

3.8 Intersections

Markings are used at intersections to reduce vehicle and pedestrian conflicts, improve the capacity of the intersection, and clarify information used in driver decision-making.

No-passing zones should be used on the approaches to all major intersections and at other intersections where the topography or road alignment makes it necessary. The length of the no-passing zone will depend upon individual intersection characteristics such as approach speed and geometry.

These markings will alert drivers that they are approaching an intersection and give them adequate time to respond. Intersection markings can also help drivers understand a transitory condition hazard such as a line of traffic stopped beyond the crest of a vertical curve.

Controlled Intersections

STOP Signs

Typical approach markings for rural intersections controlled with STOP signs are shown in Figures 26 through 30. These markings may be supplemented by the word STOP placed on the pavement on the approach in compliance with the guidelines in Section 3.12 of this Book.

At urban intersections with standard STOP line and crosswalk markings, the lane lines and directional dividing line must end at the STOP line on the approach side of the intersection. Typical approach markings for urban intersections controlled with STOP signs are shown in Figure 31.

At both urban and rural intersections, a stop line (also called a stop bar) must be used to indicate the point at which a vehicle must stop in compliance with the STOP sign. A stop line must be a solid white retroreflective line between 30 cm and 60 cm wide. The stop line must extend across the approach lanes from the right pavement edge to the directional dividing line or median, or, in the case of one-way streets, to the left pavement edge. Typical examples of stop line application are shown in Figures 26 to 31 inclusive.

Where there is no pedestrian crosswalk, the stop line must be located between 1.25 m and 3 m upstream of the projected nearside edge of the intersecting road. At STOP signs where visibility is restricted, the stop line should be located so that the driver of a vehicle properly positioned behind the stop line has an adequate view of approaching cross traffic in both directions. The stop line should also be positioned with reference to the clearance needs of cross traffic and pedestrians. At intersections where a crosswalk is located, the separation between the crosswalk line and the stop line must be 1 m, as shown in Figures 32 and 33, except where special circumstances dictate otherwise.

A stop line is normally placed parallel to the edge of the crossing roadway and parallel to crosswalk lines. At a skewed intersection with a pedestrian crosswalk, the stop bar should be placed perpendicular to the curb.

Stop lines may be omitted on the paved aprons of gravel road intersections with highways.

Traffic Control Devices

Typical approach markings for rural signalized intersections are shown in Figure 26. Typical approach markings for urban signalized intersections are shown in Figures 32 and 33.

A stop line must be used to indicate the point at which a vehicle must stop in compliance with the traffic signal. A stop line must be a solid white retroreflective line between 30 cm and 60 cm wide. The stop line must extend across the approach lanes from the right pavement edge to the directional dividing line or median, or, in the case of one-way streets, to the left pavement edge. Typical examples of stop line application are shown in Figures 26, 32 and 33. Stop lines are normally placed parallel to the edge of the crossing roadway, but may be positioned at an angle to the edges of crossing roadways when those roadways are of different widths, as shown in Figure 31.

Where there is no pedestrian crosswalk, the stop line must be located between 1.25 m and 3 m upstream of the projected nearside edge of the intersecting road. At intersections where a crosswalk is located, the separation between the crosswalk line and the stop line must be 1 m as shown in Figures 32 and 33, except where special circumstances dictate otherwise. Stop lines should be parallel to crosswalk lines.

Guide Lines

Guide lines are used to guide vehicles through an intersection or interchange where the legs are offset, skewed, or have a complex configuration, or where more than one lane for a single turning movement exists. The guide lines delineate the proper course to be taken by vehicles traversing the intersection or interchange and help to prevent driver confusion.

Guide lines should be condensed broken white retroreflective lines 20 cm wide, composed of 1 m segments with 1 m gaps as shown in Figure 3.

Crosswalks

Crosswalk markings define and delineate the path for pedestrians to cross the roadway. In rural areas, crosswalks should be marked at signalized intersections where pedestrians normally use the signal to cross the highway. Crosswalks should be marked at all intersections where there is substantial conflict between vehicle and pedestrian movements.

