

SECTION 4

MISCELLANEOUS PAVEMENT MARKINGS

Update February 2010

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Note: For chevron sight boards refer to MOTSAM Part 1 Section 6: PW-66, PW-67, PW-68 & PW-69.
 For motorway markings refer to MOTSAM part 3.

Some related Technical Documents may be found at:

<http://www.nzta.govt.nz/resources/results.html?catid=257> and

<http://www.nzrf.co.nz/>

4.01 PAVEMENT MESSAGES AND SYMBOLS

4.01.01 GENERAL

(a) Legislation:

Refer to the *Land Transport Rule: Traffic Control Devices 2004*

The word "STOP" shall be marked at a Stop controlled intersection, and a Give Way triangle symbol at a Give Way intersection where the road surface permits.

Pavement word messages or numerals marked on the road surface:

- shall have letters at least 2 m high,
- may be provided in conjunction with the appropriate regulatory or warning sign,
- shall be in a colour contrasting with the colour of the road surface, and
- shall be clearly visible to approaching traffic.

(b) Application:

Pavement word messages may be marked on the road surface to supplement traffic signs.

Pavement messages shall be marked facing the drivers direction of travel.

The object of the markings, as with signs, is to give a specific message to road users. Excessive use of word messages and symbols should be avoided. Such vague terms as 'CAUTION' or 'DANGER' without reference to a particular hazard should be avoided.

4.01.02 LETTERS AND NUMERALS

Letters and numerals marked on the trafficable roadway shall be marked as follows:

(a) Urban Roads:

Letters or numerals	:	Refer to Figures 4.1, 4.2 and 4.3.
Max. length of word	:	Half the pavement width, or the lane width when lanes are marked.
Colour	:	White

(b) Rural Roads:

Letters or numerals	:	Refer to Figures 4.1, 4.2 and 4.3. NOTE: All vertical dimensions are increased by 50%.
Max length of word	:	Half pavement width, or the lane width when lanes are marked.
Colour	:	White

(c) Special Vehicle Stops:

Pavement word messages on special vehicle stops (eg. taxi stands, bus stops, and loading zones) may be marked as follows:

Letters	:	Refer to Figures 4.2 and 4.3. NOTE: All vertical dimensions are reduced by 50%.
Colour	:	Yellow

Pavement message should be parallel to kerb with the top of the letters pointing towards the kerb.

Other lettering styles may also be adopted at the discretion of the road controlling authority.

Refer to Section 2.12 for special vehicle stops.

4.01.03 SETTING OUT

(a) Location:

The symbol or last word of the message should be positioned within 10 m of the permanent warning or regulatory sign it supplements.

Except for special vehicle parking areas all pavement messages should be marked at right angles to the path of approaching traffic.

At special vehicle parking areas the pavement message should be parallel to kerb, with the top of the letters pointing towards the kerb. Refer to Section 2.12 for full details of special vehicle parking areas.

(b) Spacing:

Where a pavement message occupies more than one line, the first word or words shall be placed nearest to the approaching traffic.

Lines of pavement messages should be spaced such that the time interval between each line is approximately one second at the prevailing (85th percentile) speed of vehicles in the vicinity of the message.

As a guide, the following line spacings may be used:

- (i) 14 m on urban roads, and
- (ii) 25 m on rural roads.

4.01.04 APPROVED PAVEMENT MESSAGES AND SYMBOLS

Refer to Tables 4.1 and 4.2 for a list of approved pavement word messages and symbols which are used to supplement traffic signs.

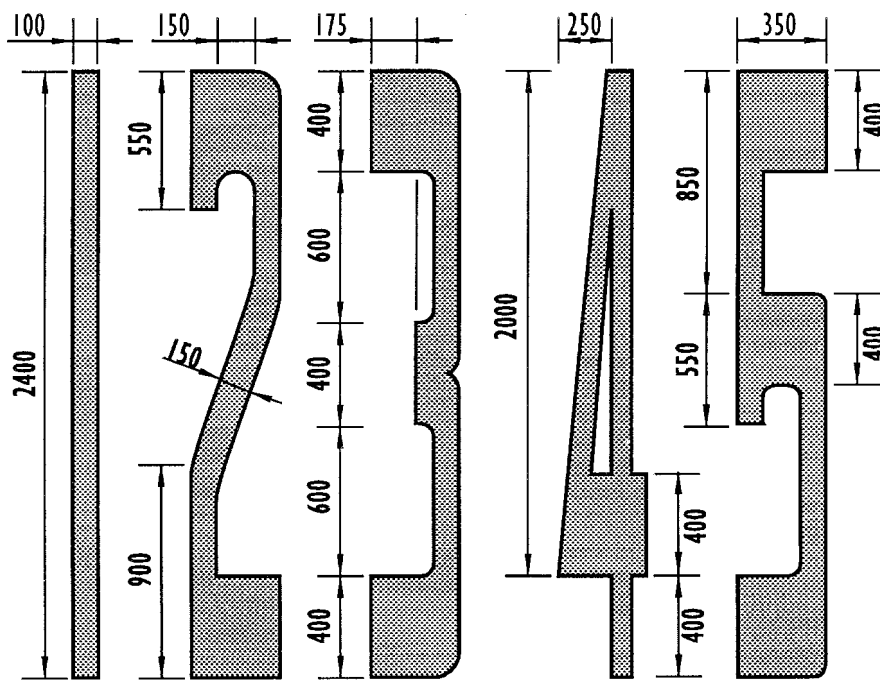
Other legends and symbols should not be used except under exceptional circumstances.

SIGN OR SYMBOL	SUPPLEMENTARY PAVEMENT MESSAGE OR SYMBOL	REFERENCE	RECOGNISED MEANING OF MARKING
RG-1 (50)	"50" Symbol (May also be marked inside circle or border)	Figure 4.1	50 km/h speed limit applies in this area.
RG-1 (60, 70, 80, 90)	"x0" Symbol as appropriate (May also be marked inside circle or border)	Figure 4.1	Specified speed limit applies in this area.
RG-5	"STOP"	Section 3.10	Intersection ahead is controlled by a compulsory Stop sign.
RG-6	Give way triangle symbol, but see section 3.09.06	Section 3.09 and Figure 3.9a	Intersection ahead is controlled by a Give Way sign.
RG-9	"NO" "ENTRY"	Figures 4.2 and 4.3	One way road. Entry from this end is prohibited.
PW-30	Diamond symbol	Section 4.02	Advance warning of pedestrian crossing ahead.
PW-32	"SCHOOL"	Figures 4.2 and 4.3	Look out for school children and traffic.
RG-19, RG-20	"ONE" "LANE" "BRIDGE"	Section 4.05	Approaching a one-lane bridge.
PW-14	"RAIL" "X"	Section 4.03	Approaching a railway level crossing.
RG-26	Cycle Symbol	Sections 2.10 and 3.19	Formally marked cycle lanes.

