Manual
Traffic and Road Use Management
Volume 3 – Signing and Pavement Marking

Part 2: Pavement Marking Usage
Chapter 2: Types of markings

July 2019
Copyright

© The State of Queensland (Department of Transport and Main Roads) 2019.

Licence

This work is licensed by the State of Queensland (Department of Transport and Main Roads) under a Creative Commons Attribution (CC BY) 4.0 International licence.

CC BY licence summary statement
In essence, you are free to copy, communicate and adapt this work, as long as you attribute the work to the State of Queensland (Department of Transport and Main Roads). To view a copy of this licence, visit: https://creativecommons.org/licenses/by/4.0/

Translating and interpreting assistance
The Queensland Government is committed to providing accessible services to Queenslanders from all cultural and linguistic backgrounds. If you have difficulty understanding this publication and need a translator, please call the Translating and Interpreting Service (TIS National) on 13 14 50 and ask them to telephone the Queensland Department of Transport and Main Roads on 13 74 68.

Disclaimer
While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained within. To the best of our knowledge, the content was correct at the time of publishing.

Feedback
Please send your feedback regarding this document to: tmr.techdocs@tmr.qld.gov.au
Contents

2 Types of markings ............................................................................................................................5

2.1 General line types .........................................................................................................................5

2.2 Longitudinal lines ..........................................................................................................................5
  2.2.1 Dividing lines ..........................................................................................................................5
  2.2.2 Barrier lines ............................................................................................................................6
  2.2.3 Lane lines .................................................................................................................................7
  2.2.4 Edge lines ...............................................................................................................................7
  2.2.5 Continuity lines .......................................................................................................................8
  2.2.6 Turn lines ...............................................................................................................................8
  2.2.7 Outline markings .....................................................................................................................8
  2.2.8 Longitudinal lines at intersections .........................................................................................10
  2.2.9 Wide centreline .....................................................................................................................11
  2.2.10 Yellow Box Marking TC2309 .............................................................................................12

2.3 Transverse lines ...........................................................................................................................12
  2.3.1 ‘STOP’ and ‘GIVE WAY’ lines ............................................................................................13
  2.3.2 Crosswalk lines .....................................................................................................................14
  2.3.3 Other transverse lines .........................................................................................................17

2.4 Other markings .............................................................................................................................17
  2.4.1 Diagonal and chevron markings ............................................................................................17
  2.4.2 Message on pavements ..........................................................................................................21
  2.4.3 Marking of parking and loading areas ....................................................................................53
  2.4.4 Kerb markings .......................................................................................................................59
  2.4.5 Multi-lane roundabouts .........................................................................................................59

2.5 Raised pavement markers ............................................................................................................60
  2.5.1 General .....................................................................................................................................68
  2.5.2 Permanent Retroreflective Raised Pavement Markers (RRPMs) ...........................................69
  2.5.3 Non-retroreflective raised pavement markers ......................................................................69
  2.5.4 Temporary Raised Pavement Markers (TRPMs) ..................................................................69
  2.5.5 Pavement bars .......................................................................................................................69
  2.5.6 Audio-Tactile Line Markings (ATLM) ................................................................................72
2 Types of markings

2.1 General line types

Lines may be continuous or broken. In general, a broken line may be crossed by vehicles at the discretion of drivers. Continuous lines may or may not imply a legal constraint on crossing; legal requirements are related specifically to the line type (barrier line, lane line, edge line or stop line). The dimensions of the various line types are shown in MUTCD Part 2 Figure 5.1.

2.2 Longitudinal lines

For more information, refer to MUTCD Part 2 Section 5.3.

<table>
<thead>
<tr>
<th>5.3 Longitudinal lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.1 General</td>
</tr>
<tr>
<td>A longitudinal line shall consist of a continuous or a broken line, or a combination of both, marked generally parallel to the direction of travel. Where warranted, longitudinal lines shall be used as described below. The pattern and dimensions of longitudinal lines are shown in Figure 5.1.</td>
</tr>
<tr>
<td>5.3.2 Dividing lines</td>
</tr>
<tr>
<td>5.3.2.1 General</td>
</tr>
<tr>
<td>A dividing line is used to separate opposing traffic movements on undivided (two-way) roads. It need not be in the geometric centre of the roadway. Where crossing of the line must be prohibited in one or both directions, a barrier line shall be used (see Clause 5.3.3).</td>
</tr>
<tr>
<td>5.3.2.2 Two-lane, two-way roads</td>
</tr>
<tr>
<td>A dividing line shall take one of the following forms:</td>
</tr>
<tr>
<td>a) a single broken line when provided on sealed pavements 5.5 m or more wide and where the guides given in Clause 5.3.2.4 are met.</td>
</tr>
<tr>
<td>b) A barrier (double) line where crossing of the line must be prohibited in one or both directions, for example, at a no-overtaking zone, or when entering or leaving the roadway (see Clause 5.3.3).</td>
</tr>
<tr>
<td>c) A single continuous barrier line as an alternative to a double barrier line but where the line may be crossed by traffic entering or leaving the roadway (see Clause 5.3.3.2).</td>
</tr>
<tr>
<td>5.3.2.3 Multi-lane roads</td>
</tr>
<tr>
<td>On undivided multi-lane roads having lane lines provided for one or both directions of traffic, a dividing line shall be provided as a dividing line of the type specified in Figure 5.1 for multi-lane undivided roads.</td>
</tr>
<tr>
<td>NOTE: A double two way barrier line may be used to restrict turning movements.</td>
</tr>
</tbody>
</table>

2.2.1 Dividing lines

For more information, refer to MUTCD Part 2 Section 5.3.2.4.

Overtaking and right-turning manoeuvres may be made across a broken dividing line in either direction. Right-turning movements may be made across a single continuous dividing line to enter or leave the road; however, overtaking movements cannot be made in either direction.
A single continuous dividing line may also be used where access driveways in an urban environment are so closely spaced that access breaks in a two-way barrier line (provided in accordance with Section 3.3.5 of this guide) would result in the two-way barrier line appearing as a series of broken lines and drivers may have difficulty in perceiving the presence of a no overtaking zone. In these circumstances, the width of the continuous dividing line should be 100 mm wide.

Dividing lines for overtaking lanes and climbing lanes shall be provided as for dividing lines on a two-lane, two-way road, with barrier lines provided if the warrants for a no overtaking zone are met.

Dividing lines should not be used on:

   a) divided roads

   b) rural undivided roads of less than 5.5 metres width

   c) urban undivided roads of less than 6.8 metres width, unless there is a prohibition on kerbside parking or parking demand is very low.

For more information on dividing lines at intersections, see Section 4.1.2 of this guide.

2.2.2 Barrier lines

For more information, refer to MUTCD Part 2 Section 5.3.3.

<table>
<thead>
<tr>
<th>5.3.3 Barrier lines</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.3.1 General</td>
</tr>
</tbody>
</table>

A barrier line is a dividing line which replaces the single dividing line to prohibit crossing movements from one or both directions, as described below:

   a) Single barrier line. See Clause 5.3.2.2(c).

   b) Double one-way barrier lines. A double one-way barrier line is continuous line beside a broken line. Overtaking across the lines are permitted from the broken line side but not from the continuous line side. Turning movements are permitted from both sides.

   c) Double two-way barrier lines. A double two-way barrier line comprises two continuous lines side-by-side. Movements across the lines, or to the right of the lines, for the purpose of overtaking or turning in either direction are prohibited.

Under the *Queensland Road Rules*, Rule 134, barrier lines have the following effects:

   a) Double one-way barrier lines: vehicles are permitted to cross the lines to overtake from the broken line side, but not from the continuous line side.

   b) Double two-way barrier lines: overtaking movements are not permitted in either direction.

Vehicles are permitted to turn right across a double one-way barrier line to enter or leave the road from both the broken line side and the continuous line side of the barrier line.

Vehicles are not permitted to turn right across a double barrier line to enter or leave the road. Where crossing to / from a property, access may be allowed along a section of road with a two-way barrier line, a gap must be left in the two-way barrier line (see Section 3.3.5 of this guide for details).

Although the distance between the two component lines is specified in MUTCD Part 2 Figure 5.1, this distance may vary. The point at which a barrier line becomes a median island is therefore open to
interpretation. It is recommended that, where barrier lines meet a median island gore, the barrier lines are continued to form at least one of the edges of the island.

Audio tactile line marking (ATLM) may be used as a two-way barrier line treatment, in line with Section 2.5.6 of this guide, to alert drivers of lane drifting.

For more information on barrier lines at intersections, see sections 3.6.3 and 4.1.3.

2.2.3 Lane lines

For more information, refer to MUTCD Part 2 Section 5.3.4.

Lane lines are used to separate lanes of traffic moving in the same direction. Overtaking and right-turning movements may be made across a broken lane line, but Queensland Road Rule 147 generally prohibits a vehicle from crossing a continuous lane line. Continuous lane lines are used to enforce lane discipline – for example, between a right-turn only lane and the adjacent lane on the left.

For more information on lane lines at intersections, see Section 4.1.4 of this guide.

2.2.4 Edge lines

Refer to MUTCD Part 2 Section 5.3.5.

5.3.5 Edge lines

Edge lines are used as follows:

a) General delineation

Edge lines are used where specified or recommended in Clause 4.2.2 to provide a continuous guide to the driver and to discourage traffic from travelling on shoulders, thereby making driving safer and more comfortable, particularly at night.

Where used for this purpose they shall be placed on both sides of the sealed surface of the roadway as follows:

i) Sealed shoulder – at edge of traffic lane.

ii) Unsealed shoulder – 75 mm clear of edge of seal.

iii) Kerbed pavement – 300 mm clear of face of kerb.

b) Lane boundaries

Edge lines may be used to define the boundaries between moving traffic lanes and parking lanes.

c) Guidance past objects and through width transitions

Short lengths of edge line or a local widening of a continuing edge line may be used to guide traffic past an object that is close enough to the road to constitute a hazard, or to transition the road past a traffic island or at a narrowing of the pavement.
Where used to deflect traffic at a pavement narrowing, the length \((L)\) of the edge lined transition shall be determined as follows:

\[
L = 0.5 \times V \times W
\]

where

\[
V = 85^{th} \text{ percentile speed, in kilometres per hour}
\]

\[
W = \text{lateral offset, in metres}
\]

Examples of such transitioning are shown in Figure 4.17.

ATLM may be used as a preferred edge line treatment in some locations.

Guidelines for ATLM are contained in Section 2.5.6 of this guide and MRTS45 *Road Surface Delineation*.

For more information on edge lines at intersections, see Section 4.1.5 of this guide.

### 2.2.5 Continuity lines

For more information, refer to MUTCD Part 2 Section 5.3.6.

#### 5.3.6 Continuity lines

A continuity line may be used to indicate the edge of that portion of a roadway assigned to through traffic, and where it is intended that the line be crossed by traffic turning at an intersection, or lane changing when entering or leaving an added lane at its start or finish. Its use to delineate trap lanes is shown in Figures 2.10 and 3.5.