Crosswalk lines must be solid white parallel retroreflective lines 10 cm to 20 cm wide, extending entirely across the pavement, as shown in Figures 32 and 33. Under special circumstances, such as where vehicle stop lines are not provided or where vehicle speeds exceed 60 km/hr, the crosswalk lines may be widened to 60 cm. The downstream edge of the crosswalk should be inset at least 60 cm from the projected nearside curb line of the cross street.

The width of the crosswalk between the lines is usually determined by the widths of the connected sidewalks and the expected two-way pedestrian flows utilizing the crossing at the peak time. The crosswalk must be at least 2.5 m wide. The 1985 U.S. Highway Capacity Manual (Transportation Research Board Special Report 209) outlines a procedure to calculate the crosswalk widths required for high pedestrian volumes. Widths of 3 m to 4 m are typical of urban areas with significant pedestrian activity.

Obstacles such as curbs and raised islands should remain outside the crosswalk lines in consideration of persons with walking impairments and persons using wheelchairs, walkers, and strollers. The traveled part of the crosswalk must be aligned with sidewalk ramps and curb cuts where these are provided at one or both sides of the roadway.

Pedestrian crossovers and school crossings are discussed in Section 3.9.

Turn Lanes

Exclusive left-turn and right-turn lanes can increase intersection capacity, improve intersection operation, and reduce the incidence of rear-end collisions. To realize these benefits, exclusive turn lanes must be properly designed, so that left-turn lanes provide adequate storage space and right-turn lanes make adequate provision for cyclists traveling through the intersection.

Where separate turning lanes have been provided, it is desirable to separate through traffic from turning traffic by means of channelizing pavement markings. Typical markings for right-turn channelization and tapers are shown in Figures 27 and 28, for separate right-turn channelization in Figure 14, and for separate left-turn lanes in Figure 29. These lines are particularly useful to drivers faced with dense traffic or complex manoeuvring areas.

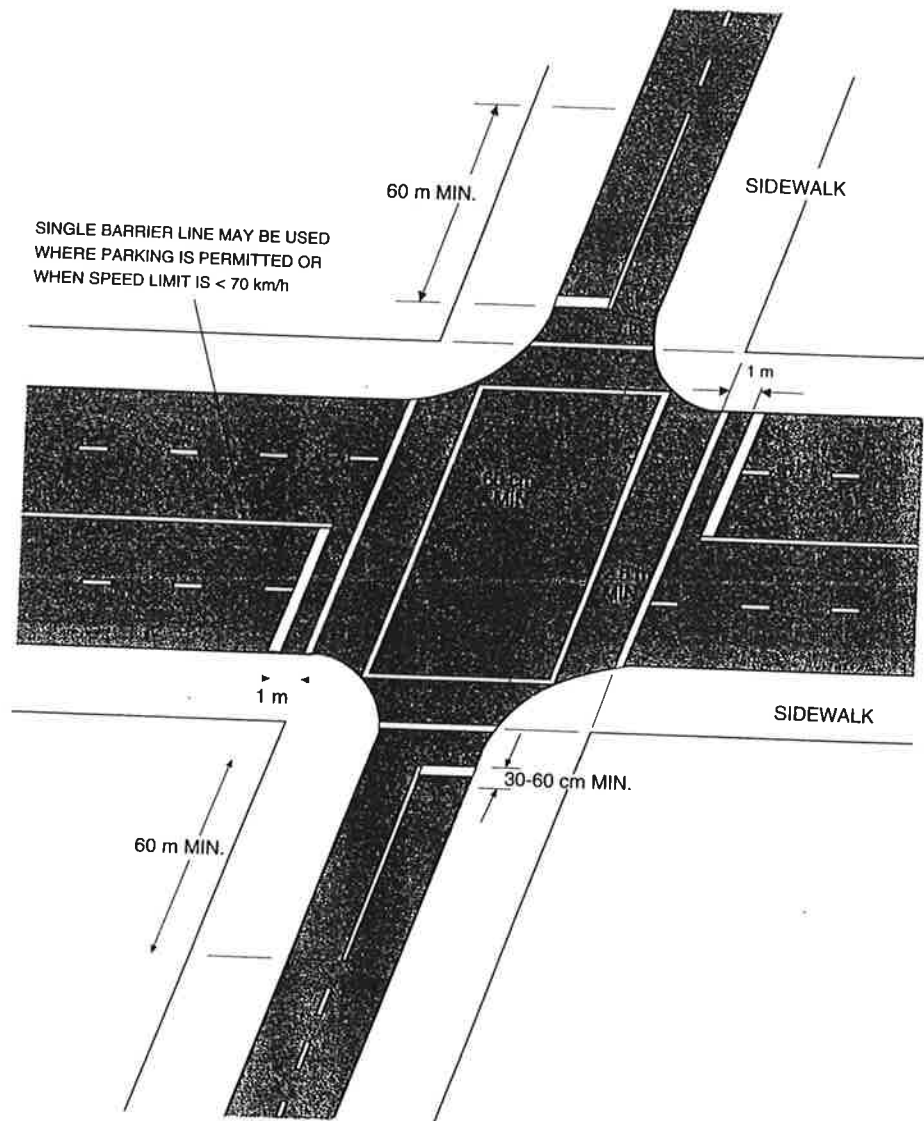
At unsignalized T-intersections where through vehicles frequently attempt to bypass slowed or stopped vehicles waiting to turn left, provided that an adequate paved shoulder exists, a left-turn slip-

