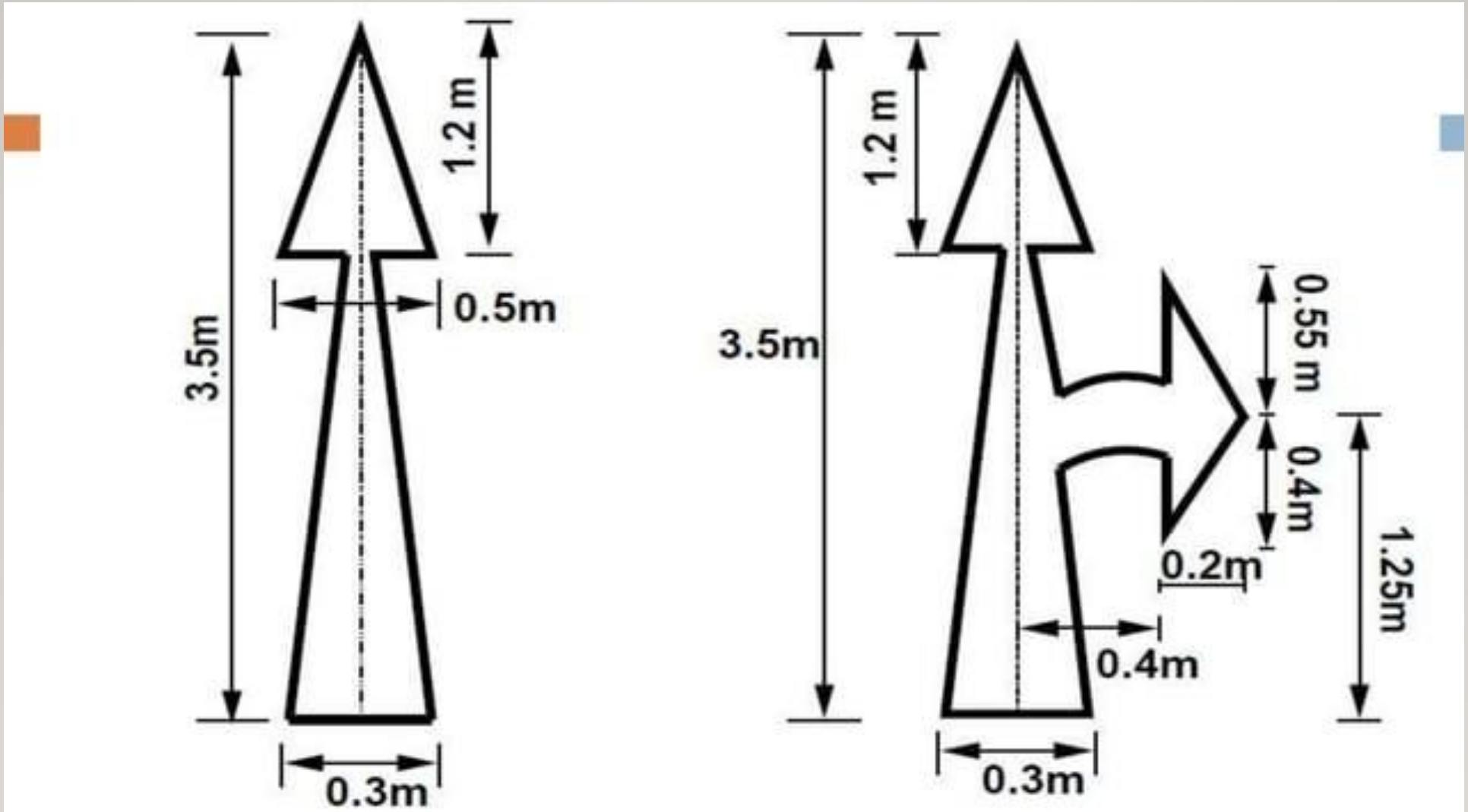


Figure 37:12: Directional arrow marking

Object markings
- objects with in the carriageway

- Traffic islands, raised medians
- Marked by not less than five alternate black and yellow stripes
  - Shall be uniform
  - Should slope forward at an angle of 45 with respect to the direction of traffic
  - should not be less than 100 m wide so as to provide sufficient visibility

- Objects adjacent to carriageway

- subway piers and abutments, culvert head walls
- Marked with alternate black and white stripes at a forward angle of 45 with respect to the direction of traffic
- Poles should be painted in alternate black and white up to a height of 1.25 m above the road level
- Other objects should be painted in solid white
- Kerbs of all islands located in the line of traffic flow shall be painted with either alternating black and white stripes of 500 mm wide
- Chequered black and white stripes of same width are also used