**NOTE:** Where a zip-merge is required (see Clause 4.7.2(a)), the continuity line is omitted.

A continuity line may also be used to indicate the edge of that portion of a road assigned to through traffic, and where it is intended that the line be crossed by traffic entering or leaving a freeway at the intersection of the ramp and the main freeway lanes. For treatment at expressway exit and entrance ramps, see Section 3.7. It is also used to show the continuity of a bicycle lane where it continues through an unsignalised intersection. For more information, see Section 3.8.2 of this guide.

Continuity lines may also be used to delineate the edge of the running lane at an indented bus bay. In this case, the line may be painted yellow. For more information on continuity lines at intersections, see Section 4.1.6 of this guide.

### 2.2.6 Turn lines

For more information, refer to MUTCD Part 2 Section 5.3.7.

Turn lines comprise a broken line 100 mm wide, with 600 mm stripes and 600 mm gaps. For more information on turn lines at intersections, see Section 4.1.7 of this guide.

### 2.2.7 Outline markings

For more information, refer to MUTCD Part 2 Section 5.3.8 and Section 2.5.5 of this guide.

Outline markings of splays, medians, islands, safety bars and shoulders shall be a single continuous line. The gap between the outline marking and safety bars should be 75 mm.
### MUTCD Part 2 Figure 5.1 – Longitudinal and transverse line types

#### LONGITUDINAL LINES

1. **Dividing lines**
   - (a) Two-lane roads
     - 3 m 9 m 3 m 9 m 3 m 9 m 3 m 9 m
     - Non Freeway: 100
     - Freeway: 150
   - (b) Multi-lane roads

2. **Barrier lines**
   - (a) Single
     - 3 m 9 m 3 m 9 m 3 m 9 m
     - Width: 80
   - (b) One direction
     - 3 m 9 m 3 m 9 m 3 m 9 m
     - Width: 80
   - (c) Both directions
     - 3 m 9 m 3 m 9 m 3 m 9 m
     - Width: 80

3. **Lane lines**
   - (a) Broken
     - 3 m 9 m 3 m 9 m 3 m 9 m
     - Width: 100 150
   - (b) Special purpose - broken, including exit lines at roundabouts
     - 3 m 9 m 3 m 9 m 3 m 9 m
     - Width: 100
   - (c) Continuous
     - 3 m 9 m 3 m 9 m 3 m 9 m
     - Width: 100 150

4. **Edge lines** (including transition lines)
   - Width: 150* 150

5. **Continuity lines**
   - 1 m 3 m 1 m 3 m 1 m 3 m 1 m
   - Width: 200 200

6. **Turn lines**
   - 600 mm stripe and gap
   - Width: 100

7. **Outline markings**
   - Width: 150 150

#### TRANSVERSE LINES

8. **Stop lines**
   - 600 mm stripe and gap
   - Width: 300

9. **Give way lines**
   - 600 mm stripe and gap
   - Width: 300

* This width may be reduced to 100 mm on rural roads with unsealed shoulders and on urban roads with a 60 km/h or lower speed zone.
Table 2.2.7 – Design codes for line types

<table>
<thead>
<tr>
<th>Line code</th>
<th>Line type</th>
<th>Line type</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDL</td>
<td>Dividing lines</td>
<td>Two-lane roads</td>
</tr>
<tr>
<td>MDL</td>
<td>Multi-lane roads</td>
<td></td>
</tr>
<tr>
<td>SBL</td>
<td>Barrier lines</td>
<td>Single</td>
</tr>
<tr>
<td>ODBL</td>
<td>One direction</td>
<td></td>
</tr>
<tr>
<td>DBL</td>
<td>Both directions</td>
<td></td>
</tr>
<tr>
<td>BLL</td>
<td>Lane lines</td>
<td>Special purpose – broken, including exit lines and roundabouts</td>
</tr>
<tr>
<td>CLL</td>
<td>Continuous</td>
<td></td>
</tr>
<tr>
<td>EL</td>
<td>Edge lines</td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>Continuity lines</td>
<td></td>
</tr>
<tr>
<td>TL</td>
<td>Turn lines</td>
<td></td>
</tr>
<tr>
<td>OM</td>
<td>Outline markings</td>
<td></td>
</tr>
<tr>
<td>SL</td>
<td>Stop lines</td>
<td></td>
</tr>
<tr>
<td>GWL</td>
<td>Give way lines</td>
<td></td>
</tr>
</tbody>
</table>

2.2.8 Longitudinal lines at intersections

For more information refer to MUTCD Part 2 Section 5.3.9.

5.3.9 Longitudinal lines at intersections and roundabouts

Use of longitudinal lines at, and on the approaches to intersections and roundabouts shall be as follows:

a) Dividing, barrier and lane lines

These lines shall be used as follows:

i) At minor side roads with or without STOP or GIVE WAY sign control, these lines, where existing on the major road approach, shall be carried through the intersection, except that a gap shall be left in a double barrier line for turning or crossing traffic – see Clause 5.3.3.2.

ii) At signalised intersections, the lines shall be discontinued at the stop line on each approach.

iii) Where lane changing just in advance of the intersection is a problem and needs to be prohibited, the last 10 m to 12 m of lane line on the approach shall be continuous.
iv) On an intersection approach controlled by STOP and GIVE WAY signs or across which is marked a give-way line, a dividing line terminating at the stop or give-way line comprising either:

(A) a single continuous dividing line 10 m to 12 m in length, or

(B) a special purpose broken dividing line (see Figure 5.1) up to 30 m in length unless a single continuous line is required for another purpose, for example, to control overtaking;

shall be marked wherever the sealed pavement width or width between kerbs is at least 6 m over the length of the line. It shall also be provided at lesser widths if the rest of the approach road is dividing line marked, or if there is a crest or curve on the immediate approach. The marking may need to be extended in the latter case.

v) Exit lines shall be marked at multi-lane roundabouts, except where geometric restrictions prohibit their safe use or where combinations of single lane exits and high turning traffic volumes can lead to operational difficulties. A typical example is shown in Figure 2.7.

Exit lines shall:

(A) comprise a special purpose lane line (see Figure 5.1)

(B) have a minimum of three segments marked per exit line

(C) commence from a line drawn tangentially from the central island to the splitter island exit edge line at the previous exit, and

(D) extend far enough into the roundabout exit to provide satisfactory guidance for exiting vehicles.

b) Edge lines

Where edge lines are used, they shall be discontinued through a major intersection or past intersecting roads or streets which have STOP or GIVE WAY signs. If the intersection is wide, a continuity line should be used.

For more information on longitudinal lines at intersections, see Section 4.1 of this guide.

2.2.9 Wide centreline

For more information refer to Transport and Main Roads Technical Note TN155 Wide centre line treatment – interim advice Section 4.
4 Dimensions and Design of a WCLT

Minimum length of WCLT

The minimum length that a WCLT should be installed over is 2 km (inclusive of intersections and other structure treatments).

Cross section of WCLT

The dimensions related to WCLT and application of ATLMs is detailed in Table 4.1 below.

<table>
<thead>
<tr>
<th>Posted Speed</th>
<th>WCLT¹</th>
<th>ATLM</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 km/h and greater</td>
<td>1.0 m</td>
<td>Yes</td>
</tr>
<tr>
<td>70–80 km/h</td>
<td>0.8 m</td>
<td>No²</td>
</tr>
<tr>
<td>60 km/h</td>
<td>0.6 m</td>
<td>No</td>
</tr>
</tbody>
</table>

Notes to Table:
1. WCLT is width between the centres of the lines at either side of the treatment.
2. ATLM to be applied if section is immediately adjacent to a 90 km/h or higher speed zone (transitioning drivers between high and low speed zones) or there is a history of fatigue related crashes.

Wide centreline treatment (WCLT) is used to provide additional separation for opposing traffic flows. WCLT shall comprise either a double barrier line or one-way barrier line; for more information, see Section 2.2.1 of this guide.

As per Clause 4.4.2 of TRUM Volume 2 Part 5, audio-tactile centre lines should only be applied in conjunction with audio-tactile edge lines, except on roads with sealed shoulder widths less than 500 mm or where audio-tactile edge lines are not used due to noise issues.

The positioning and layout of ATLM at WCLT are detailed in Transport and Main Roads Traffic Control sign drawings TC1978_1 to TC1978_3. It is important to note that the ATLMs are located offset, not on top of, the associated line marking. For more details on ATLM, see Section 2.5.6 of this guide.

2.2.10 Yellow Box Marking TC2309

Refer to Technical Note TN180 Yellow box marking at signalised intersections.

2.3 Transverse lines

For more information, refer to MUTCD Part 2 Section 5.4.

5.4 Transverse lines

5.4.1 General

Transverse lines should be wider than longitudinal lines to compensate for the low angle at which they are viewed.
5.4.2 Give-way lines

A give-way line shall comprise a broken line a minimum of 300 mm wide with line segments 600 mm long separated by 600 mm gaps. It shall be placed in a similar position to that specified for a stop line. The give-way line shall be used as follows:

a) To indicate the safe position for a vehicle to be held at a GIVE WAY sign at an intersection.

b) At a roundabout, to indicate the safe position for a vehicle to be held before entering. The line shall be placed across the entering road along the edge of the circulating roadway (see Figures 2.7 and 2.8). Markings shall not be placed across the exits from a roundabout.

It may be used to indicate the safe position for a vehicle to be held at a T-intersection or in any other location where a driver is legally required to give way to an intersecting or conflicting traffic stream.

5.4.3 Stop lines

A stop line is a continuous line that shall be marked across the traffic lanes approaching a traffic control device at which traffic is required to stop. It shall extend from the left-hand edge of pavement to the dividing line, median, or in the case of a one-way street, to the right-hand edge of pavement. It shall only be used in conjunction with another device which legally requires a driver to stop under prescribed conditions, and indicates the point behind which vehicles must stop when required.

At ‘STOP’ signs where visibility is often restricted, the driver’s line of sight both to left and right, the needs of pedestrians and the clearance from traffic in the intersecting road shall be considered when positioning the stop line. It shall be a minimum of 300 mm wide at a STOP sign and shall be parallel to the line of the intersecting road.

The use of stop lines at signalized intersections, railway crossings and at mid-block pedestrian crossings is given in Parts 14, 7 and 10 respectively.

5.4.4 Positioning of lines at ‘STOP’ and ‘GIVE WAY’ signs

The stop and give-way lines to be used with STOP and GIVE WAY signs shall be as illustrated in Figure 5.3. Figure 2.1 shows the use of the GIVE WAY signs and the associated markings on roads of various widths with and without a median. The use of STOP signs and associated lines shall be similar. Requirements and recommendations for these pavement markings are as follows:

a) The minimum pavement marking associated with STOP and GIVE WAY signs shall be a stop or give way line (see Clauses 5.4.2 and 5.4.3) normally placed in prolongation of the kerb line or edge line, but may be set back if there is a problem of vehicles over-running the line, or if it is desired to hold vehicles back some distance from the intersecting roadway.

b) If the intersection is wide, e.g. two lanes entering with a large radius kerb return, a continuity line should be used across the right hand side of the approach.