Table 4.1: White Pavement Messages and Symbols

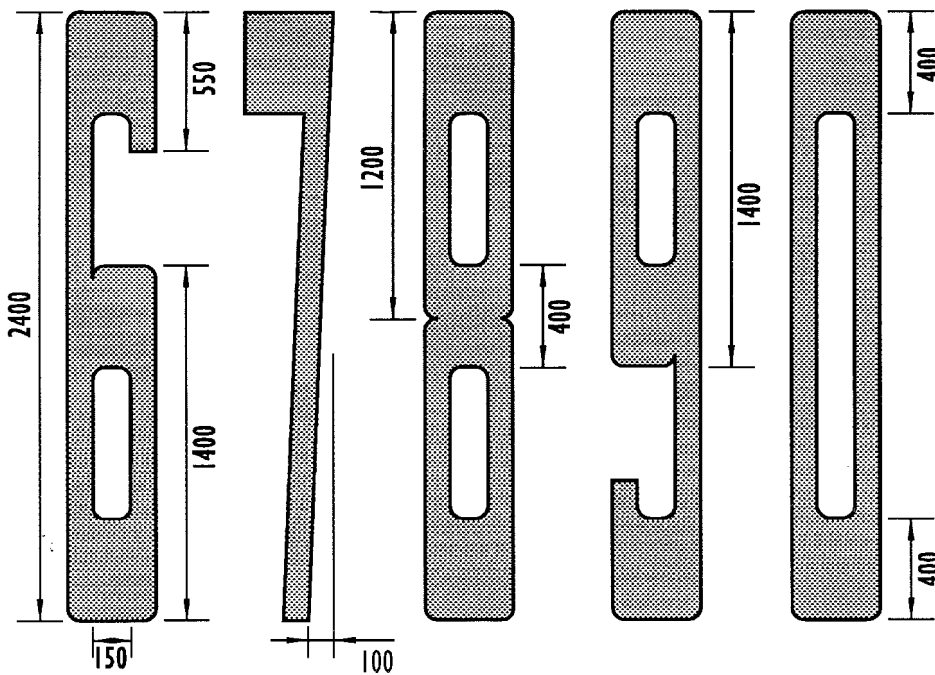
SIGN OR SYMBOL	SUPPLEMENTARY PAVEMENT MESSAGE OR SYMBOL	REFERENCE	RECOGNISED MEANING OF MARKING
RP-10	Disabled parking symbol	Section 2.12.07	Keep clear, car park reserved for disabled parking only.
RP-5, RP-5.1	"BUS STOP"	Section 2.12.03	Keep clear, area reserved for bus stop.
RP-6, RP-6.1	"TAXI STAND"	Section 2.12.02	Keep clear, area reserved for taxi stand.
RP-7, RP-7.1	"LOADING ZONE"	Section 2.12.04	Keep clear, area reserved for loading zone for goods service vehicles.
None	Isosceles triangle symbol	Section 4.07	Fire hydrant within 5 m.
None	Hollow isosceles triangle symbol	Section 4.07	Ball type fire hydrant within 5 m.
None	Circle symbol	Section 4.07	Keep clear of fire hydrant lid.

Table 4.2: Yellow Pavement Messages and Symbols



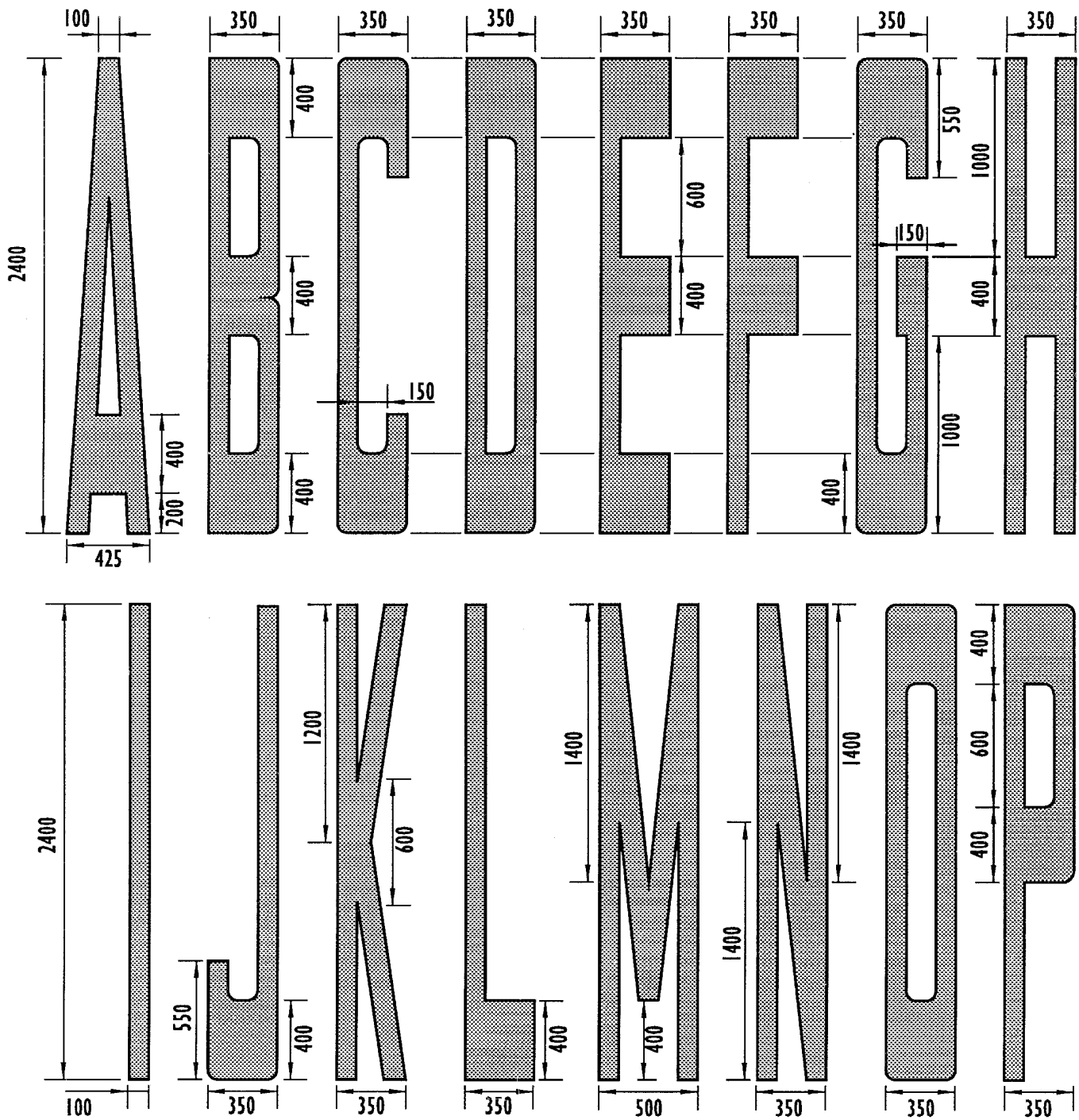
- NOTES:
1. Except where shown otherwise, width of all vertical and near vertical strokes of numerals is 100 mm.
 2. Spaces between all numerals are 75 mm.
 3. Dimensions given are those for numerals 2.4 m high (urban standard). In rural areas, vertical dimensions only should be increased by 50%.

Width of all numerals except '1' is 350 mm. Where shown, corners may be rounded to nominal 75 mm radius.



