Chapter 37

Road markings

37.1 Overview

The essential purpose of road markings is to guide and control traffic on a highway. They supplement the function of traffic signs. The markings serve as a psychological barrier and signify the delineation of traffic path and its lateral clearance from traffic hazards for the safe movement of traffic. Hence they are very important to ensure the safe, smooth and harmonious flow of traffic. Various types of road markings like longitudinal markings, transverse markings, object markings and special markings to warn the driver about the hazardous locations in the road etc. will be discussed in detail in this chapter.

37.2 Classification of road markings

The road markings are defined as lines, patterns, words or other devices, except signs, set into applied or attached to the carriageway or kerbs or to objects within or adjacent to the carriageway, for controlling, warning, guiding and informing the users. The road markings are classified as longitudinal markings, transverse markings, object markings, word messages, marking for parkings, marking at hazardous locations etc.

37.3 Longitudinal markings

Longitudinal markings are placed along the direction of traffic on the roadway surface, for the purpose of indicating to the driver, his proper position on the roadway. Some of the guiding principles in longitudinal markings are also discussed below.

Longitudinal markings are provided for separating traffic flow in the same direction and the predominant color used is white. Yellow color is used to separate the traffic flow in opposite direction and also to separate the pavement edges. The lines can be either broken, solid or double solid. Broken lines are permissive in character and allows crossing with discretion, if traffic situation permits. Solid lines are restrictive in character and does not allow crossing except for entry or exit from a side road or premises or to avoid a stationary obstruction. Double solid lines indicate severity in restrictions and should not be crossed except in case of emergency. There can also be a combination of solid and broken lines. In such a case, a solid line may be crossed with discretion, if the broken line of the combination is nearer to the direction of travel. Vehicles from the opposite directions are not permitted to cross the line. Different types of longitudinal markings are centre line, traffic lanes, no passing zone, warning lines, border or edge lines, bus lane markings, cycle lane markings.

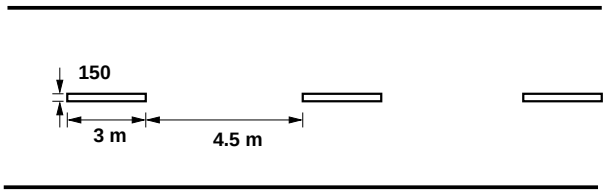

Figure 37:1: Centre line marking for a two lane road

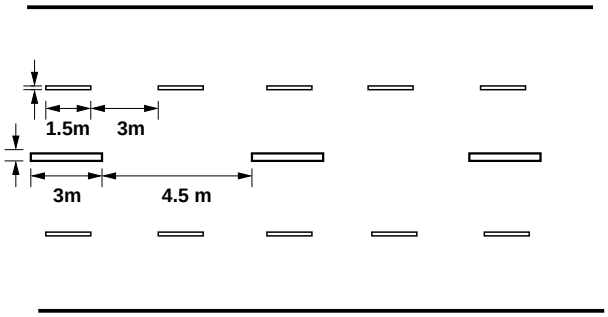

Figure 37:2: Centre line and lane marking for a four lane road

37.3.1 Centre line

Centre line separates the opposing streams of traffic and facilitates their movements. Usually no centre line is provided for roads having width less than 5 m and for roads having more than four lanes. The centre line may be marked with either single broken line, single solid line, double broken line, or double solid line depending upon the road and traffic requirements. On urban roads with less than four lanes, the centre line may be single broken line segments of 3 m long and 150 mm wide. The broken lines are placed with 4.5 m gaps (figure 37:1). On curves and near intersections, gap shall be reduced to 3 metres. On undivided urban roads with at least two traffic lanes in each direction, the centre line marking may be a single solid line of 150 mm wide as in figure 37:2, or double solid line of 100 mm wide separated by a space of 100 mm as shown in figure 37:3. The centre barrier line marking for four lane road is shown in figure 37:4.