2.3.1 ‘STOP’ and ‘GIVE WAY’ lines

The ‘STOP’ or ‘GIVE WAY’ line may be marked as shown in MUTCD Part 2 Figure 5.3 and Figure 2.3.1 of this document.

For more information on ‘STOP’ and ‘GIVE WAY’ lines at intersections, see Sections 4.1.8 and 4.1.9 of this document.
**MUTCD Part 2 Figure 5.3 – Pavement markings at ‘GIVE WAY’ and ‘STOP’ signs**

![Figure 5.3](imageURL)

(a) Pavement markings at GIVE WAY signs

(b) Pavement markings at STOP signs

Note:

1. Dividing line marked in accordance with Section 2.2.1 of this guide.
   Dimensions in millimetres unless otherwise shown.

**Figure 2.3.1 – Pavement markings at ‘GIVE WAY’ and ‘STOP’ signs**

![Figure 2.3.1](imageURL)

(a) Pavement markings at GIVE WAY signs

(b) Pavement markings at STOP signs

Note:

1. No distance is given for the setback between the stop, or holding, line and give way line. It is site-dependent and is desirable:
   a) where there is a problem with vehicles over-running the line,
   b) to hold vehicles back some distance from the intersection (such as service road crossing, road crossing, conflict with right turning vehicles that have priority).

**2.3.2 Crosswalk lines**

Refer to AS1742.10 Section 8.4.
8.4 Signs and pavement markings

The following signs and pavement markings are used at pedestrian activated traffic signals (mid-block):

a) No-stopping signs (R5-35, R5-36-1) See Clause 6.4(b)

b) Signals Ahead signs (W3-3) See Clause 11.2(a)

c) Stop lines 300 to 600 mm wide

d) Crosswalk lines comprising two parallel lines at least 2.4 m apart, 150 to 300 mm wide which may be either continuous or broken with 1 m line segments and 300 mm gaps.

The line marking arrangement for a mid-block pedestrian actuated traffic signal installation is shown in AS1742.10 Figure 5.
**AS1742.10 Figure 5 – Pedestrian-actuated traffic signals (mid-block) – two-way roadway**

Notes

1. Sign W3-3 (see ASS1742.3 Part 10 Section 11.2(a)) is required if crossing is in an isolated location or if crossing is not visible at a distance greater than 200 m. Where used, the Size B should be the minimum size. The ‘CROSSING AHEAD’ (W8-22) supplementary plate may be used with this sign.

2. Extended single barrier line is optional.

Dimensions in metres.
2.3.3 Other transverse lines

The use of transverse lines with ‘KEEP CLEAR’ markings is discussed in Section 2.4.2.3 of this guide.

2.4 Other markings

2.4.1 Diagonal and chevron markings

Refer to MUTCD Part 2 Section 5.5.1.

<table>
<thead>
<tr>
<th>5.5.1 Diagonal and chevron markings</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5.1.1 General</td>
</tr>
<tr>
<td>Wide diagonal or chevron markings may be applied to areas of pavement which are not intended for use by moving vehicles. They define splayed island approaches to obstructions, sealed shoulders, painted islands and medians and areas separating exit ramps from the main freeway traffic lanes (see Clause 5.7.2). They are also used to indicate escape areas, if required. Diagonal markings are used when all traffic must pass to one side of the marking, and chevron markings when traffic may pass to either side of the marking.</td>
</tr>
<tr>
<td>5.5.1.2 Markings on splayed approaches</td>
</tr>
<tr>
<td>The markings of splayed approaches to islands or obstructions shall be parallel bars or chevrons as shown in Figure 5.4(a) and (b). The bars shall be a minimum of 1.0 m wide measured normal to the bar with a gap between bars measured parallel to the road centre line of three to five times the width of the bar. The angle between the bars or chevrons and the approach line should be 45 degrees maximum. On approaches where the 85th percentile speed is 90 km/h or greater, the angle may be reduced to 30 degrees (i.e. 60 degrees included angle between sides of a chevron). The outline should be supplemented by raised pavement markers, especially where street lighting is below standard or absent.</td>
</tr>
<tr>
<td>5.5.1.3 Diagonal markings on shoulders</td>
</tr>
<tr>
<td>If a marking on sections of sealed shoulder is required to discourage vehicular encroachment, it shall comprise bars having a minimum width of 1.0 m measured normal to the marking and with a gap between bars, measured parallel to the road centre line of five to twenty times the width of the bar (see Figure 5.5).</td>
</tr>
<tr>
<td>5.5.1.4 Painted islands and median strips</td>
</tr>
<tr>
<td>Painted islands and median strips shall be defined by outlining areas of pavement with lines. The interior may be either sealed with an aggregate of contrasting colour or texture, or consist of diagonal or chevron markings (see Figures 5.6(a), (b) and (c)). The outline should be supplemented by raised pavement markers, especially where street lighting is substandard or absent.</td>
</tr>
</tbody>
</table>
Typical uses of painted islands include:

a) islands of substandard size in urban areas

b) channelising islands at rural intersections where operating speeds are high, or road lighting is absent or inadequate

c) narrow medians

d) part-time safety zones, and

e) narrow lane separators.

The island may be surrounded by double two-way barrier line if all crossing movements are to be prohibited.

The width and spacing of diagonal markings when used inside painted islands and median strips is shown in Figure 5.6.

The figures referred to in this extract show the application of various chevron and diagonal markings for roads other than freeways. MUTCD Part 2 Figures 3.3 to 3.5 show markings at exit and entrance ramps for motorways.

With reference to MUTCD Part 2 Figure 5.4 below, the following should apply:

**Orientation**: The diagonal (or diagonal component of the chevron) is angled toward the direction of travel at the running lane edge.

**Angle**: In the interests of keeping the pavement marking task simple and efficient, an angle of 45° for all situations is acceptable.

**Width**: The width ‘B’ of the painted bars is also subject to variation, depending on the type of device and the location, but again it is acceptable to adopt a fixed width of one metre to allow the use of a standard template in marking operations.

**Spacing**: The spacing ‘S’ between bars depends on device type and traffic speed. On higher-speed roads, bars should be more widely spaced to aid conspicuity; however, a narrower spacing may apply – for example, when there is an island on an approaching uphill grade. The given range of spacings should be maintained but, again, to allow the use of efficient methods of setting out (such as a standard template), the spacing may always be a whole number multiple of the standard template dimension. Refer to MUTCD Part 2 Section 5.5.1.2 for markings on splayed approaches.

See TRUM Volume 3 Part 3 Section 3.1.2 on diagonals and chevrons for more details of setting out and template dimensions.

**Outline**: Diagonal bars and chevrons are most commonly delineated by edge lines or outline markings. The gap ‘W’ between the ends of the bars and the outline should be 150 mm and consistent along all edges. Line marking widths for edge lines, outline markings shall be as per MUTCD Part 2 Figure 5.1.
**MUTCD Part 2 Figure 5.4 – Splayed approach**

(a) Traffic to left side only  

(b) Traffic to either side

**LEGEND:**
- Angle A = 45° or 30°  
- See Clause 5.5.1.2  
- B = 1.0 m min.  
- S = 3B to 5B  
- W = 150 mm

**MUTCD Part 2 Figure 5.5 – Shoulders**

**LEGEND:**
- B = 1.0 m min.  
- S = 5B to 20B  
- W = 150 mm
MUTCD Part 2 Figure 5.6 – Painted islands and median strips

(a) Channelising island

LEGEND:
B = 600 mm min.
S = 1.5B to 3B
W = 150 mm

(b) Median island

LEGEND:
B = 1.0 m min.
S = 3B to 5B
W = 150 mm

(c) Diagonal median marking

LEGEND:
B = 1.0 m min.
S = 5B to 20B
W = 150 mm
2.4.2 Message on pavements

For more information, refer to MUTCD Part 2 Section 5.5.2.

5.5.2 Messages on pavements

5.5.2.1 General

Words, numerals and symbols may be marked on pavements to convey guiding, warning or regulatory messages to drivers. They shall be elongated in the direction of traffic movement to make them legible at the maximum distance.

NOTE: The benefit obtainable with increasing elongation diminishes if the distortion ratio exceeds about 8:1.

5.5.2.2 Words and numerals

The length of letters and numerals shall be 2.5 m where the speed limit is up to 80 km/h and 5.0 m at higher speed limits. The shape of letters and numerals shall be as shown in Figure 5.7.

A message should, if possible, be confined to one line. Where two or more lines are required they should be designed as follows:

a) Where the 85th percentile speed is greater than 80 km/h, a separation of four times the character height shall be used, and the message arranged to read sequentially, i.e. with the first word nearest to the driver.

b) At speeds lower than in Item ‘a)’, the separation between lines shall be from one-half to one times the character height and the message arranged to read from top to bottom.

Word messages commonly used on road pavements are as follows:

‘BUS LANE’ and ‘BL’, ‘TRANSIT LANE’ and ‘TL’ – see Part 12

‘RAIL X’ – see Part 7

‘KEEP CLEAR’ – see Clause 4.5.2.6

5.5.2.3 Intersection arrows

Intersection pavement arrows give a positive indication of the paths vehicles must follow at intersections. They are legally enforceable. The choice of and need for intersection pavement arrow markings shall be determined as set out in Figure 5.9. This is based on the following requirements:

a) Where all the manoeuvres that are permitted by traffic legislation are to be allowed from a marked traffic lane, arrow markings need not be provided.

b) If all the manoeuvres that are permitted by traffic legislation are not to be allowed from a marked traffic lane, those manoeuvres which are to be allowed shall be marked with pavement arrows.

c) Where any arrow is required in a lane, all manoeuvres that are to be permitted from that lane shall be marked with pavement arrows.
d) Notwithstanding the provisions in Item (a) where it is considered desirable for safety or other considerations to mark arrows indicating the legally permitted manoeuvres from that lane, e.g. to emphasise that a turn is not permitted from a lane adjacent to an exclusive right turn lane by marking with a straight ahead arrow, these arrow markings may be provided. However, such markings should be restricted to those found to be necessary after observance of performance in the field.

Pavement arrows shall be marked in each lane of a multi-lane approach to a roundabout with two or more lanes to indicate the movements permitted from each lane.

If a lane on the approach to an intersection or roundabout is to be designated by means of arrows as above, arrows shall be placed in that lane as follows:

i) Arrow nearest a stop or give-way line – 6 m clear distance back from the line.

ii) Arrows in a through lane from upstream – at least two additional arrows at a head-to-head spacing of 15 m to 50 m.

iii) Arrows in a developed lane at least 36 m long (excluding taper) – at least two additional arrows, the first with its head at the point where the fully developed lane first begins and the second or subsequent arrows equispaced at 15 to 50 m head-to-head between the first and last arrows.

iv) Arrows in a developed lane less than 36 m long (excluding taper) – one additional arrow only or in very short lanes, less than 20 m, no additional arrows, i.e. one arrow only in the lane.

v) Provision of a single arrow in accordance with Item iv) shall comprise the one arrow nearest to the stop or give-way line only, 6 m clear distance back from the line.