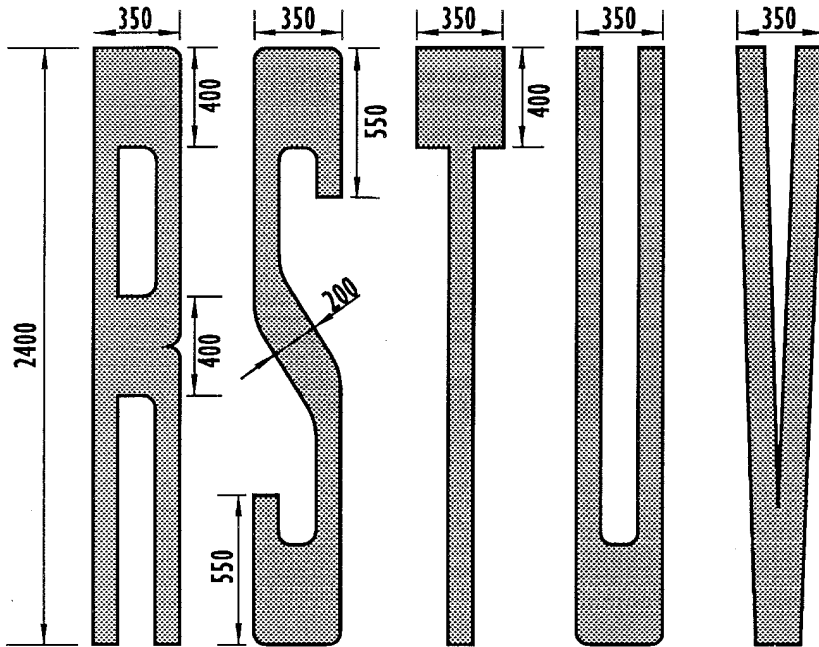
MARKINGS FOR NUMERALS

FIGURE 4.1

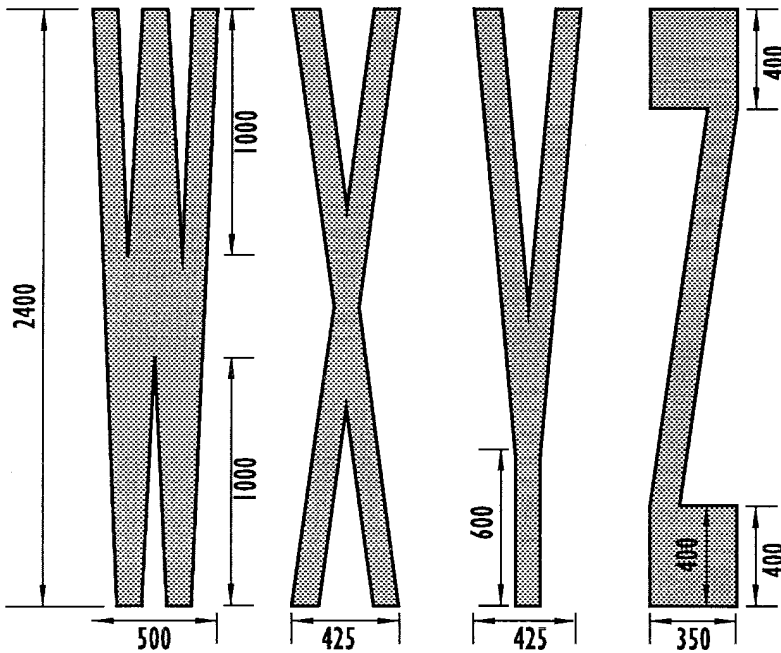


Refer to notes on Figure 4.3.

FIGURE 4.2 MARKINGS FOR LETTERS A TO P



- NOTES:**
1. Where shown, corners should be rounded to nominal 75 mm radius.
 2. Width of vertical and near vertical strokes is 100 mm.
 3. Width of all horizontal strokes is 400 mm.
 4. Space between all letters except A, W, and X is 75 mm. Space between A, W, or X and another letter is 25 mm.
 5. Dimensions given are for letters 2.4 m high, to be used in 50 km/h zones. In rural areas, vertical dimensions should be increased by 50%.
 6. For commercial vehicle stops, vertical dimensions should be decreased by 50 %.



MARKINGS FOR LETTERS R TO Z

FIGURE 4.3

4.02 PEDESTRIAN CROSSINGS

4.02.01 GENERAL

(a) Legislation:

Refer to the *Land Transport Rule: Traffic Control Devices Rule 2004* and to *Traffic Note 1 - Revision 2*.

The Rule requires pedestrian crossings to have the following components:

- A speed limit no more than 50 km/h (unless Land Transport NZ approval is obtained)
- Zebra markings in reflectorised white marked on, and contrasting with, the roadway and conforming to specifications in Schedule 2 of the rule.
- Must not exceed 15 metres from one side of the roadway to the other side unless interrupted by a traffic island.
- Must have no permanent obstruction to visibility of all the crossing for an approaching driver from a safe stopping distance at a safe operating speed for the road.
- Black and white posts within 2m of each end of the crossing, including on traffic islands which separate two crossings.
- On each black and white pole a Belisha beacon or fluorescent Belisha beacon disc.
- A pedestrian crossing warning sign on each approach to the pedestrian crossing.
- A limit line not less than 300 mm wide and five metres from the pedestrian crossing unless such a marking is impracticable.
- A white diamond pavement marking should be installed at least 50 metres in advance of the crossing. Note that this is not now mandatory, but remains good practice.

(b) Application:

Special care is required when locating pedestrian crossings so that they are at a desirable location for both pedestrians and drivers. This is especially so at intersections.

For further details on pedestrian crossings refer to:

- *Pedestrian Planning and Design Guide*, Land Transport New Zealand 2007 available late 2007 at www.landtransport.govt.nz
- *NZS 6701:1983 Code of Practice for Road Lighting - Section 11: Pedestrian Crossings**
- *MOTSAM PART I - Signs in Advance of Pedestrian Crossings*, ie. PW-30 and PW-3.

(c) Decision Process:

The process for determining whether a pedestrian crossing is the best option is detailed in the

Pedestrian Planning and Design Guide, Land Transport NZ 2007 available late 2007 at www.landtransport.govt.nz.

4.02.02 SUITABLE TREATMENTS

(a) General:

It is recommended that the length of pedestrian crossings should always be kept to the minimum practicable.

Pedestrian crossings should not be located within:

- (i) 100 m of any other crossing facility on the same route,
- (ii) 200 m of a signalised pedestrian crossing, or
- (iii) 100 m of a major intersection, unless located at another intersection.

Pedestrian crossings should be marked as indicated in:

- Figure 4.4: Typical pedestrian crossing with kerb extensions,
- Figure 4.5: with raised median islands,
- Figure 4.6: on a raised platform, and
- Figure 4.7: Signalised Mid-block Pedestrian Crossings.

*Note: This standard is expected to be superseded during 2008 with AS/NZS 1158.4 Supplementary Lighting at Pedestrian Crossings.

(b) Two-lane Roads without Marked Centrelines:

Pedestrian crossings on roads without centrelines should be marked as indicated.

The pedestrian crossing should not exceed 10 m in overall width, measured from kerb to kerb.

In cases where there is excess pavement width it is desirable to install kerb extensions and/or a raised pedestrian refuge island. Raised pedestrian refuge islands effectively divide the pedestrian crossing into two separate crossings.