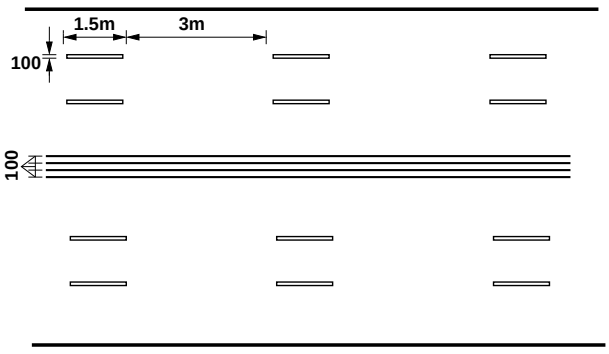

Figure 37:3: Double solid line for a two lane road

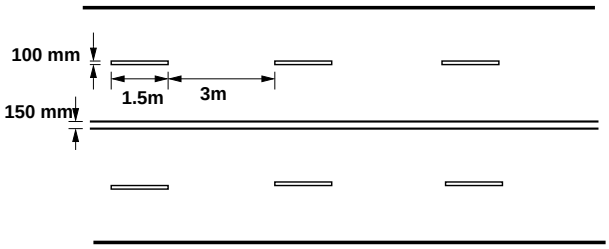

Figure 37:4: Centre barrier line marking for four lane road

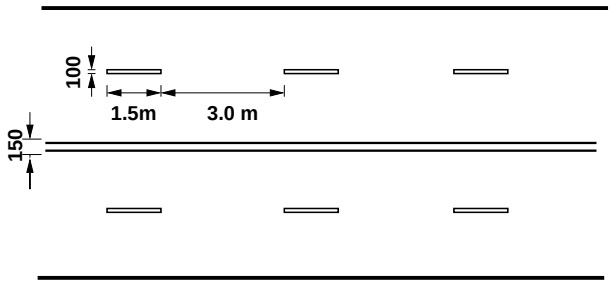

Figure 37:5: Lane marking for a four lane road with solid barrier line

37.3.2 Traffic lane lines

The subdivision of wide carriageways into separate lanes on either side of the carriage way helps the driver to go straight and also curbs the meandering tendency of the driver. At intersections, these traffic lane lines will eliminate confusion and facilitates turning movements. Thus traffic lane markings help in increasing the capacity of the road in addition ensuring more safety. The traffic lane lines are normally single broken lines of 100 mm width. Some examples are shown in figure 37:5 and figure 37:6.

37.3.3 No passing zones

No passing zones are established on summit curves, horizontal curves, and on two lane and three lane highways where overtaking maneuvers are prohibited because of low sight distance. It may be marked by a solid yellow line along the centre or a double yellow line. In the case of a 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 . These solid lines are also called barrier lines. When a solid line is to the right of the broken line, the passing restriction shall apply only to the

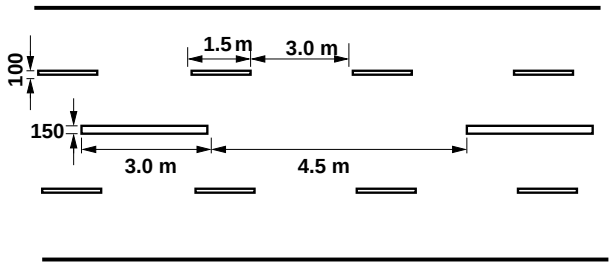

Figure 37:6: Traffic lane marking for a four lane road with broken centre line

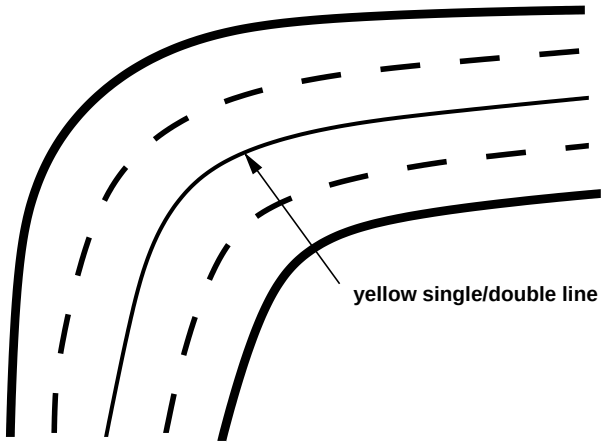

Figure 37:7: Barrier line marking for a four lane road

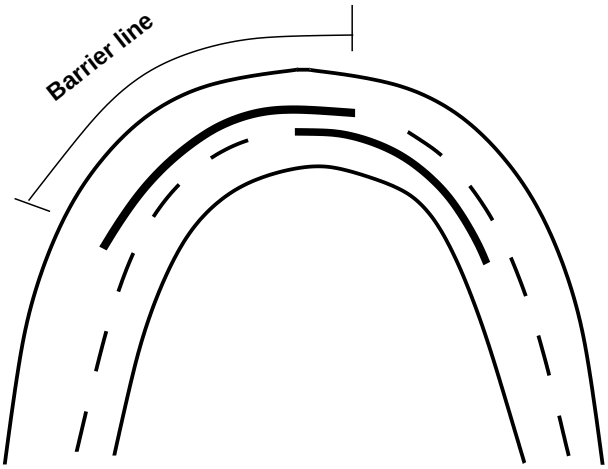

Figure 37:8: No passing zone marking at horizontal curves

opposing traffic. Some typical examples are shown in figure 37:7 and figure 37:8. In the latter case, the no passing zone is staggered for each direction.