At intersections where queues of vehicles are likely to occur, e.g. at traffic signals, pavement arrows should commence sufficiently in advance of the intersection so that waiting vehicles will not obscure them. Where this is not practicable, or where additional information for road users on lane designation (e.g. ‘trap’ lanes) is required, signs adjacent to or over the appropriate lanes should be installed to supplement the pavement arrows.

Where a turning lane is provided to cater exclusively for U-turns, and it is essential to distinguish it from a right turning lane before or after, the U-turn arrow may be used. If the distinction is not needed, a right turn arrow will usually be sufficient.

Where two separate successive turns in the same direction may be made from a single turning lane, the sequential turns arrow may be used in advance of the first turn. The use of this marking is the exception, rather than the rule.

Standard designs for pavement arrows shall be as shown in Figures 5.10 and 5.11. They are elongated similarly to letters or numerals in order to increase their recognition distance.

5.5.2.4 Lane change arrows

Lane change arrows shall be provided at lane reductions (merges) typically as illustrated in Figures 4.16, 4.18 and 4.20 in all situations where a lane change rather than a zip-merge is provided for, see Clause 4.7.2 and Figure 4.16.
Lane change arrows shall conform to the designs in Figure 5.12, the urban type to be used where the 85th percentile speed is 80 km/h or less, and the rural type where it is more than 80 km/h.

Three arrows shall be used in each case. They shall be equispaced between the advance merge sign and the start of the lane change taper.

Lane change arrows shall not be used in the zip-merge case described in Clause 4.7.2(a).

5.5.2.5 Expressway exit lane arrows

The use of the exit lane arrows shown in Figure 5.13 is specified in Clause 5.7.3. Their use is further illustrated in Figure 3.4.

5.5.2.6 Keep clear marking

A keep clear marking as shown in Figure 4.8 when used to control the blocking of entrances and exits at side streets or property access points by queued traffic, shall only be used in the following situations:

a) To allow emergency vehicle access from its depot or station.

b) Where a blockage would create a safety problem elsewhere in the system, e.g. vehicles stopping to turn right into a driveway causing a blockage at a nearby intersection.

The marking shall not be used primarily for the purpose of facilitating access/egress to a side street or driveway.

2.4.2.1 Traffic lane arrows

The choice of and need for pavement arrow markings at intersections is set out in MUTCD Part 2 Figure 5.9.
### MUTCD Part 2 Figure 5.9 – Use of intersection pavement arrows

<table>
<thead>
<tr>
<th>No.</th>
<th>Description of requirements</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Legal manoeuvres if lane unmarked.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Legal manoeuvres if left lane only marked</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Legal manoeuvres if right lane only marked</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Markings for two exclusive left turn lanes</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Markings for two exclusive right turn lanes</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Markings for shared left turn and through from lane adjacent to left turn lane</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Markings for shared right turn and through from lane adjacent to right turn lane</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Markings for shared left turn and through from lane adjacent to two exclusive left turn lanes</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Markings for shared right turn and through from lane adjacent to two exclusive right turn lanes</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Markings to indicate left turn prohibition (signing also required, see Clause 2.8.2)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Markings to indicate right turn prohibition (signing also required, see Clause 2.8.2)</td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

1. Full lines indicate arrows to be marked.
2. Dotted lines indicate manoeuvres, which are permitted by regulations, but which need not be marked.
3. On some intersection approaches, it may be necessary to combine two or more of the marking methods shown.
Turn arrows have legal status under Queensland Road Rules:

Under the *Queensland Road Rules* (Rule 28 and 32), right and left turners are treated in the same manner. To allow a turn from a lane adjacent to an exclusive turn lane, combination traffic lane arrows need to be installed that indicate to allowed movements. For more information on turn arrows, see Figure 5.7 of the MUTCD Part 2.

If any lane on the approach to an intersection is to be designated by means of arrows, at least three arrows should be placed in that lane. The head of the first arrow should have three metres clear distance from the stop or holding line (if any) or intersection boundary. A spacing of 15 metres to 30 metres, head-to-head, should be used between repeater arrows according to the size of the arrow, larger arrows being used for high-speed roads.

Where a traffic lane in which arrow markings are required is not long enough for three arrows at the normal spacing, the arrow spacing may be reduced to half the normal spacing. If it is necessary to reduce the spacing to less than 15 metres, then the number of arrows may be reduced. If there are no arrow markings in adjacent lanes, the spacing may be further reduced to enable three arrows to be provided. Where an exclusive bicycle lane is marked on the approach to a signalised intersection, two arrows are recommended in the bicycle lane.

The height of grid squares shown in MUTCD Part 2 Figures 5.10 and 5.11 is as follows:

a) Straight ahead and combined arrow
   
   Height of grid squares, $Y = \text{arrow length} / 60$ (100 mm minimum).

b) Turn arrow
   
   Height of grid squares, $Y = \text{arrow length} / 40$ (100 mm minimum).

c) U-turn arrow
   
   Height of grid squares, $Y = \text{arrow length} / 50$ (100 mm minimum).
**MUTCD Part 2 Figure 5.10 – Intersection pavement arrows – common types**

(a) Straight ahead  
(b) Combination - straight ahead and turn  
(c) Exclusive turn

**Notes**

1. Minimum length of arrow:
   a. Straight ahead arrow and combined arrow = 6 m.
   b. Turn arrow = 4 m.

2. The width of grid squares is constant at 100 mm. The height of the grid squares is 100 mm minimum.
Notes

1. Minimum length of arrow:
   a. Double turn arrow = 4 m.
   b. U-turn arrow = 5 m.
   c. Sequential turns and 45° turn arrows = 6 m.
2. The width of grid squares is constant at 100 mm. The height of the grid squares is 100 mm minimum.
Traffic Control Sign – Modified multi land roundabout pavement marking arrow TC1845_1

NOTES:
1. Minimum length of arrow = 6m.
2. The width of grid squares is constant at 100mm. The height of grid squares is 100mm minimum.
Traffic Control Sign – Modified multi-lane roundabout pavement marking arrow – right
TC1845_2

NOTES:
1. Minimum length of arrow = 6m.
2. The width of grid squares is constant at 100mm. The height of grid squares is 100mm minimum.
2.4.2.1.1 Lane change arrows

Lane change arrow designs are provided in MUTCD Part 2 Figure 5.12.

*MUTCD Part 2 Figure 5.12 – Merge pavement arrows*

Notes

1. Dimension ‘D’ should be approximately 0.6 times the width of the lane.
2. When installing arrows, it is recommended that the head be laid first.

Dimensions in millimetres
2.4.2.1.2 Freeways

Refer to MUTCD Part 2 Sections 5.7.2 and 5.7.3.

5.7.2 Exit ramp nose marking

Exit ramp nose marking is illustrated in Figure 5.28.

5.7.3 Expressway exit lane arrows

Expressway exit lane arrows shall be used on main expressway roadways where there is a ‘trap’ lane which is one from which all traffic must exit. Because the indicated movement is such a small angular divergence from the through path, the use of conventional turn arrows is not recommended. Use of slightly inclined straight ahead arrows as illustrated in Figure 5.29 is preferred. The shape of these arrows is specified in Clause 5.5.2.5.

Where arrows are used in the trap lane, a combination arrow shall be placed in the next lane to the right, adjacent to each trap lane arrow, indicating that the second lane is a shared exit and through lane. The recommended spacing is 50 m head-to-head.

NOTE: For best visual effect the arrow inclination should not exceed 15°.

Entrance ramp nose marking chevrons to be reversed. See Figures 3.3 and 3.4.

*MUTCD Part 2 Figure 5.28 – Exit ramp nose marking*

*MUTCD Part 2 Figure 5.29 – Expressway exit lane arrows in a ‘Trap’ lane and an adjacent ‘Optional’ lane*

This will normally only occur at two-lane exits as illustrated in MUTCD Part 2 Figure 3.4, which shows an arrow spacing of 50 m.
2.4.2.2 Words, numerals and symbols

Legibility distance is increased by enlarging the length of characters; however, the benefit obtainable with increasing elongation diminishes if the distortion ratio exceeds about 8:1.

The proportions of letters and numerals should be as shown in MUTCD Part 2 Figure 5.7.
Notes
The grid width ‘X’ is constant at 100 mm, but the grid height ‘Y’ may vary as follows:

\[ Y = 62.5 \text{ mm where the speed limit is up to } 80 \text{ km/h} \]
\[ Y = 125 \text{ mm at higher speeds} \]
Additional word messages for use on road pavements include the following:

- TRAFFIC SIGNALS
- HEAVY VEHICLES ONLY
- SCHOOL
- SCHOOL X
- FORM ONE LANE
- SLOW
- STOP
- GIVE WAY
- PED X
- LOW SPEED LANE
- TRUCK LANE

Where traffic lanes are reserved for the exclusive use of turning traffic, control by means of arrows is preferred.

Where the message is an advance warning message, the word ‘AHEAD’ should be added at the end of the message.

Where the letter ‘X’ is to be placed on a line by itself in the pavement messages, ‘PED X’, ‘SCHOOL X’ or ‘RAIL X’, the special widened form shown in Figure 2.4.2.2.5 of this guide should be used.

2.4.2.2.1 Narrow lanes

There are instances where the width of a lane, once edge lines and centre lines have been accommodated, is too narrow for a word such as ‘SCHOOL’ to be marked on the pavement using the recommended dimensions. It is impractical, because of the use of standard templates, and undesirable, in terms of legibility, to reduce the width of the letters.

A number of options are available:

a) The spacing between letters may be reduced.

b) On roads of more than two lanes, the message may extend across more than one lane for traffic travelling in the same direction.

c) On two-lane roads, where a tighter spacing would not achieve the required reduction in word length or legibility would be unacceptably reduced, the following may be adopted:

i. use an abbreviated form (as permitted by Queensland Road Rule 317(1)) if the abbreviation is commonly understood

ii. use a two-line message for ‘SCHOOL X’, ‘PED X’ and ‘RAIL X’, with the wide ‘X’ as shown in Figure 2.4.2.2.5

iii. use other road signs, or

iv. use the word ‘SLOW’ instead of the intended lettering, in conjunction with more specific road signs.
Details of non-standard treatments should be entered in Form M994 and approved by the Regional Director as appropriate prior to its installation on a road.

2.4.2.2 Speed zones

Refer to MUTCD Part 4 Section 11.

Section 11: Pavement markings

11.1 General

Where the pavement surface is suitable, painting of elongated numerals adjacent to the speed restriction sign (R4-1) may be used in the following circumstances:

i. at the start of a lower speed zone where the difference in adjacent speed zones is 20 km/h or higher, with the exception of the start of a school zone or other variable speed zone
ii. at repeater signs at major intersections only
iii. on undivided multi-lane roads, at the start of the speed zone.