(c) Two-lane Roads with Marked Centrelines:

Pedestrian crossings on roads with centrelines should be marked as indicated in Figures 4.4; 4.5 and 4.6.

A centreline marked through a pedestrian crossing does **not** legally divide it into two separate crossings.

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On roads with pavement widths greater than 10 m and/or where there are large numbers of parked vehicles on the approaches to pedestrian crossings, it may be desirable to install kerb extensions.

On roads with moderate to high volumes and where pedestrian crossings are greater than 10 m in length, it may be desirable to install raised pedestrian refuge islands in the centre of the road.

(d) Multi Lane Roads:

Pedestrian crossings on multi lane roads should be marked as two separate crossings. Each crossing should not exceed 10 m in length and should be divided by a centrally located raised pedestrian refuge island.

The minimum recommended width for a raised pedestrian refuge island is 2 m.

On multi lane roads it is preferable, where possible, to install kerb extensions to minimise the width of pedestrian crossings and to position pedestrians outside of vehicles parked on the approaches to crossings.

(e) Flush Median Divided Roads:

On roads marked with flush medians it is desirable to keep the number of pedestrian crossings to an absolute minimum. See figure 4.5.

Where a pedestrian crossing is marked on a two-lane road marked with a flush median, a raised median pedestrian refuge island should be constructed, to divide the crossing into two separate crossings.

When a pedestrian crossing is marked on a multi-lane road, it is **strongly recommended** that a raised median pedestrian refuge island should also be constructed, to divide the crossing into two separate crossings.

Refer to Section 2.09.08: Pedestrian Crossings.

(f) Intersections:

On side road approaches to intersections controlled by "STOP" or "GIVE WAY" signs, it is preferable to provide a raised pedestrian refuge in the centre of the road rather than formally marked pedestrian crossings.

However, where pedestrian crossings are installed, they should be marked 1 m in advance of the limit line.

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On uncontrolled side road approaches to intersections, pedestrian crossings should be located at least 600 mm from the kerb line of the through road.

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It is desirable to locate pedestrian crossings prior to the tangent points of kerb radii, to minimise crossing lengths, particularly at intersections with large corner radii.

Pedestrian crossings should be located on desired pedestrian paths.

Edge lines marked on approaches to intersections shall not be marked through pedestrian crossings.

(g) Roundabouts:

At roundabout intersections, pedestrian crossing locations are a compromise between:

- (i) Being too close to the roundabout entrance / exit, which can restrict vehicular entry / exit manoeuvres, and
- (ii) Being too far away, which may reduce pedestrian crossing usage.

An optimum distance depends on each individual site but is usually in the range of 10 m to 25 m from a roundabout exit.

4.02.03 CENTRELINES

The centreline should always stop short of the crossing, at the limit line as shown in Figure 4.4

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4.02.03B LIMIT LINES

All pedestrian crossings shall have a limit line marked as follows, unless such a marking is impracticable:

Colour	:	Reflectorised white
Width	:	300 mm
Stripe	:	Continuous
Location	:	5 metres from the pedestrian crossing.

4.02.04 NO-STOPPING LINES

On each approach to a pedestrian crossing no-stopping lines shall be marked not more than 1 m out from the kerb and for a minimum distance of 6 m prior to the crossing. Where operating speeds are greater than 30 km/h, and on rural roads, the distance should be increased to 15 m.

Where school patrols operate no-stopping line markings should be provided for a minimum of 15 m on both approach and departure sides of pedestrian crossings.

Where kerb extensions are provided, no-stopping lines may be omitted.

Refer to Section 2.11.02 for full details of no-stopping lines.

4.02.05 ADVANCE WARNING DIAMOND

Advance warning diamond symbols, if marked, shall be located not less than 50 m in advance of the pedestrian crossing and in the centre of each approach lane.

Advance warning diamond symbols shall be marked as follows:

Colour	:	White
Line width	:	100 mm
Diamond	:	0.6 m x 4 m (minimum), 1 m x 6 m (desirable)
Proportions	:	As indicated in Figures 4.4 and 4.5.

Advance warning diamond symbols shall be located so they are clearly visible to approaching drivers for at least 50 m.

4.02.06 CROSSING BARS

The bars of pedestrian crossings shall be marked parallel to the direction of approaching traffic and:

- (a) At right angles to the kerblines, or
- (b) On the most convenient pedestrian crossing route.

Pedestrian crossings shall be marked as follows:

Colour	:	Reflectorised white. Note that these markings shall contrast with the roadway.
Bar Width	:	300 mm
Gap	:	600 mm
Bar Length	:	3.0 m (desirable), 2.0 m (minimum).

The length of bars may be increased to provide greater visual impact or to provide wider crossings where there are large pedestrian volumes.

4.02.07 EDGE LINES

Edge lines shall not continue through pedestrian crossings.

Where edge lines are marked and there are problems with vehicles parking in no-stopping areas prior to pedestrian crossings, no-stopping areas may be marked with diagonal bars at suitable spacings to discourage parking. Refer to Section 2.04.03 for details of diagonal shoulder bar markings.

4.02.08 CROSSING POLES AND BELISHA BEACONS

(a) Crossing Poles:

Poles which indicate the positions of pedestrian crossing shall be at least 75 mm diameter, at least 2 m high and be marked with alternate parallel bands of black and white* each approximately 300 mm wide.

A pole shall be located within 2 m of each end of every pedestrian crossing, preferably on the approach sides to crossings.

Pedestrian crossings divided by a raised central median or pedestrian refuge shall have poles to mark the ends of each separate crossing, ie. at the road sides and at the central raised central median or pedestrian refuge.

(b) Belisha Beacons:

A Belisha beacon or a fluorescent Belisha beacon disc shall be installed on every black and white pole specified above.

Where beacons are provided they shall consist of 300 mm minimum diameter yellow/amber spheres with a minimum light output of 650 lumens. Beacons shall have a flashing rate of between 40 to 60 flashes per minute and shall be located so that they are visible to all approaching traffic.

*Note: The conspicuity of these poles is enhanced at night when the white bands are reflectorised.

4.02.09 LIGHTING

Pedestrian crossings shall normally be illuminated during the hours of darkness and when the street lights are operating in the vicinity, unless the road controlling authority considers that a particular crossing will generally not be used at night.

Lighting for pedestrian crossings shall meet the requirements of *AS/NZS 1158.4 : 2009 Lighting of Pedestrian Crossings*.

4.02.09 SIGNALISED MID-BLOCK PEDESTRIAN CROSSING (Crosswalk Lines)

(a) General:

Refer to Section 3.11.08 for details of crosswalk lines at traffic signal controlled intersections.

Signalised mid-block pedestrian crossings may be desirable where:

- Mid-block pedestrian crossing volumes are high, or
- It is desirable to coordinate mid-block pedestrian crossing flows with adjacent traffic signal controlled intersections, or
- The crash history at a mid-block pedestrian crossing site indicates that it may be desirable to signalise the crossing.

(b) Mid-block signalised pedestrian crossings should be marked as follows:

Refer to Figure 4.7.

(i) Crosswalk lines:

Colour	:	Reflectorised white
Line width	:	100 mm
Stripe	:	Continuous
Crosswalk width **	:	1.8 m (minimum), 2.5 m (desirable).