37.3.4 Warning lines

Warning lines warn the drivers about the obstruction approaches. They are marked on horizontal and vertical curves where the visibility is greater than prohibitory criteria specified for no overtaking zones. They are broken lines with 6 m length and 3 m gap. A minimum of seven line segments should be provided. A typical example is shown in figure 37:9

37.3.5 Edge lines

Edge lines indicate edges of rural roads which have no kerbs to delineate the limits upto which the driver can safely venture. They should be at least 150 mm from the actual edge of the pavement. They are painted in yellow or white.

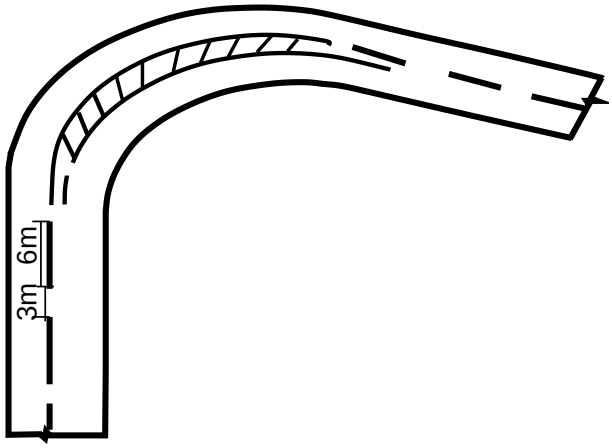

Figure 37:9: Warning line marking for a two lane road

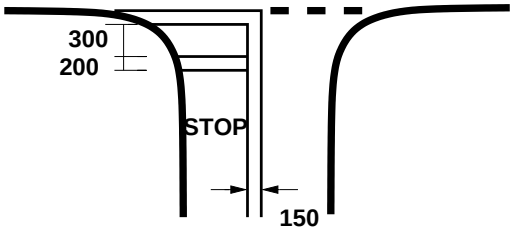

Figure 37:10: Stop line marking near an intersection

All the lines should be preferably light reflective, so that they will be visible during night also. Improved night visibility may also be obtained by the use of minute glass beads embedded in the pavement marking materials to produce a retroreflective surface.

37.4 Transverse markings

Transverse markings are marked across the direction of traffic. They are marked at intersections etc. The site conditions play a very important role. The type of road marking for a particular intersection depends on several variables such as speed characteristics of traffic, availability of space etc. Stop line markings, markings for pedestrian crossing, direction arrows, etc. are some of the markings on approaches to intersections.

37.4.1 Stop line

Stop line indicates the position beyond which the vehicles should not proceed when required to stop by control devices like signals or by traffic police. They should be placed either parallel to the intersecting roadway or at right angles to the direction of approaching vehicles. An example for a stop line marking is shown in figure 37:10.

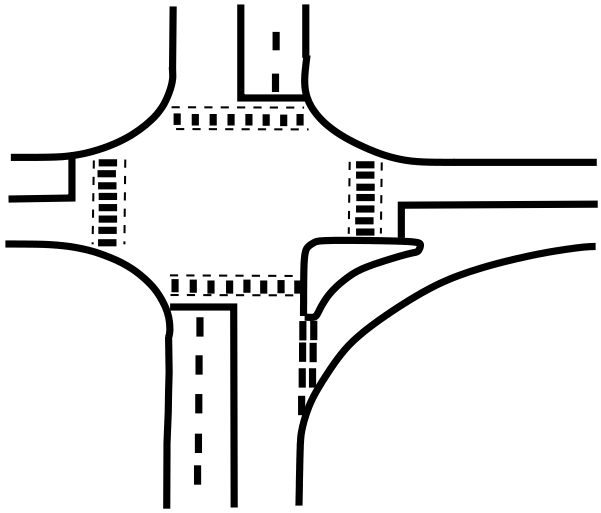

Figure 37:11: Pedestrian marking near an intersection

37.4.2 Pedestrian crossings

Pedestrian crossings are provided at places where the conflict between vehicular and pedestrian traffic is severe. The site should be selected that there is less inconvenience to the pedestrians and also the vehicles are not interrupted too much. At intersections, the pedestrian crossings should be preceded by a stop line at a distance of 2 to 3m for unsignalized intersections and at a distance of one metre for signalized intersections. Most commonly used pattern for pedestrian crossing is Zebra crossing consisting of equally spaced white strips of 500 mm wide. A typical example of an intersection illustrating pedestrian crossings is shown in figure 37:11.