Such markings shall only be used to supplement speed restriction (R4-1) signs and shall not be used alone. Their use is generally restricted to locations where the provision of signs alone is not adequate, for example, where the impact of the sign is reduced by the nature of the roadside environment, and it is considered that the sign needs to be augmented to increase road user perception.

However, with the exception of school zones and other time-based speed zones, the use of pavement markings is encouraged at the start of HATUAs (see Section 4.3.4). Painted numerals shall not be used to indicate the speed limit on local streets.

11.2 Marking details

A separate set of numerals shall be painted in each traffic lane and no additional words or symbols shall be used.

The dimensions of the numerals shall be as prescribed in Part 2 of this manual.

Numbers may also be painted on the road at the start of special speed zones, such as 40 km/h local area speed limits and a 50 km/h speed limit where a nodal traffic calming scheme has been introduced on traffic carrying roads.

Numerals are to be painted as per MUTCD Part 2 Figure 5.7.
2.4.2.2.3 Bicycle lanes

For more information, refer to AS1742.9 Section 2.3.1.

### 2.3 Pavement markings

#### 2.3.1 General

The following pavement markings as illustrated in Figure 2.1(1) shall be used for bicycle lanes and facilities on roads:

- **a) Bicycle lane line:** The bicycle lane line shall be placed between the bicycle lane and lanes of moving traffic and where appropriate, parked vehicles. It shall be a white continuous line.
- **b) Continuity line:** A continuity line shall replace the bicycle lane line:
  - i. where motor traffic needs to enter or cross a bicycle lane when making a turn at an intersection or major driveway, and
  - ii. to show the continuity of a bicycle lane where it continues through an unsignalised intersection.
- **c) Bicycle stop line:** A white stop line the same width as the stop line provided for other traffic shall be provided in a bicycle lane at the point where bicycles need to stop at traffic signals. The bicycle stop line may be provided a minimum of 2.0 m in advance of the vehicular stop line to give bicycles a small head start at the onset of the green period, provided the line is clear of cross traffic and any marked pedestrian crossing.
- **d) Bicycle storage area:** A safe storage area for bicycles at the head of a traffic queue at a signalized intersection. The bicycle symbol shall be marked in the bicycle storage box.
- **e) Hook turn storage box:** A safe storage area for bicycles to indicate an alternative option for cyclists to turn right at signalized intersections. This facility is particularly suitable where cyclists would need to cross multiple lanes to turn right. A smaller bicycle symbol and pavement arrow shown in Figure 2.1(1) shall be used to indicate to cyclists where to stop and wait for the hook turn.
- **f) Bicycle pavement symbol:** Where used on roads to indicate a bicycle lane, the bicycle symbol shall be as illustrated in Figure 2.2(1). The bicycle symbol may be installed in full-time and part-time bicycle lanes as follows:
  - i. It may be used in lieu of the bicycle lane (R7-1-4) sign at the beginning of the lane in conjunction with the word 'LANE' and at additional locations along the lane as required (see Figure 2.2(2)).
  - ii. It may be placed on the approach and departure sides of intersections (if the lane continues through the intersection). Symbols so placed may be considered as part of the Item (i) option.
  - iii. It may be placed at the end of the lane in conjunction with the words 'LANE END' as shown in Figure 2.2(3).

Where necessary the symbol size shall be reduced proportionately to fit within the lane.
2.3.2 Other pavement markings

The following additional pavement markings may be used where required:

a) **No bicycle symbol**: The symbol illustrated in Figure 2.3 may be used in lieu of the No Bicycles (R6-10-3) sign as indicated in Clause 2.2(e).

b) **Bicycle lane safety strip**: Safety of cyclists can be improved by providing separation between the bicycle lane and the traffic lane or parked vehicles to avoid instances of ‘dooring’. This separation may be provided by marking a safety strip as shown in Figure 2.1(2). Although desirable, it is not necessary to provide a safety strip on each side of the bicycle lane.

c) **Pavement arrow**: Pavement arrows may be used in conjunction with the bicycle symbol where a bicycle lane has been provided on the approach to traffic signals (see Figure 2.10) where some movements are restricted. The arrow is white in colour.

2.3.3 Pavement colour

Where used, the colour of pavement to indicate a bicycle lane shall be Emerald Green, as specified in Clause 1.6.

The use of pavement colour is optional. It should be limited to areas of potential conflict with motor vehicles, for example, bicycle storage areas and at the entry into auxiliary lanes or roundabouts.

For further information on the use of pavement colours in bicycle lanes, refer Traffic and Road Use Management (TRUM) manual Volume 1 Guide to Traffic Management Part 10 Traffic control and communication devices.

The 490 x 800 mm bicycle symbol may also be used in bicycle lanes on roadways where the larger 1100 x 1800 mm symbol would not be practicable.
Notes:

- $X = 65$ mm for a $1100$ mm x $1800$ mm bicycle suitable for roadway lanes.
- A smaller symbol will be required for bicycle paths, see AS1742.9 Figure 3.1.
AS1742.9 Figure 2.2(2) – Bicycle lane pavement marking
AS1742.9 Figure 2.2(3) – Bicycle lane end pavement marking
AS1742.9 Figure 2.3 – No-bicycles pavement symbol for road use
2.4.2.2.4 Bicycle paths and footpaths

For more information, refer to AS1742.9 Section 3.3 with amendments from MUTCD Part 9 Section 3.3.

### 3.3 Pavement markings

The following requirements and recommendations apply to pavement markings used on paths:

a) **Separation lines (directional separation):** When used, lines used for separating opposing directions of travel on a path shall be as follows:
   
   i. A white unbroken line:
      
      (A) on curves where sight distance is poor
      
      (B) in high volume locations or elsewhere where there is potential for conflict, or
      
      (C) on the approaches to path / path intersections.
   
   ii. A white broken line in all other cases.

b) **Separation line (user separation):** The line used for separating pedestrians and bicycles on a separated path shall comprise a white unbroken line at least 80 mm wide.

c) **Bicycle and pedestrian pavement symbols:** These symbols are shown in Figure 3.1 in a size suitable for off-road paths and footpaths. Pavement symbols may be used on bicycle and separated paths in lieu of the Bicycle ONLY (R8-1) sign. Symbols or symbol groups should be installed as required.

d) **Pavement arrow:** This is shown in Figure 3.1 and may be used in conjunction with pavement symbols on busy paths where there is a need to encourage users to keep to the left.

e) **Multiple symbol display:** Where two or more of the pavement symbols in Items (c) and (d) are to be displayed as a group, they shall be displayed in the order bicycle-pedestrian-arrow in the direction of travel with a separation of 1.0 to 1.2 m between each symbol.

f) **Give-way and stop lines:** Where a GIVE WAY (R1-2) sign or a STOP (R1-1) sign is placed to face bicycle traffic on a path it may be accompanied by a white transverse line 200 mm wide, comprising:
   
   i. a broken line with 200 mm lines, 200 mm gaps at a GIVE WAY sign, or
   
   ii. an unbroken line at a STOP sign.

g) **Give way or stop pavement marking:** In lieu of a GIVE WAY or STOP sign, a give-way or stop pavement marking, respectively, may be marked on the path (see Figure 3.2(1)).

h) **No-bicycles symbol:** The symbol illustrated in Figure 3.3(b) may be used in lieu of the No Bicycles (R6-10-3) sign as indicated in Clause 3.2(b).

i) Pavement marking should contrast well with the path colour. If the contrast is inadequate, a darker background colour may be applied.
j) **Edge lines:** These may be provided in the following circumstances:
   i. In unlit areas to assist night-time navigation, especially where a path is not straight, or
   ii. Around hazards.

k) Utilisation of pavement marking signs is appropriate in lieu of signage with limited benefit or to supplement the existing signage. Usage of the pavement marking is to be treated as per the placement of the symbol and shall meet all the warrants for the relevant sign.

**AS1742.9 Figure 3.1 – Bicycle and pedestrian pavement symbols and arrows for paths**

A larger bicycle symbol will be required for bicycle lanes on roadways (see Figure 2.2(1)).
AS1742.9 Figure 3.2(1) – Give way pavement symbol for paths

MUTCD Part 9 Figure 3.3(B) – No bicycles pavement symbol for paths
2.4.2.2.5 Advance warning of pedestrian crossings

‘PED X’, ‘SCHOOL X’ and ‘SCHOOL’ are the only pavement markings for use in advance of pedestrian facilities in Queensland. The zig-zag pavement markings, in advance of pedestrian crossings, have not been approved for use in Queensland and shall not be used.

For more information on bicycle facilities, see Section 3.8 of this guide.

Figure 2.4.2.2.5 – Wide ‘X’ for application at pedestrian, school and railway crossing on narrow pavement

Notes

1. The grid width (X) is constant at 100 mm, but the grid height ‘Y’ may vary as follows:
   \[ Y = \text{Height of letter or symbol required (mm) } / \text{40} \]
2. ‘X’ should be the same height as worded message.
3. For detailed design of word messages, refer to Section 2.4.2 of this guide.
2.4.2.2.6 Bus lanes and transit lanes

For more information, refer to AS1742.12 Section 6.2.

6.2 Pavement messages

6.2.1 Message

Relevant word messages shall be marked on the road pavement in full-time or part-time bus, transit or truck lanes. Markings shall be white and elongated in the direction of traffic movement to improve their legibility.

NOTE: Legibility distance is increased by enlarging the length of characters. The benefit obtainable with increasing elongation diminishes if the distortion ratio exceeds about 10:1.

The relevant messages shall be selected from the following:

BUS LANE and BL (may only be used as repeater markings)

BUS ONLY

TRUCK LANE

T2 (T3) LANE and T2 (may only be used as repeater markings).

Other information such as AM, PM, AM + PM, times, M–F may be used together with any of the above messages if necessary to avoid confusion.

For an advance warning, the word ‘AHEAD’ should be added to the message.

6.2.2 Design for low and high-speed roads

The length of letters should be not less than 2.5 m in urban areas but on high-speed highways and expressway-type roads may need to be at least twice this length. The dimensional proportions of letters should be as shown in Figure 3.

Where two or more lines of text are required, they should be designed as follows:

a) On high-speed roads, generally speed zones higher than 80 km/h, a separation of four times the character height should be used, and the message should be arranged to read sequentially, that is, with the first word nearest to the driver.

b) For low-speed, urban situations the separation between lines of text may, if necessary, be from one-half to one times the character height, in which case the message should be arranged to read from top to bottom. The method of placing these markings on low-speed urban roads is illustrated in Figure 4.

For arrangement of pavement messages, refer to Section 2.4.2 of this guide.
Notes

1. The grid width is constant at 100 mm, but grid height 'x' may vary:
   
   The grid height 'x' = \( \frac{\text{height of letter required (mm)}}{40} \)

2. The word ‘AHEAD’ may need to be made narrower (e.g. grid width reduced to 75 mm) to fit into a lane.
2.4.2.3 Keep clear zones

Queensland Road Rule 128 prohibits traffic from entering an intersection if the intersection is blocked by vehicles. The bounds of an intersection are defined in the Queensland Road Rules as the

...area where two or more roads (except any road-related area) meet, and includes:

a) any area of the roads where vehicles travelling on different roads might collide, and
b) the place, other than a road-related area, where a slip lane between the roads meets the road into which traffic on the slip lane may turn.’