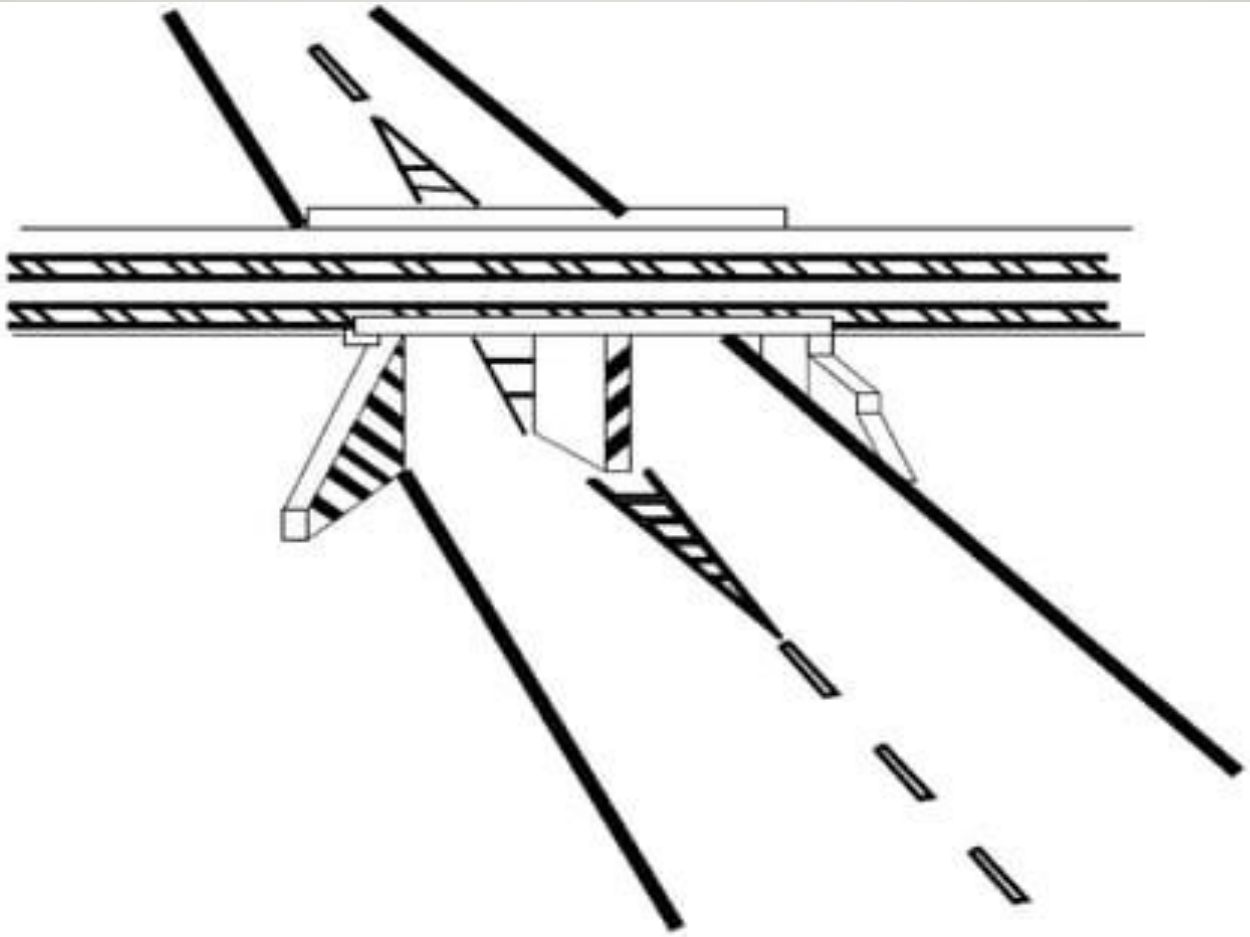


Figure 37:13: Marking for objects adjacent to the road way

Word messages

- Information to guide, regulate, or warn the road user
- Characters are usually capital letters
- Legends should be as brief as possible and not more than three words

Markings for hazardous locations

- Wherever there is a change in the width of the road, the driver should be warned about this situation
- Road markings showing the width transition in the carriageway should be of 100 mm width
- Converging lines shall be 150 mm wide

Traffic Islands

Traffic islands are painted or solid structure that is placed on a road to control traffic. These islands can be an either circular or narrow strip that runs between two roads at an acute angle. A painted island is one that uses only road markings without Krebs or other obstacles.

Types of traffic islands

- Divisional islands
  - Separate opposing flow of traffic with more lanes
  - Head – on collisions are eliminated
- Channelizing islands
  - Guide traffic
  - Reduce conflict between traffic
  - Provide desired angle for merging & crossing
- Pedestrian Loading island
  - Provided at bus stops near cross walks to aid / protect pedestrians
- Rotary islands
  - Large centralized island
  - Crossing manoeuvre is converted to “weaving”

Rotary or Central Traffic Islands

Channelizing Traffic Island

Divisional Traffic Island

Refuge Traffic Island