around lane (also called a shoulder bypass lane) may be added by re-marking the highway edge line as shown in Figure 30. A slip-around lane may also be introduced to reduce collisions or improve traffic operations. A left-turn slip-around lane should be introduced only if a left-turn storage lane is not possible.

When a left-turn or right-turn lane is of sufficient length that a motorist could unintentionally drive into the auxiliary lane, arrows might be required to indicate that vehicles in the auxiliary lane are required to turn. Arrows as shown in Figures 27 and 29 should be located such that they will ensure that the motorist understands the intended use of the auxiliary lane and is deterred from making erratic manoeuvres such as last minute lane changes close to the intersection.

When a two-way left-turn lane is used on a section of roadway, it should be marked as shown in Figure 34.

Figure 32 - Signalized Intersection



3.10 Parking

Parking space markings encourage an orderly and efficient use of parking spaces in areas of high turnover. These markings are also useful to identify where parking is prohibited, such as bus stops, loading zones, approaches to a corner, and to help to prevent encroachment on fire hydrant zones.

Stalls

Type

Curbside parking is generally designated as parallel parking. Angle parking should be limited to streets that function primarily as parking areas.

Length

Parallel parking stalls are 6 m to 6.7 m long to provide manoeuvring space for vehicles. Stalls at either end of a series may be as short as 5.5 m, provided there is no obstruction in front of or behind the stall. Angled parking stalls are generally denoted by lines 5.5 m long.

Width

Parallel parking stalls are 2.3 m to 3.7 m wide. Stalls should be wider if the parking lane is used as a travel lane during peak periods, or if the parking turnover is high.

Setback

Parallel parking stalls should have the following minimum setbacks:

- 4.6 m setback on each side from fire hydrants;

- 6.1 m setback on each side of an intersection. Setback should be greater if required for adequate sight distance. Greater setback is especially helpful near uncontrolled intersections, on roads with high operating speeds, or where through vehicles need more room to manoeuvre around left-turning vehicles.

Local statutory prohibitions on parking may supersede these minimums, or may impose additional restrictions. Approaches to pedestrian crossings, traffic signals, bus stops, private driveways, railroad crossings, or fire stations may be subject to such local restrictions. Local parking restrictions must be observed when marking parking stalls.