In an urban area, an intersection is generally defined by the kerb lines.

Rule 96 of the Queensland Road Rules allows the provision of ‘KEEP CLEAR’ markings on the road. Where it is considered desirable to indicate the limits of the prohibition, two transverse lines may be used as shown in MUTCD Part 2 Figure 5.8. The recommended transverse line width is 150 mm.

**MUTCD Part 2 Figure 5.8 – Keep clear marking**

Note

1. A single message covering two lanes may be adequate. The words may be made wider to suit.
2.4.2.4 Pedestrian (zebra) crossings

For more information, refer to AS1742.10 Section 6.5.

6.5 Pavement markings

Pedestrian crossing (zebra) marking shall consist of a series of white coloured longitudinal bars approximately 600 mm wide and not less than 3.0 m long. The bars shall run lengthwise along the road and shall be placed approximately parallel to each other with gaps of approximately 600 mm between bars. Whilst the crossing is usually at right angles to the line of the road, it may be angled by not more than 30 degrees where local circumstances require.

Additional approach markings at a raised pedestrian crossing (zebra) shall be as specified in Clause 6.2 and Figure 2.

As an alternative to the use of No Stopping signs, the no-stopping prohibition in the vicinity of the crossing may be imposed by means of a continuous yellow line on the roadway adjacent to the kerb or edge of pavement for the length of the prohibition.

For the profile of raised pedestrian crossings (zebra) on bus routes, refer to MUTCD Part 13 Clause 2.4.2.

Pedestrian crossing (zebra) markings are shown in AS1742.10 Figure 1.

For more information on pedestrian crossing facilities see Section 3.13 of this guide.
AS1742.10 Figure 1 – Pedestrian crossing (zebra)

Notes
1. Sign R3-1 may be supplemented by flashing yellow signals.
2. Variations to no stopping distances may be required, see MUTCD Part 10 Section 6.2.
3. Sign W6-2 (minimum size B) is used in advance of pedestrian crossings where visibility of R3-1 sign is obstructed.
4. For installation of markings at a raised crossing, see MUTCD Part 10 Figure 2.
5. A single-barrier line should be provided on each approach to the crossing if the road has a dividing line. Dimensions in metres.
2.4.2.5 Step-out markings

For more information, refer to MUTCD Part 2 Section 5.7.5.

<table>
<thead>
<tr>
<th>5.7.5 ‘Step-out’ marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>The step-out marking shown in Figure 5.31 is used as illustrated in Figure 3.3 as an alternative to the normal exit ramp marking if visibility to the pavement along the ramp taper is poor (e.g. at a crest or left hand curve) or there is evidence of drivers inadvertently taking the exit. Green RRPMs may be used with step-out markings as illustrated.</td>
</tr>
</tbody>
</table>

|MUTCD Part 2 Figure 5.31 – Step-out marking at an exit ramp|

2.4.2.6 Road hump markings

For more information, refer to AS1742.13 Section 4.6.6.

<table>
<thead>
<tr>
<th>4.6.6 Road hump markings</th>
</tr>
</thead>
<tbody>
<tr>
<td>The pavement markings to be used at road humps consist of a marking on each face of the hump in the form of a transverse line with a series of alternate long and short lines at approximately half metre spacing running up the face of the hump. This marking is shown in Figure 4.3. The marking may be omitted on humps if a contrasting colour pavement material has been used such that the hump is clearly visible under all conditions. Contrasting pavement material should have similar skid resistance to surrounding pavements for the benefit of bicycles and motorcycles.</td>
</tr>
</tbody>
</table>

Refer also to Section 5.2.2 of this guide for information on local area traffic management: road humps.
**AS1742.13 Figure 4.3 – Pavement marking for road humps**

Note:
1. The length of this part of the marking may be varied on the flat-top hump to suit the length of the taper (generally between 1000 mm–1500 mm).
   Dimensions in millimetres.

**MUTCD Part 10 Figure 2 – Markings on a raised pedestrian crossing (zebra)**

Notes
1. Ramp height 75 mm to 100 mm.
2. Ramp grade 1:12 to 1:20.
   Dimensions in millimetres.
2.4.3 Marking of parking and loading areas

2.4.3.1 Parking bay lines

For more information, refer to AS1742.11 Section 7.1.

7.1 Delineation of parking spaces

7.1.1 Parking spaces for general use

Parking spaces for general use are marked by one of the following methods (see Figure 7.1):

a) Continuous white lines 100 mm wide, indicating all sides of the space, except any sides indicated by kerbing or similar changes in paving (see Figure 7.1(a)(i) and the left-hand example in Figure 7.1(b)). This pattern shall not be used in locations where there are part-time clearways or other part-time No Stopping areas.

b) Continuous white lines 100 mm wide indicating only the divisions between the spaces and the ends of the parking area (see middle example in Figure 7.1(b)). This pattern shall be used only to delineate angle parking spaces.

c) White markings 100 mm wide in the shape of an inverted T or an L at the corners of the spaces only (see Figure 7.1(a)(ii)). This pattern may be used in locations where there are part-time clearways or other part-time No Stopping areas. It is not suitable for angle parking unless 600 mm-long lines are also marked out from the kerb (see right hand example in Figure 7.1(b)).

d) Raised pavement markers (non-reflective) indicating the outline of the spaces as a series of white dots for right angle or parallel parking, but not for angle parking at angles other than 90 degrees. This method should not be used where through traffic runs over parking bay markings at times when there is no parking.

e) Contrasting pavement materials, such as bricks, arranged in a manner similar to methods in Items (a), (b) or (c) above. Possible future discolouring and loss of contrast caused by dirt and tyres should be taken into account.

7.1.2 Special use parking spaces

Parking spaces which are to be permanently set aside for special uses such as coach parking or disabled parking may be marked by broken yellow lines using line widths, and line and gap lengths as shown in Figure 7.1(a)(iii) as an alternative to the methods given in Clause 7.1.1. This method may also be adapted to angle-parking.

7.1.3 Parking space dimensions

Dimensions for marked parking spaces are given in AS2890.5.
AS1742.11 Figure 7.1 – Delineation of parking spaces

(a) Parallel parking

(Not suitable in locations where there are part-time clearways or part-time no-stopping areas)
(i) Marking all sides with continuous white lines

(ii) Marking corners of spaces only (example application)

(c) Marking special use parking spaces with broken yellow lines

Notes

1. See Clause 7.1 of AS1742.11 in Section 2.4.3 of this guide for other methods. Dimensions in millimetres
2.4.3.2 No stopping and zone lines

For more information, refer to AS1742.11 Section 7.2.

<table>
<thead>
<tr>
<th>7.2 Edge marking of no stopping and special purpose zones</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roadway edge marking used in the control of parking shall take one of the following forms:</td>
</tr>
<tr>
<td>a) Unbroken yellow no stopping line: This line shall comprise an unbroken yellow line, 80 mm to 100 mm wide, placed close and parallel to the edge of the roadway as shown in Figure 7.2(a). This line has a similar legal effect as the R5-35 full-time No Stopping sign and the R5-45 full-time clearway linear control sign, though it also prohibits stopping behind the line. It may be used to either supplement these signs or in lieu of them. If used in lieu of R5-45 full-time clearway linear control signs, the R5-50 CLEARWAY (start) sign is still required at the start and at intervals and the R5-51 END clearway and R5-39 Tow-away signs are still required if applicable (see Clause 4.3.1)</td>
</tr>
<tr>
<td>b) Broken yellow zone line: This line shall comprise a broken yellow line, 80 mm to 100 mm wide with 600 mm line segments and 900 mm gaps, placed close and parallel to the edge of the roadway as shown in Figure 7.2(b). It may be used to supplement signposted zones where only certain types of vehicles are permitted to stop.</td>
</tr>
<tr>
<td>If a special purpose zone is isolated from other marked parking spaces, a parking space or series of spaces outlined with broken yellow lines similar to those shown in Figure 7.1(d) may be used in lieu.</td>
</tr>
</tbody>
</table>
2.4.3.3 Other pavement markings

Refer to AS1742.11 Section 7.3.

### 7.3 Other pavement markings

Pavement messages may be used to supplement sign controls or statutory restrictions. Such messages shall consist of words at least 300 mm high, written either to face oncoming traffic (perpendicular to the edge of the roadway) or parallel to the edge of the roadway, facing to the middle of the roadway, as appropriate. The letters should be similar to Series D and should not be elongated.

Some typical messages are as follows:
- BUS ONLY or BUS STOP
- LOADING ZONE
- TAXI or TAXI RANK
- NO STOPPING
- NO PARKING
- KEEP CLEAR*
- Disabled symbol (minimum height shall be 800 mm).
The preferred colour for these pavement messages and symbols is white. However, the disabled symbol may be alternatively placed as a white symbol on a small blue rectangle within each parking space.

Some state and territory regulations prohibit vehicles from stopping or parking over some of these messages marked on the road surface. In a street where parking spaces are not marked, problems with vehicles parking across driveways and other statutory No Stopping areas can be reduced by painting a L-shaped marking to enclose the extremity of the permitted parking area, as illustrated at each end of Figure 7.1(a)(ii).

* Note: This use of the KEEP CLEAR marking relates only to the control of parking which may cause an obstruction, e.g. in front of a driveway. For use of the KEEP CLEAR marking in the queued traffic situation, refer to Part 2 of this manual.

2.4.3.4 Restricted parking zones

Diagonal pavement markings may be used to discourage parking in ‘NO STOPPING’ areas where the prohibition has been installed to permit unobstructed visibility to and of road users, such as at the approaches to school crossings, and violations of the stopping prohibitions are prevalent.

The arrangement shown in Figure 2.4.3.4 of this guide should be used sparingly and reserved for areas where a particular need exists.

For more information on parking control see Section 5.1 of this guide.
Figure 2.4.3.4 – Pavement markings for ‘No Stopping’ areas

Notes

1. Road to have a minimum sealed width of 10 m.
2. Diagonal markings shall be installed in accordance with MUTCD Part 2 Figure 5.5.
3. For details of other pavement markings and signs, refer to MUTCD.
4. Markings to be restricted to locations where parking violations continually occur.
5. Markings are not used where the parking lane is used as a traffic lane during peak hours.
MUTCD Part 2 Figure 5.5 – Shoulders

2.4.4 Kerb markings

For more information, refer to MUTCD Part 2 Section 5.5.3.

5.5.3 Kerb markings

Kerbs of medians and traffic islands may be marked white and reflectorised if added visibility is required.

Generally, the noses of medians and islands should be so painted.