37.4.3 Directional arrows

In addition to the warning lines on approaching lanes, directional arrows should be used to guide the drivers in advance over the correct lane to be taken while approaching busy intersections. Because of the low angle at which the markings are viewed by the drivers, the arrows should be elongated in the direction of traffic for adequate visibility. The dimensions of these arrows are also very important. A typical example of a directional arrow is shown in figure 37:12.

37.5 Object marking

Physical obstructions in a carriageway like traffic island or obstructions near carriageway like signal posts, pier etc. cause serious hazard to the flow of traffic and should be adequately marked. They may be marked on the objects adjacent to the carriageway.

37.5.1 Objects within the carriageway

The obstructions within the carriageway such as traffic islands, raised medians, etc. may be marked by not less than five alternate black and yellow stripes. The stripes should slope forward at an angle of 45° with respect to

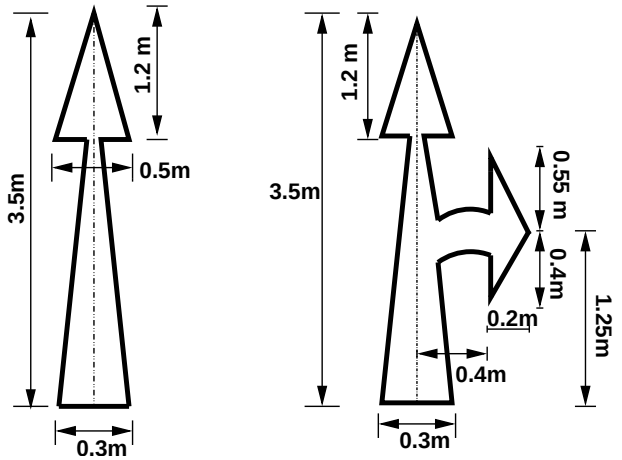

Figure 37:12: Directional arrow marking

the direction of traffic. These stripes shall be uniform and should not be less than 100 m wide so as to provide sufficient visibility.

37.5.2 Objects adjacent to carriageway

Sometimes objects adjacent to the carriageway may pose some obstructions to the flow of traffic. Objects such as subway piers and abutments, culvert head walls etc. are some examples for such obstructions. They should be marked with alternate black and white stripes at a forward angle of 45° with respect to the direction of traffic. Poles close to the carriageway should be painted in alternate black and white up to a height of 1.25 m above the road level. Other objects such as guard stones, drums, guard rails etc. where chances of vehicles hitting them are only when vehicle runs off the carriageway 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 or chequered black and white stripes of same width. The object marking for central pier and side walls of an underpass is illustrated in figure 37:13.

37.6 Word messages

Information to guide, regulate, or warn the road user may also be conveyed by inscription of word message on road surface. Characters for word messages are usually capital letters. The legends should be as brief as possible and shall not consist of more than three words for any message. Word messages require more and important time to read and comprehend than other road markings. Therefore, only few and important ones are usually adopted. Some of the examples of word messages are STOP, SLOW, SCHOOL, RIGHT TUN ONLY etc. The character of a road message is also elongated so that driver looking at the road surface at a low angle can also read them easily. The dimensioning of a typical alphabet is shown in figure 37:14.