** *The width between crosswalk lines is usually determined by the widths of the footpaths so connected and the number of pedestrians using the crossing.*

Crosswalk lines shall be continuous white lines extending entirely across the pavement.

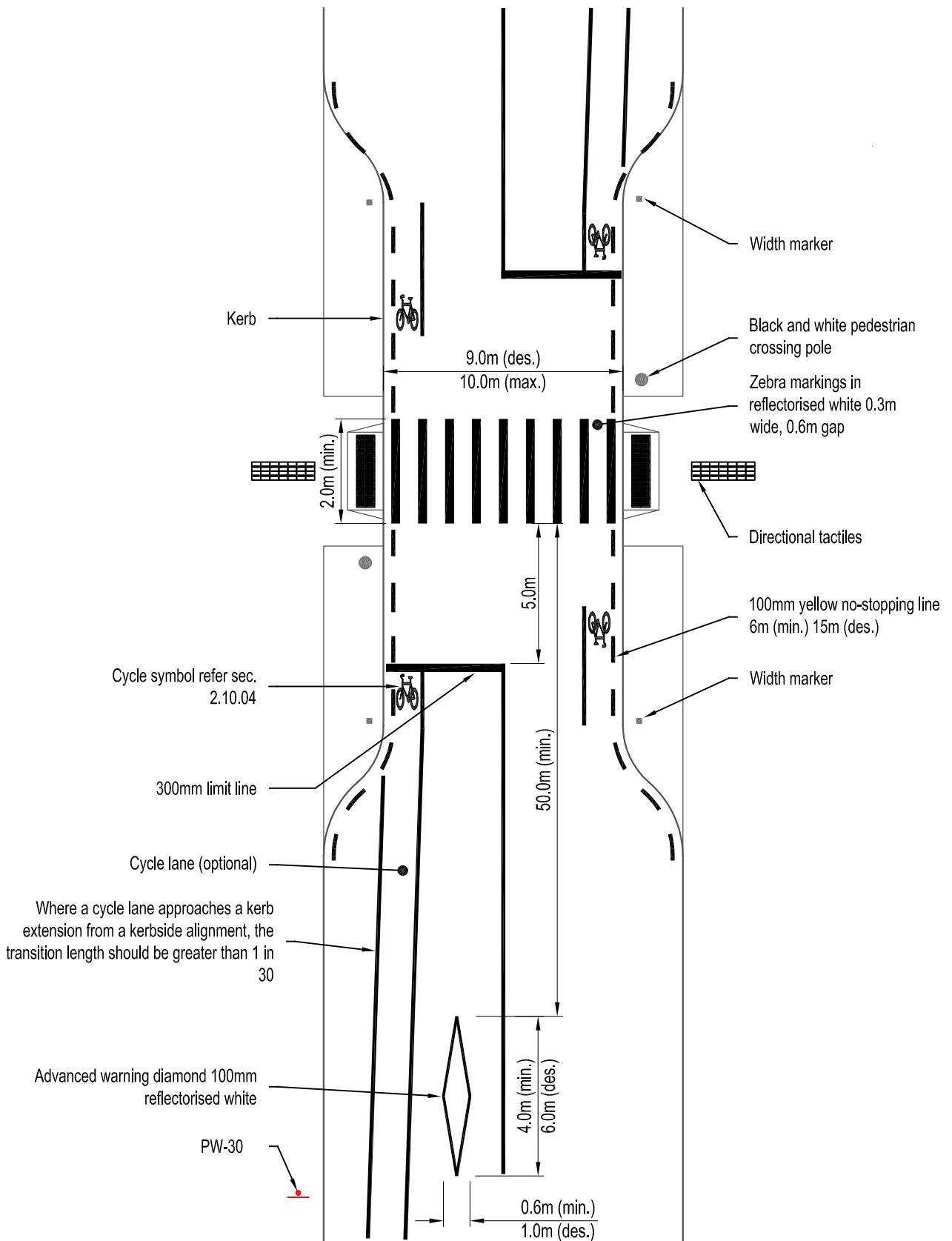
No longitudinal lines, ie. edge lines, centrelines or turning guide lines, should continue through a crosswalk area.

(ii) **Limit lines:** Limit lines at a Signalised Pedestrian Crossings shall be located at least 6.0 m clear of the nearest crosswalk line, but not less than 10 m in advance of the secondary signal. The primary traffic signal should be located as close as possible to the limit line.

Limit lines should be marked as defined in Section 3.06

(iii) **No-stopping lines:** No-stopping lines, as defined in Section 2.11, should be marked in advance of signalised mid-block pedestrian crossings to ensure signal conspicuity.

(iv) **Lane lines:** On multi lane roads, lane lines should be marked as defined in Sections 2.02 and 3.04.