Curb Markings and Restrictions

Markings

Markings used to define parking spaces must be white. The front and rear limits of each parallel parking stall, and the lateral limits of angle parking stalls, should be defined by solid lines approximately 10 cm wide. Examples of acceptable configurations for marking parking stalls are shown in Figure 47.

Restrictions

Signs should be used rather than pavement markings to denote areas where parking is restricted. On narrow roadways, curbside parking is often prohibited on one or both sides. On one-way roads narrower than about 5 m, and two-way roads narrower than about 8 m, parking is generally prohibited on both sides. On one-way roads 5 m to 7.5 m wide, and on two-way roads 8 m to 9.5 m wide, parking is generally prohibited on one side.

Disabled Requirements

Location

Parking spaces for disabled drivers have specific requirements to accommodate wheelchairs safely and efficiently. Disabled parking spaces should be located in an unobstructed area where the road surface is even and level, with a slope of less than 5% in the longitudinal direction and less than 2% in the cross direction. Disabled parking spaces should have access to a nearby curb cut or ramp for wheelchairs.

Width

Curbside disabled parking spaces should be restricted to angle parking, unless the space available for parallel parking is sufficiently wide to ensure safe driver-side access for wheelchairs. Disabled angle parking spaces should be at least 3.7 m wide, inclusive of an adjacent unobstructed area 1.0 m wide to allow the driver or passenger to operate a wheelchair between parked vehicles.

Figure 48 – Disabled Access Symbol



Marking

The disabled access (wheelchair) symbol shown in Figure 48 may be placed in each parking space designated for use by persons with disabilities. A blue background with white border may supplement the symbol, or blue lines may supplement white disabled parking space markings.

3.11 Coloured Pavement

General

Coloured pavements are used to supplement other traffic control devices. Where coloured pavements are used, the traffic control device must be applicable at all times.

Coloured pavement surface should be used only where they contrast significantly with adjoining paved areas.

Care should be taken when considering the use of decorative pavements that use coloured materials (such as brick or coloured aggregate). These materials may convey to the road user a meaning that is not intended.

Colours

Colours for pavements used to supplement traffic control devices must be limited to the following:

- **Yellow** must only be used for median islands separating traffic flowing in opposite directions.
- **White** must only be used for delineation on shoulders, on channelizing islands where traffic passes on both sides in the same general direction, and for crosswalks.

- **Blue** must only be used for disabled parking spaces.

3.12 Words and Symbols

Words and symbols applied to the pavement may be used alone or as a supplement to standard signs for the purposes of guiding or warning traffic. Reference should be made to OTM Book 5 (Regulatory Signs) for information on supporting regulatory signs and by-laws.

The inventory of different word and symbol pavement markings should be minimized to avoid driver confusion and promote effective guidance. Where a symbol is known to be well-understood, it is generally preferable to a word message.

Word and symbol markings must be formed of retroreflective white marking material. Word and symbol markings should be no more than one lane wide, and should be repeated in every lane to which the message applies.

Word Messages

Word messages may include regulatory legends (such as STOP markings) or warning legends (such as markings for school zones, pedestrian crossings, or railroad crossings).

A word message should be as brief as possible, consisting of no more than three words. A multi-line message should be placed so that the first word is nearest to the approaching driver.

Due to the low angle at which word and symbol markings are viewed, they must be elongated in the direction of traffic movement to be legible. Dimensions of letters and numerals to be used in word markings are illustrated in Figures 49 to 52

inclusive. The longitudinal space between lines in multi-line word messages should be at least three times the height of the letters on low speed roads, and may increase with increased speed to a maximum of ten times the height of the letters.

Symbols

Lane-use arrow pavement markings, as shown in Figure 53, may be used in two-way left-turn lanes, as shown in Figure 34, and in right-turn and left-turn bays.