2.4.5 Multi-lane roundabouts

Pavement markings at a multi-lane roundabout consist of:

a) ‘Give Way’ line across each entry

b) pavement arrows in each lane approaching the roundabout – at least three arrows should be used in each lane, and

c) exit line marking at multi-lane exits. Exit line markings are to be special purpose lane lines with a reduced width of 80 mm.

Typical arrangements for pavement markings at multi-lane roundabouts are shown in Figures 4.2.2(Q) to 4.2.2(W) at Section 4.2.2 of this guide. Modified multi-lane roundabout pavement marking arrows are shown in Traffic Control Sign – Modified multi-lane roundabout pavement marking arrow TC1845_1 and Traffic Control Sign – Modified multi-lane roundabout pavement marking arrow – right TC1845_2 depicted in Section 2.4.2.1 of this guide.

Exit line marking is provided at multi-lane exits where there is a common destination for two or more lanes at an entry to a roundabout. Where only a single lane at each entry has a destination at the multi-lane exit, an exit line is not provided – this arrangement is shown in Figure 4.2.2(T) at Section 4.2.2 of this guide. This arrangement reinforces the priority of the circulating vehicle. It also allows the (circulating) driver to select the appropriate exit lane in safety – this is important where a left-hand turn into a side street, or a diverge, is located a short distance after the roundabout.

Where a multi-lane roundabout must cater for a dual right turn to a multi-lane exit from the stem of a T-junction, the exit line would be extended to reflect this arrangement as shown in Figure 4.2.2(V) at Section 4.2.2 of this guide.

The exit line is marked concentrically to the central island and joined tangentially to the exit lane line. It is offset from the central island by sufficient width to allow a heavy vehicle to turn right without
mounting the non-trafficable section of the central island. It should not, however, leave an excessively large internal lane.

There must be no line marking across exit paths. The exit line marking must be designed so that it does not need to be crossed by drivers using the correct lanes travelling around the roundabout. Exit line markings should be the only lines on the circulating roadway (delete all other lines).

Where a multi-lane roundabout has a single lane exit, initially it may be necessary to narrow part of the circulating roadway with painted chevrons. The painted chevrons should be replaced with concrete kerb in the future, with due consideration of the turning circle requirements of large vehicles as shown in Figure 4.2.2(S) at Section 4.2.2 of this guide.

An alternative treatment may also be considered, i.e. ‘spiral’ markings as shown in Figure 4.2.2(W) to Figure 4.2.2(Y) at Section 4.2.2 of this guide. Spiral line marking should only be considered as a solution to assist in minimising operational problems on existing roundabouts where no other solution is feasible and would be supported by appropriate diagrammatic signs on the approaches to the roundabout. New roundabouts should be designed to ensure that spiral line marking is not needed. Where the proposed exit line marking varies from Figures 4.2.2(Q) to 4.2.2(V) at Section 4.2.2 of this guide or where unusual site conditions exist, advice should be sought from the department’s Traffic Engineering Unit.

2.5 **Raised pavement markers**

Refer to MUTCD Part 2 Section 5.6.

<table>
<thead>
<tr>
<th>5.6 Raised pavement markers</th>
</tr>
</thead>
</table>

### 5.6.1 General

Raised pavement markers are of the following types:

- a) Retroreflective raised pavement markers (RRPM), see Clause 5.6.2.
- b) Non-retroreflective raised pavement markers (NRPM), see Clause 5.6.3.
- c) Internally illuminated pavement markers, see Clause 5.6.4.

Symbols used on plans to represent raised pavement markers are given in Table 5.4.

### 5.6.2 Retroreflective raised pavement markers (RRPM)

RRPMs are used to augment painted lines, stripes and chevrons when it is deemed necessary or desirable to improve their visual properties. As devices which are considered to be at same level as the road surface RRPMs are intended to be trafficable when placed within a painted island or median strip.

RRPMs generally provide more effective and durable pavement markings than painted lines because:

- a) they are not generally obscured at night under wet conditions
- b) they provide an audible and tactile signal when traversed by vehicle wheels, and
- c) they are conspicuous in all conditions.

Physical and performance requirements for pavement markers are specified in AS 1906.3.
In deciding whether to use markers, the following factors should be taken into account:

i) operational effectiveness

ii) ease of installation

iii) self-cleansing properties under traffic

iv) effects of noise in or near residential areas.

The colour specified for RRPMs in various usages is shown in Table 5.3.

RRPMs shall not be displayed towards oncoming traffic on the right-hand edge lines on undivided roads.

5.6.3 Non-retroreflective raised pavement markers (NRPMs)

NRPMs shall be white. Their use in moving traffic situations is confined to lane guidance through intersections, see Clause 5.6.5.4.

5.6.4 Internally illuminated

The application of internally illuminated raised pavement markers in respect of colour, positioning and spacing shall be the same as for RRPMs. If used in a continuously operating mode, they shall also have retroreflective elements meeting the photometric requirements of AS1906.3. If used in a switching mode, they shall not be retroreflective. The markers shall not be used in a flashing mode.

NOTE: Users should satisfy themselves that the photometric performance of the self-illuminating feature of such devices is adequate for their purposes.

5.6.5 Application of raised pavement markers

5.6.5.1 Positioning of markers

Markers are generally located in gaps in the painted broken lines. The gap for placing markers should be sufficient to accommodate a margin for error in remarking operations.

For applications with continuous lines such as barrier lines and traffic islands, the marker shall be placed 25 mm to 50 mm from the line as shown in Figure 5.14.

On sharp curves, RRPMs augmenting painted edge lines, lane lines and painted median/island approaches shall be orientated so that the full retroreflective effect is realized on approach. This is achieved by aiming the reflective face in the direction of approaching traffic rather than tangentially to the curve.

5.6.5.2 Augmenting painted lines

The use of RRPMs in augmenting pavement markings shall be as illustrated in Figures 5.15 to 5.26. The positioning of RRPMs in relation to the painted lines, is specified in Clause 5.6.5.1.

The normal spacing between RRPMs, dimension N shown on the following treatment diagrams, is the distance indicated in Table 5.5 for the particular situation.

a) lane lines

b) dividing lines

c) barrier lines
d) edge lines.

Except on single lane roadways, e.g. freeway ramps, RRPMs shall not be used to supplement edge lines unless they are also used, at the same location, to supplement dividing, barrier or lane lines (see Figure 5.20). They should not generally be used on edge lines where the shoulder is not sealed as they are likely to be removed or covered in grading operations, but if used they should be placed inside the edge line. Provision of RRPMs on edge lines on rural roads is optional but important in locations subject to fog or other adverse visibility conditions, or at points of special hazard, e.g. approaches to bridges with sub-standard shoulder width (see Figure 5.21).

RRPMs should generally be placed outside the painted line to prolong their effective life and to increase the apparent lane width. However, if sealed shoulders (forming part of an identified cycle network) or bicycle lanes are less than 1.5 m wide then RRPMs shall be placed to the right of the line.

NOTE: The preferred spacing on edge lines is 24 m and the maximum, 36 m (see Table 5.5).

e) Continuity lines

RRPMs should not be used on continuity lines, as they may inhibit rather than encourage the correct lane-changing manoeuvre. However they may be required if the line is on a curve or is of excessive length such as along a weaving section, and extra delineation of the lane-change area is needed. The spacing in this case shall be 24 m.

f) Traffic islands, medians and other devices

The configurations shown are intended to illustrate the use of RRPMs only and should not be taken as a guide to the lengths or sizes of the facilities described. If the island outline or bicycle lane line is less than 1.5 m from the face of kerb then RRPMs shall be placed to the right of the line. RRPMs should not be placed where outlines are less than 1 m from the kerb face and approaches to the island meet desirable delineation requirements.

5.6.5.4 Lane guidance through intersections

A treatment of the type illustrated in Figure 5.27 comprising the placement of NRPMs within an intersection to guide non-turning traffic may be considered where it is apparent that such traffic would have difficulty in finding the correct lane on the departure side. The treatment is normally applicable only to wide signalised intersections on multi-lane roads. Typical situations where the treatment may be required are:

a) lanes on opposite sides of the intersection offset by half a lane width or more, e.g. the north-south leg of Figure 5.27

b) drivers required to steer a curved course through the intersection, e.g. the east-west leg of Figure 5.27

c) highly skewed intersections where the travel distance within the intersection is excessive, or

d) other features such as tram lines or adverse vertical geometry which may make the course difficult to follow.
Where applied, the treatment shall be completed for all through lanes on all legs even though the problem may exist for one intersecting road only. Markers should normally be omitted from within the area bounded by turn lines when these are marked, but may be required if inadequate, confusing or incorrect guidance would result, for example, where a curved path is to be followed.

It is essential that these treatments be maintained at a high level so that confusing patterns will not be created by an excessive number of missing markers. The expected high cost of maintenance should be taken into account when considering the need for treatment.

As an alternative to NRPMs, short dashes of thermoplastic material may be used, provided they are at least as visible as NRPMs under all viewing conditions.

MUTCD Part 2 Table 5.3 – Colour of retroreflective raised pavement markers to augment painted lines

<table>
<thead>
<tr>
<th>Application</th>
<th>RRPM colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividing lines</td>
<td>Yellow</td>
</tr>
<tr>
<td>Lane lines</td>
<td>White</td>
</tr>
<tr>
<td>Right hand edge line, divided road and one-way road</td>
<td>Yellow</td>
</tr>
<tr>
<td>Left hand edge line, divided road and one-way road</td>
<td>Red</td>
</tr>
<tr>
<td>Left hand edge line, 2-way road</td>
<td>Red</td>
</tr>
<tr>
<td>Small* channelising island outline, painted or raised – all sides</td>
<td>White</td>
</tr>
<tr>
<td>Median island outline, painted or raised – all sides</td>
<td>Yellow</td>
</tr>
<tr>
<td>Roadway diverge outline, including expressway exit nose, and approach end of large island</td>
<td></td>
</tr>
<tr>
<td>• left† side</td>
<td>Yellow</td>
</tr>
<tr>
<td>• right† side</td>
<td>Red</td>
</tr>
<tr>
<td>Step-out markings at expressway exit ramps</td>
<td>Green</td>
</tr>
</tbody>
</table>

Notes:

* A small island should generally be regarded as one with no side, including approach and departure markings, longer than 12 m.