**TYPICAL PEDESTRIAN CROSSING
WITH KERB EXTENSIONS**

FIGURE 4.4

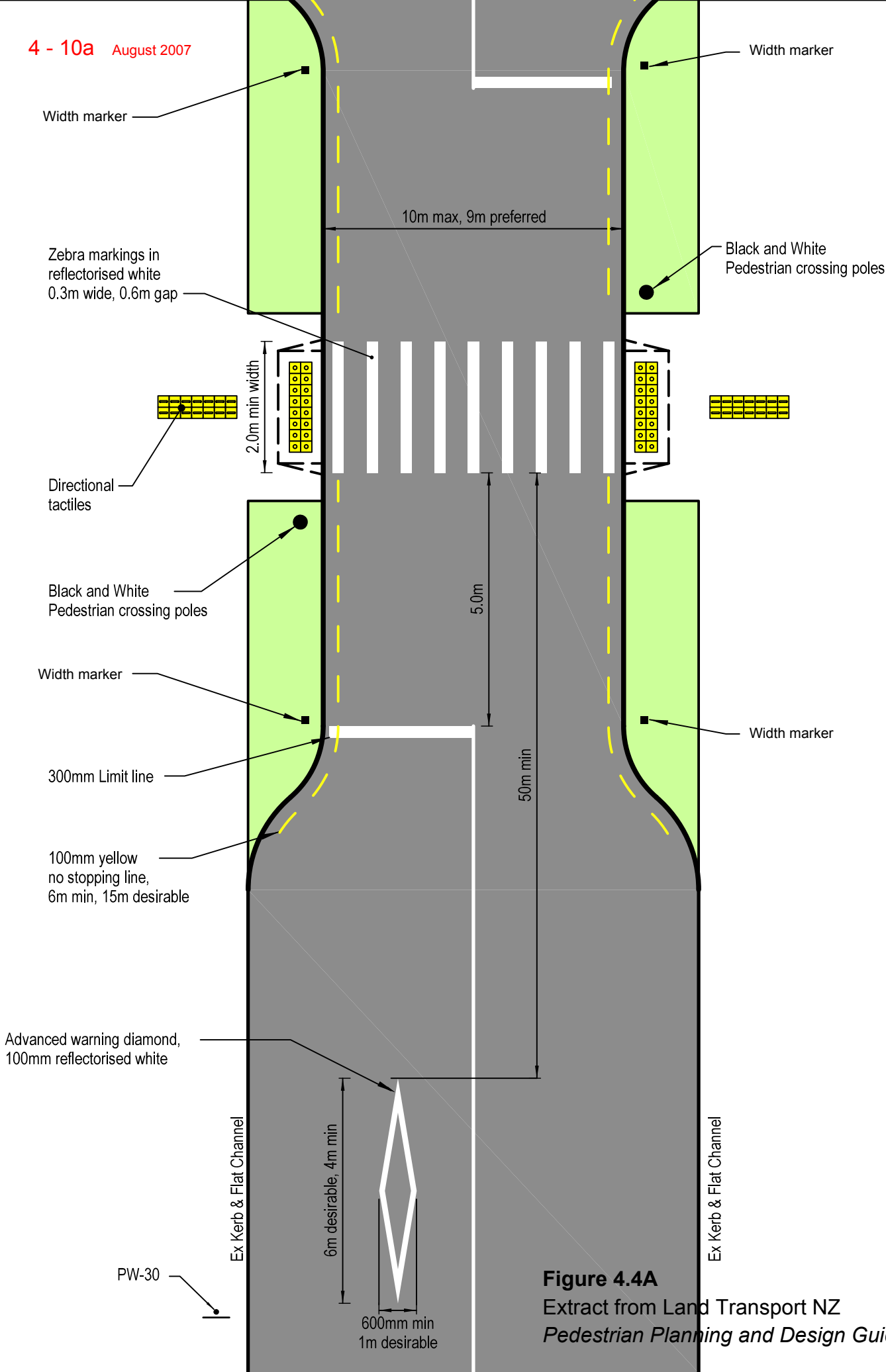
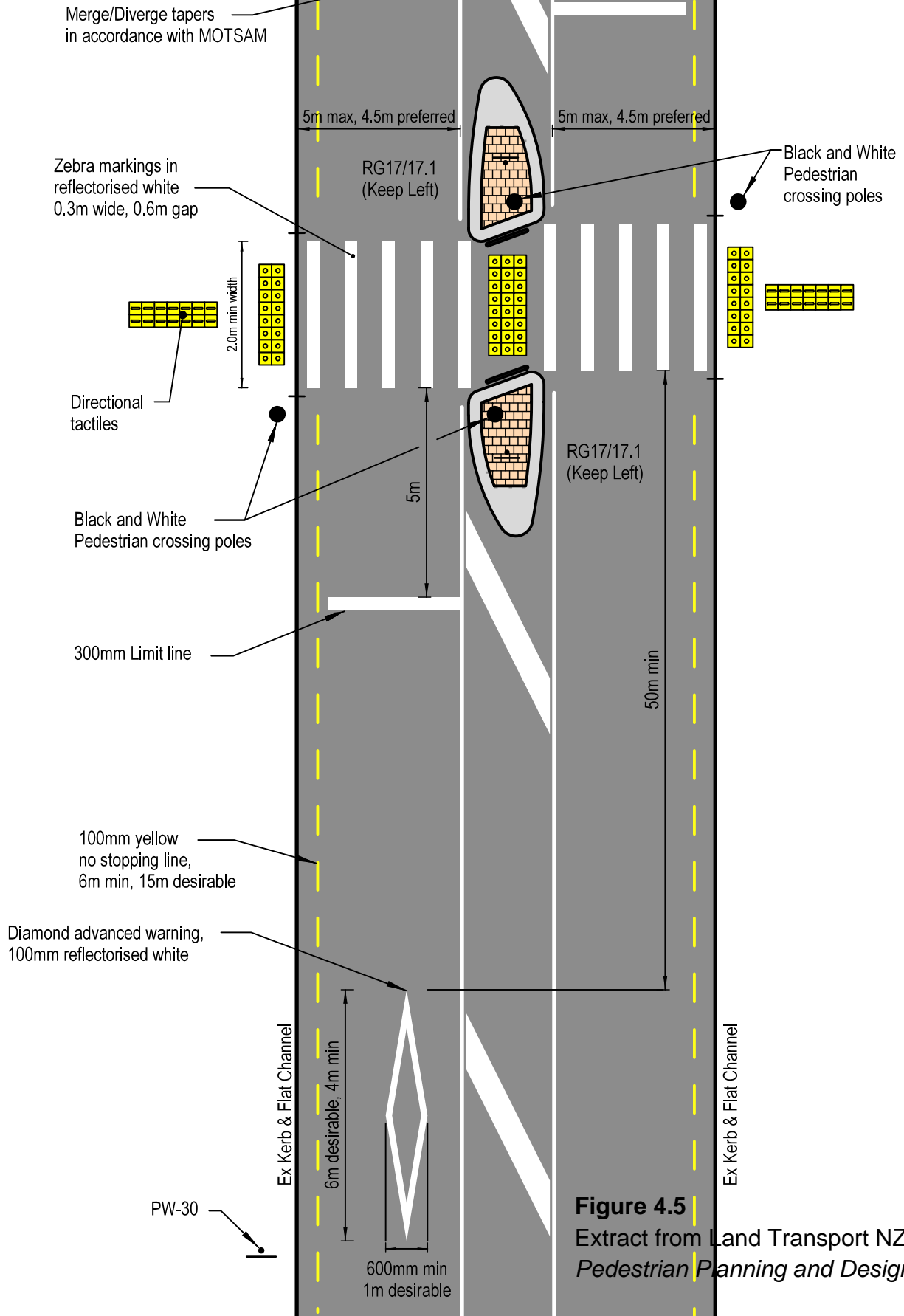