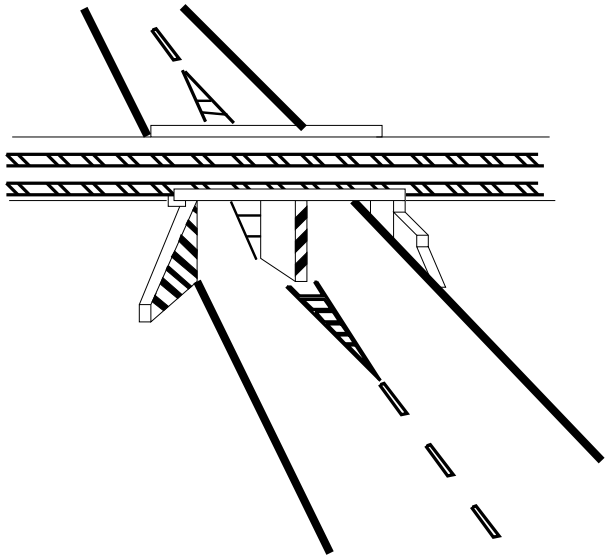

Figure 37:13: Marking for objects adjacent to the road way

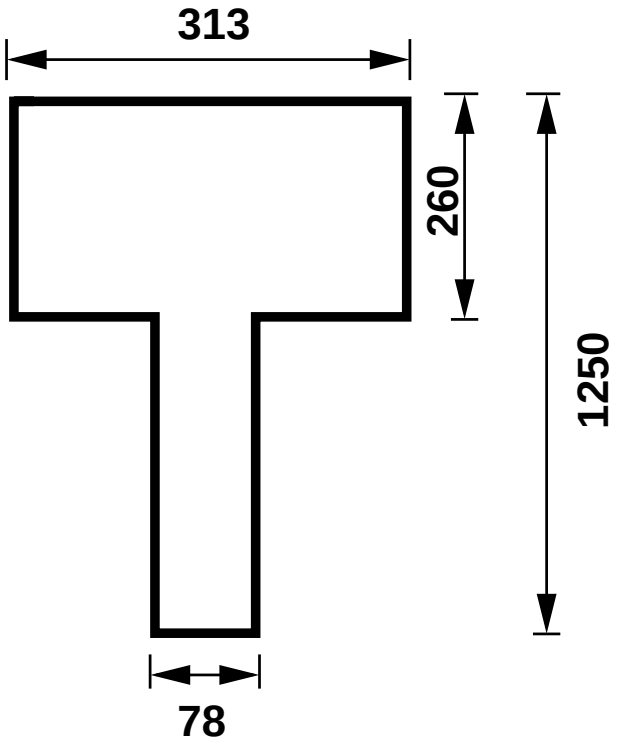

Figure 37:14: Typical dimension of the character T used in road marking

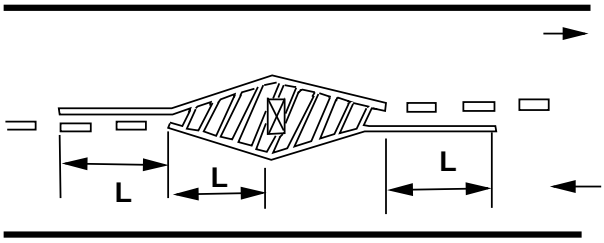

Figure 37:15: Approach marking for obstructions on the road way

37.7 Parking

The marking of the parking space limits on urban roads promotes more efficient use of the parking spaces and tends to prevent encroachment on places like bus stops, fire hydrant zones etc. where parking is undesirable. Such parking space limitations should be indicated with markings that are solid white lines 100 mm wide. Words TAXI, CARS, SCOOTERS etc. may also be written if the parking area is specific for any particular type of vehicle. To indicate parking restriction, kerb or carriage way marking of continuous yellow line 100 mm wide covering the top of kerb or carriageway close to it may be used.

37.8 Hazardous location

Wherever there is a change in the width of the road, or any hazardous location in the road, the driver should be warned about this situation with the help of suitable road markings. Road markings showing the width transition in the carriageway should be of 100 mm width. Converging lines shall be 150 mm wide and shall have a taper length of not less than twenty times the off-set distance. Typical carriageway markings showing transition from wider to narrower sections and vice-versa is shown in figure 37:15. In the figure, the driver is warned about the position of the pier through proper road markings.

37.9 Summary

Road markings are aids to control traffic by exercising psychological control over the road users. They are made use of in delineating the carriage way as well as marking obstructions, to ensure safe driving. They also assist safe pedestrian crossing. Longitudinal markings which are provided along the length of the road and its various classifications were discussed. Transverse markings are provided along the width of the road. Road markings also contain word messages, but since it is time consuming to understand compared to other markings there are only very few of them. Markings are also used to warn the driver about the hazardous locations ahead. Thus road markings ensure smooth flow of traffic providing safety also to the road users. The following web link give further insight in to the road markings: mutcd.fhwa.dot.gov/pdfs/200311/pdf-index.htm.

37.10 Problems

1. Broken lines

   (a) allows crossing with discretion

(b) does not allow crossing except for entry or exit from a side road

(c) allows crossing only in case of extreme emergency

(d) are not at all used as road markings.

2. Stop line comes under

(a) Longitudinal markings

(b) Object markings

(c) Transverse markings

(d) None of these

37.11 Solutions

1. Broken lines

(a) allows crossing with discretion$\surd$

(b) does not allow crossing except for entry or exit from a side road

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(a) Longitudinal markings

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