† Left or right when viewed in the direction of travel.
**MUTCD Part 2 Table 5.4 – Symbols for raised pavement markers**

<table>
<thead>
<tr>
<th>Marker or term</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-retroreflective raised pavement marker</td>
<td>○</td>
</tr>
<tr>
<td>Retroreflective raised pavement marker:</td>
<td></td>
</tr>
<tr>
<td><strong>Unidirectional</strong></td>
<td></td>
</tr>
<tr>
<td>• White</td>
<td></td>
</tr>
<tr>
<td>• Yellow</td>
<td></td>
</tr>
<tr>
<td>• Red</td>
<td></td>
</tr>
<tr>
<td>• Green</td>
<td></td>
</tr>
<tr>
<td><strong>Bidirectional</strong></td>
<td></td>
</tr>
<tr>
<td>• White</td>
<td></td>
</tr>
<tr>
<td>• Yellow</td>
<td></td>
</tr>
</tbody>
</table>

**MUTCD Part 2 Table 5.5 – Normal spacing (N) between RRPMs**

<table>
<thead>
<tr>
<th>Situation</th>
<th>Dimension N, m</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unlit roads generally, lane lines and dividing lines</td>
<td>24</td>
</tr>
<tr>
<td>Substandard curves or curves 400 m radius or less</td>
<td>12</td>
</tr>
<tr>
<td>Dividing (barrier) lines on approaches to median ends</td>
<td></td>
</tr>
<tr>
<td>Roads with street lighting meeting AS1158.1.1 (except that 24 m spacing for lane lines may be sufficient in many cases)</td>
<td></td>
</tr>
<tr>
<td>Short length of special purpose dividing or lane line, exit lines at roundabouts</td>
<td></td>
</tr>
<tr>
<td>Dividing lines on all multi-lane undivided roads</td>
<td></td>
</tr>
<tr>
<td>Lines outlining traffic islands, median and separator ends, and other devices</td>
<td>4 min, 12 max*</td>
</tr>
<tr>
<td>Markers on edge lines including outlines of painted median strips and separators</td>
<td>24 preferred, 36 max</td>
</tr>
<tr>
<td>Dividing and lane lines on intersection approaches (minimum – one and marker at each end of the line)</td>
<td>12</td>
</tr>
</tbody>
</table>

Note:
* Shown on MUTCD Part 2 Figures 4.22 to 4.24 and 4.26 at the preferred dimension, 6 m.

**MUTCD Part 2 Figure 5.14 – Lateral placement of RRPMs**

---

**MUTCD Part 2 Figure 5.15 – Broken lane lines**

---
MUTCD Part 2 Figure 5.16 – Continuous lane lines

MUTCD Part 2 Figure 5.17 – Broken dividing line

MUTCD Part 2 Figure 5.18 – Continuous dividing line

MUTCD Part 2 Figure 5.19 – Barrier lines

MUTCD Part 2 Figure 5.20 – Edge lines on a two-lane two-way road

MUTCD Part 2 Figure 5.21 – Edge lines on a multi-lane one-way roadway

Note: RRPMs are only used on rural divided roads as indicated in Clauses 5.6.5.2(d) of the MUTCD Part 2 extract in Section 2.5 of this guide.
**MUTCD Part 2 Figure 5.22 – Large raised or unpaved traffic island with diverging traffic**

* For N, see Table 5.5

Note: Spacing shown is indicative only.

**DIMENSIONS IN METRES**

**MUTCD Part 2 Figure 5.23 – Large raised or unpaved traffic island with subsequent merge**

* For N, see Table 5.5

Note: Spacing shown is indicative only.

**DIMENSIONS IN METRES**

**MUTCD Part 2 Figure 5.24 – Approach to (or departure from) median island (two-way flow)**

* For N, see Table 5.5

Note: Spacing shown is indicative only.

**DIMENSIONS IN METRES**
**MUTCD Part 2 Figure 5.25 – Painted median strips**

Note: Diagonal rows of RRPMs within the marked median are intended to be additional to the RRPMs on the outlines.

**MUTCD Part 2 Figure 5.26 – Painted islands**

(a) Small channelising island

(b) Median island

Notes

1. For small islands, a minimum of two RRPMs should be visible on any one edge.
2. The spacing may be adjusted to allow even gaps between RRPMs.
2.5.1 General

Raised pavement markers may be permanent or temporary, retroreflective or non-retroreflective. They are also used individually to locate particular objects, e.g. fire hydrants and special survey points.

Retroreflective raised pavement markers were developed to improve wet / night visibility, when pavement striping provides less delineation and supplemental systems are necessary. These devices use a reflector, which extends above the smooth film of water on the road surface, providing a valuable delineation function by reflecting light from vehicle’s headlights. Raised pavement markers can improve driver’s performance by providing information about roadway geometry at a distance greater than is possible with pavement striping.

Temporary raised pavement markers are used to mark the travelled path at short-term work sites.
When used on narrow traffic lanes, raised pavement markers usually improve lane discipline. They are also very useful for highlighting sudden lateral shifts in lane lines, for use in conjunction with pavement markings at detours on long-term side tracks and deviations, on edge lines on substandard horizontal curves and for use on altered lane lines where confusion with previously painted markings may occur.

2.5.2 Permanent Retroreflective Raised Pavement Markers (RRPMs)

Continuous application of RRPMs to augment the painted dividing line on two-lane, two-way roads should be considered where the Annual Average Daily Traffic (AADT) exceeds 2000 vpd. Also, at isolated locations of special hazard, provision of RRPMs should be considered on any sealed surface irrespective of the traffic volume.

2.5.3 Non-retroreflective raised pavement markers

Non-retroreflective raised pavement markers shall be circular, approximately 100 mm in diameter and 15 mm high. The colour shall be white.

2.5.4 Temporary Raised Pavement Markers (TRPMs)

Temporary raised pavement markers may be used to mark the temporary travelled path at short-term work sites or to indicate the permanent travelled path on new work prior to the application of permanent pavement markings.

For marking temporary paths while work is in progress, TRPMs are simply glued to the surface, often using bituminous adhesive. For night-time performance, they should be fitted with retroreflectors compliant with AS1906.3.

TRPMs used to indicate the alignment for new markings should be placed on the surface of the road base or basecourse, so that the final surface course can hold the TRPM in place. The retroreflective flap then protrudes from the road surface to indicate the new marking alignment. Later, the flap may be cut away flush with the road surface.

2.5.5 Pavement bars

For more information, refer to MUTCD Part 2 Section 4.3.

### 4.3 Pavement bars

#### 4.3.1 General

Pavement bars are raised blocks that may be used to augment painted islands and painted median strips to discourage but not prohibit traffic movements across the islands or median strips.

#### 4.3.2 Design and installation

Typically pavement bars are 200 mm wide and 400 mm long. They shall have an approximately hemispherical cross-section with rounded ends. Their use shall be limited to the following:

a) Where the 85th percentile approach speed is less than 75 km/h, the height of the bars shall be a maximum of 50 mm.

b) Where the 85th percentile approach speed exceeds 75 km/h pavement bars shall not be used. Raised retroreflective pavement markers arranged in transverse rows may be used instead (see Clause 5.6.5.2(f) and Figure 5.25).
Pavement bars shall be painted or otherwise coloured yellow and they shall be reflectorised. They shall be arranged perpendicular to the direction of travel so as to increase visual effect and minimize the possibility of loss of vehicular control if traversed.

### 4.3.3 Uses

Typical uses of arrangements of pavement bars are to:

a) control turning movements at intersections (see Figure 4.1).

b) lane control (see Figure 4.2).

c) supplementing barrier lines where frequent and hazardous infringements occur, except on substandard curves.

d) replacing raised islands where these are undesirable or not considered effective because of the absence of street lighting or restricted pavement width.

e) replacing a raised island where, but for limitation on minimum size, it would otherwise be used.

f) approach treatment to a median or other central obstruction (see Figure 4.3).

g) replacing a narrow median (see Figure 4.4).

h) islands traversable by over-dimensional vehicles.

Pavement bars shall not be installed on two-way roadways less than 6.8 m in width, nor on substandard curves.

Installations of pavement bars should normally be outlined with single continuous lines. If the installation is in the form of a median separating opposing directions of traffic, the outline markings may consist of barrier lines.

---

**MUTCD Part 2 Figure 4.1 – Pavement bars for control of turning movements at intersections**

Note: The 18 m length using seven bars at 3m spacings may be reduced to 9 m using four bars at 3 m spacings.
**MUTCD Part 2 Figure 4.2 – Pavement bars for lane control**

![Diagram](image1)

Note: First two bars at 1.5 m spacing, thence 3 m spacing up to 45 m and 6 m spacing beyond that.

**MUTCD Part 2 Figure 4.3 – Pavement bars at a median approach**

![Diagram](image2)

Note: Measured from median end, bars at 3 m spacing for first 45 m, thence at 6 m spacing.

**MUTCD Part 2 Figure 4.4 – Pavement bars used as a median**

![Diagram](image3)

Note: All bars at 3 m spacing, except those in tapered section.

The size and shape of pavement bars need to be carefully designed, so that they do not cause a hazard to motorcyclists and bicyclists.

Care should be exercised in the layout of islands using pavement bars to reduce the risk of drivers or riders losing control if the pavement bars are crossed. Where motorcycle and bicycle traffic are significant, or where serious vehicle encroachment over a painted traffic island is a persistent problem, it may be preferable to use close spaced RRPMs or to install a conventional kerbed raised island.

RRPMs may be used to supplement outline markings as shown in Figure 2.5.5 in this guide.
2.5.6 Audio-Tactile Line Markings (ATLM)

For more information, refer to MRTS45 Clause 7.7.
### 7.7 Audio tactile line marking

#### 7.7.1 Application of audio tactile line marking

Where shown on the design documents, audio tactile line marking (ATLM) configured as a pattern of raised ribs shall be applied directly to the road surface on existing painted edge lines, centre double barrier lines, centre one-way barrier lines or wide centre line marking. At locations where edge lines have not been marked (such as across narrow structures), ATLM shall not be applied.

ATLM shall be applied in a controlled manner, to produce a finished longitudinal line with a consistent appearance and profile that provides a significant audible warning.

#### 7.7.2 Application on existing painted lines

All extraneous or loose material shall be removed from areas where the material is to be applied, immediately prior to application of ATLM. In addition, existing line markings shall be prepared and primed, in accordance with the manufacturer’s recommendations, to ensure satisfactory adhesion of the material.

#### 7.7.3 Placement and dimension of audio tactile line marking

Where nominated in the Contract, ATLM shall be applied to all lines shown on the design documents and shall conform to the tolerances shown in Table 7.9.2.

Use of ATLMs on Wide Centreline treatments are outlined in Section 7.11 of this Technical Specification.

The height of the raised ribs is measured from the plane surface formed by the tops of the aggregate.

Diagrams depicting these requirements are provided in Figure 7.7.3(a), Figure 7.7.3(b) and Figure 7.7.3(c).

#### 7.7.4 Gaps for cyclists

A 1.5 m gap spaced every 20 m shall be provided in the ATLM edge line.

ATLM or raised profiled markings have proven to be effective in improving both wet / night visibility and in creating an audible and vibratory warning.

It should be discontinued 10 metres prior to structures (such as bridge rail, guardrail and culverts), where it is likely that cyclists might need to enter the traffic lane to pass the structure (this is likely where the structure is within one metre of the edge line) and recommence 10 metres past the end of the structure.

ATLM should be discontinued within 200 m of residences to prevent noise generated by ATLM from being a problem to nearby residents. For more information, refer to TRUM Volume 2 Part 5.
**MRTS45 Figure 7.7.3(a) – ATLM edge line**

![ATLM edge line diagram]

**MRTS45 Figure 7.7.3(b) – ATLM centre double barrier lines**

![ATLM centre double barrier lines diagram]