Figure 4.4A
Extract from Land Transport NZ
Pedestrian Planning and Design Guide



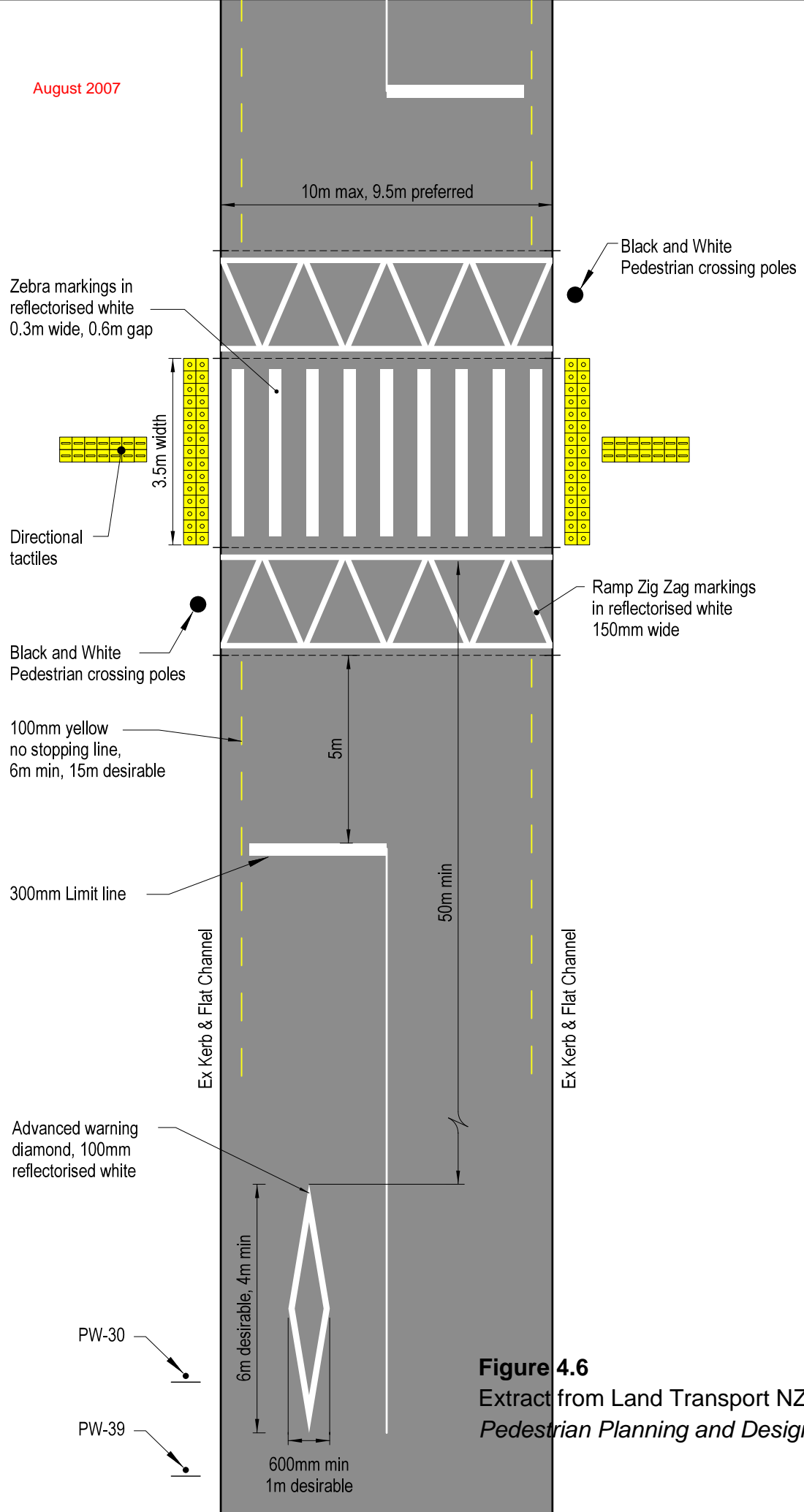
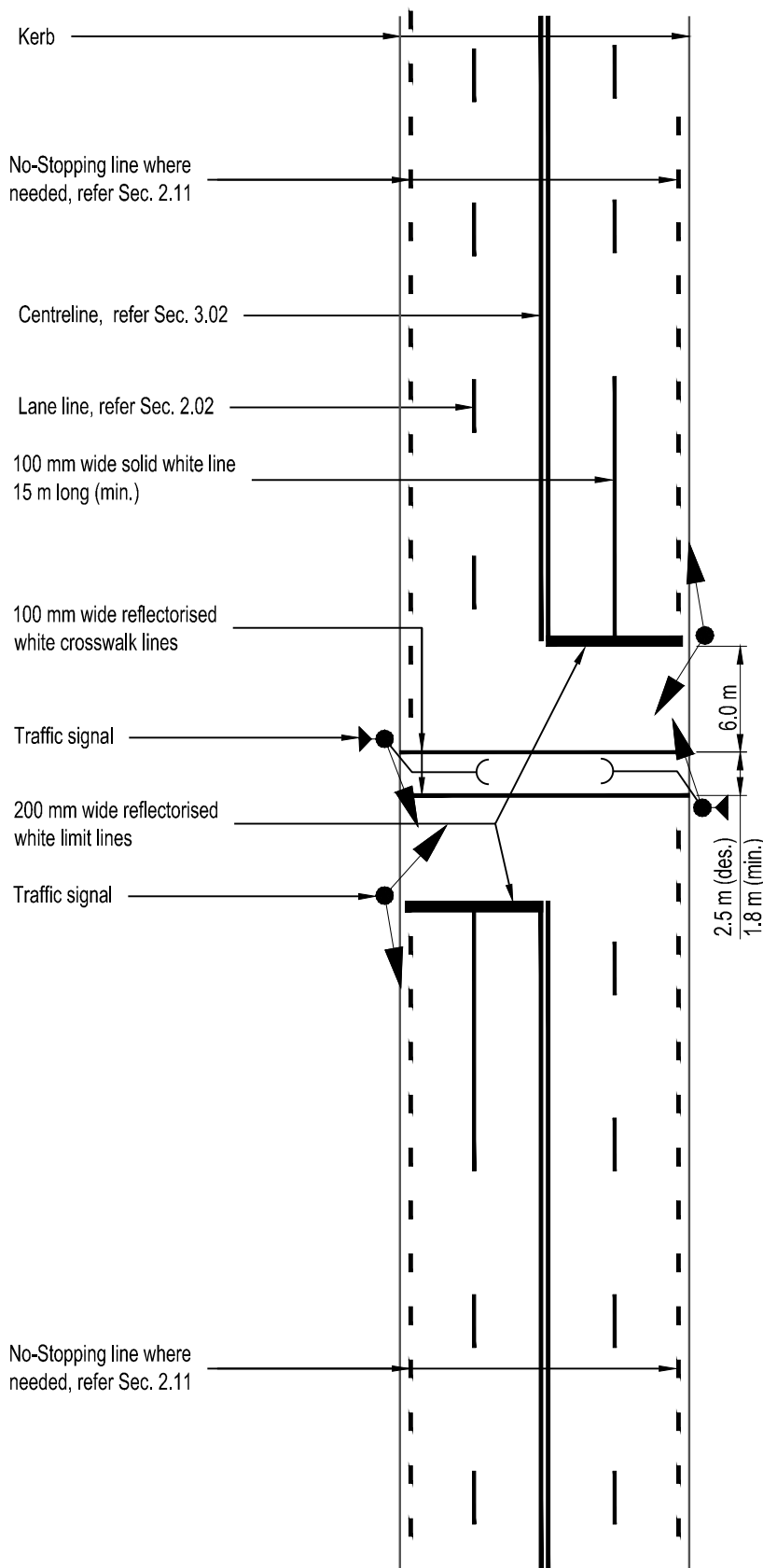


Figure 4.6
Extract from Land Transport NZ
Pedestrian Planning and Design Guide



**MARKINGS FOR PEDESTRIAN CROSSINGS
SIGNALISED MID-BLOCK CROSSING**

FIGURE 4.7

4.03 RAILWAY LEVEL CROSSINGS

This section has been replaced with Part 9 of the Traffic Control Devices Manual

which can be viewed at

<http://www.landtransport.govt.nz/tcd-manual/part-9/docs/09-level-crossings.pdf>

As a result, pages 4 - 15 to 4 - 30 have been deleted from this section.

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4.04 FLASHING RED (AND TEMPORARY) SIGNALS

4.04.01 GENERAL

(a) Legislation:

Refer to the *Land Transport Rule: Traffic Control Devices 2004*.

(b) Application:

Flashing traffic red signals may be used at fire stations, airfield runways and other locations where traffic may be required to stop for special occurrences.

Wherever the road surface permits, it is desirable to provide special markings on the approaches to flashing red signals. These special markings are specified below.

Refer to Figure 4.22 for the markings required on the approaches to flashing red traffic signals. Note that these markings also apply to temporary traffic signal controls.