Where a through lane becomes a mandatory turn lane, lane-use arrow pavement markings must be placed to warn vehicles that a mandatory turn is approaching. Where symbol arrows are used to warn of a mandatory movement, they must be accompanied by standard signs and may be accompanied by the word marking ONLY.

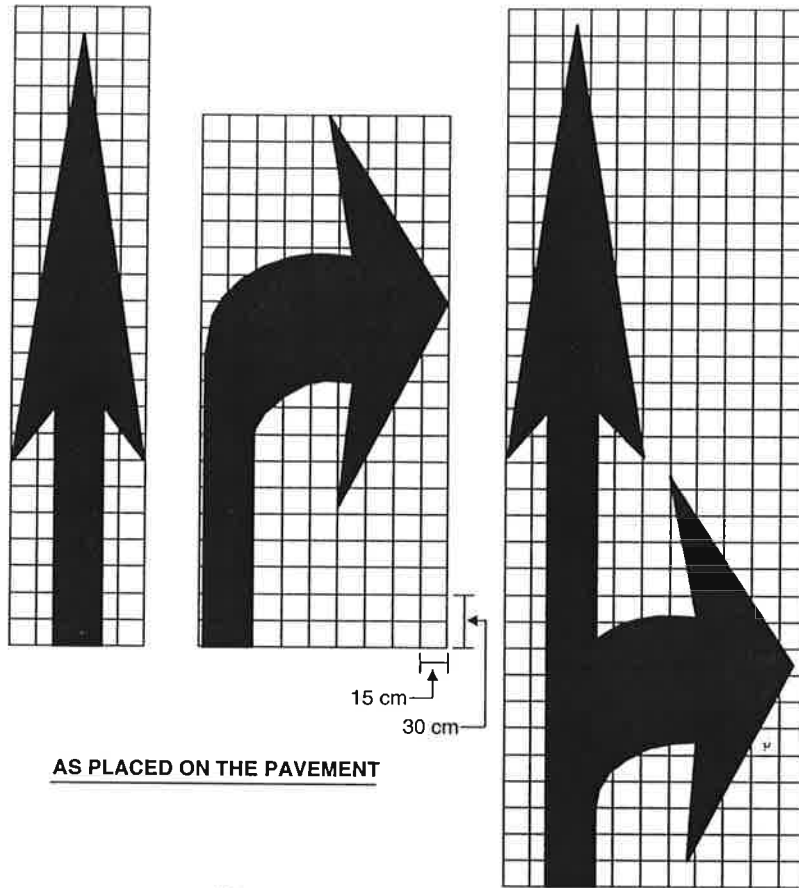
In situations where a lane reduction transition occurs, the lane reduction arrow markings may be used.

The longitudinal space between repeated symbols such as arrows should be at least three times the height of the symbols on low speed roads, and may increase with increased speed to a maximum of ten times the height of the symbols.

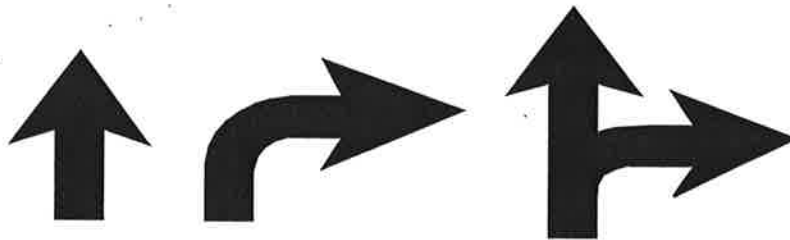
Where wrong-way movement is possible, directional arrow markings may be placed near the downstream terminus of a ramp or channelization. The arrow indicates the correct direction of travel for all drivers, including those attempting to travel the wrong way on a one-way roadway.

The disabled access (wheelchair) symbol may be placed in parking spaces designated for use by persons with disabilities. A blue background and white border may supplement the wheelchair symbol shown in Figure 48.

Figure 53 - Standard Pavement Markings (Arrows)



AS PLACED ON THE PAVEMENT



AS SEEN BY THE MOTORIST