PW - 3 advance warning signs for traffic signals should be erected in conjunction with flashing red signals, refer to PART I of this manual.

Where appropriate, PW - 49 FIRE STATION and PW - 51 AIRCRAFT advance warning signs should also be erected in advance of the PW - 3 TRAFFIC SIGNAL signs.

4.04.02 CENTRELINES

Centrelines on the approaches to flashing red traffic signals should be marked as follows:

Colour	:	White
Width	:	100 mm
Stripe	:	Continuous
Length	:	50 m rural, 30 m urban.

4.04.03 LIMIT LINES

All flashing red traffic signal installations shall have limit lines as detailed in Section 3.06.

Limit lines at flashing traffic red signals shall be located:

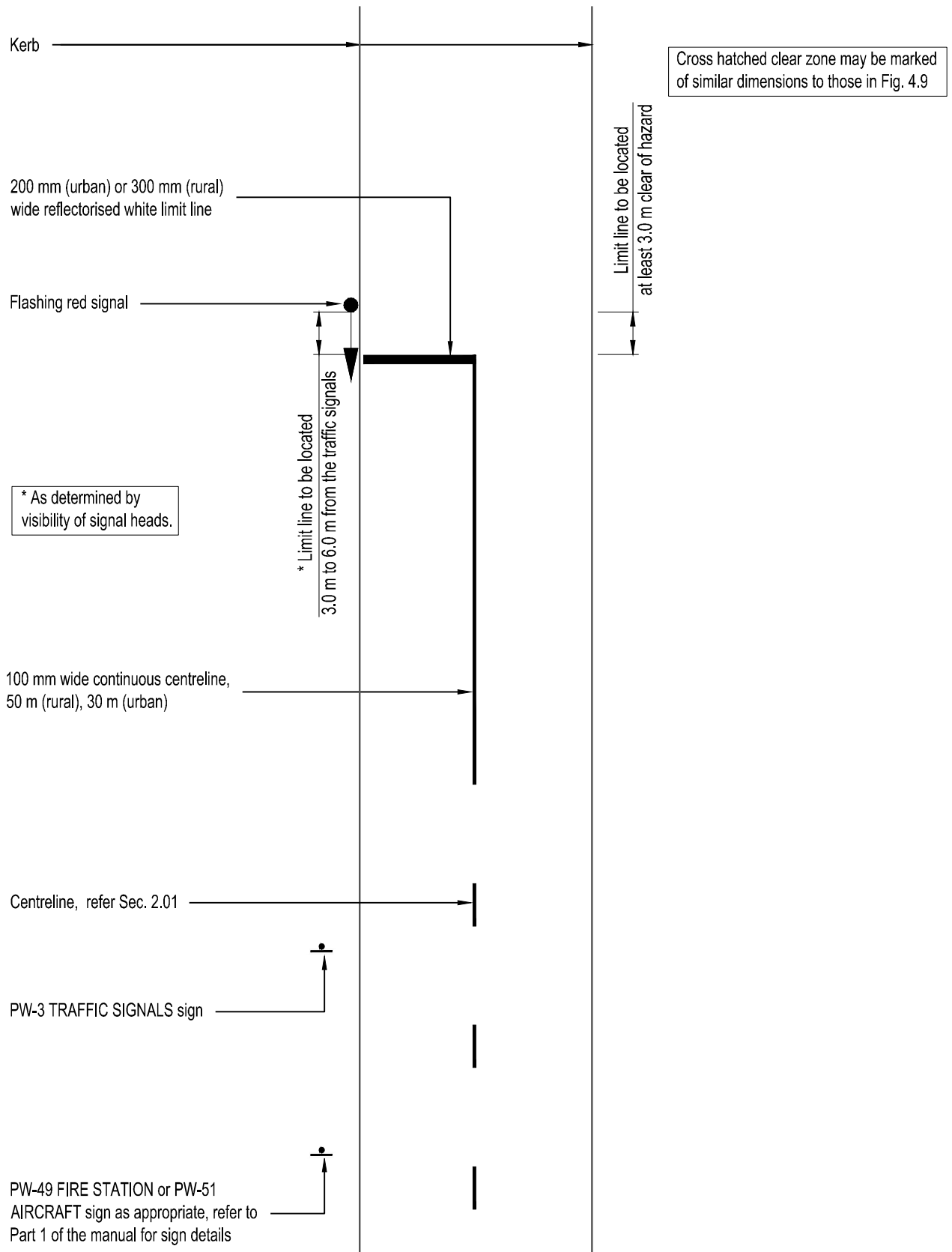
- (a) a minimum of 3 m clear of the line of the hazard, and
- (b) within 3 m to 6 m of the traffic signal.

4.04.04 CROSS HATCHING (Clear Zones)

In situations where exits for emergency vehicles may be blocked by queuing traffic, a cross-hatched clear zone similar to the one shown in Figure 4.21 may be marked.

It is not recommended that cross-hatched clear zones be marked on multi lane roads.

FLASHING RED (AND TEMPORARY) TRAFFIC SIGNALS



**MARKINGS FOR APPROACHES TO FLASHING RED
(AND TEMPORARY) TRAFFIC SIGNALS FIGURE 4.22**

4.05 ONE-LANE BRIDGES

4.05.01 GENERAL

Wherever the road surface permits centreline, edge line and holding line markings should be provided on the approaches to one-lane bridges, as well as special delineation. These are described below.

Refer to Figures 4.23 and 5.6 and Section 5.02: Hazards Adjacent to the Roadway.

4.05.02 EDGE LINES

Sealed carriageways forming the approaches to one-lane bridges shall have edge lines marked in the following manner:

Colour	:	White
Width	:	100 mm, refer to Section 2.03
Stripe	:	Continuous
Length	:	50 m minimum.

The edge lines shall form a taper on the sealed carriageway approach to a one-lane bridge, from the edges of seal or edge lines to the bridge carriageway width. Edge lines should normally terminate just clear of the kerbs at the ends of one-lane bridges but they may be continued over a bridge when there is sufficient width to effectively mark and maintain the lines.

4.05.03 CENTRELINES

Continuous centrelines should be marked on the sealed carriageway approaches to one-lane bridges only when the entry/departure carriageways are marked as two-lane two-way roads.

Centrelines should be marked as follows:

Colour	:	White
Width	:	100 mm
Stripe	:	Continuous
Length	:	Minimum: 20 m
	Desirable:	30 m in urban areas, and 50 m in rural areas.

A centreline shall be marked from the point where the width of the approach road carriageway is at least 5.0 m, and desirably 6.0 m, to allow opposing traffic to pass.

4.05.04 HOLDING LINES

Where a two-lane two-way sealed approach to a one-lane bridge is controlled by RG - 19 and RG - 19.1 "GIVE WAY" signs it should be marked with a single white holding line.

The holding line is only to indicate where vehicles should stop when giving way and has no legal significance.

The holding line should be marked as follows:

Refer to Section 3.06.04.

Colour	:	Reflectorised White
Width	:	200 mm in urban areas, and 300 mm in rural areas
Stripe	:	Continuous.

The holding line shall be marked at the point where the width of the approach road carriageway is at least 5.0 m, and desirably 6.0 m, to allow opposing traffic to pass.

Holding lines on sharply curved bridge approaches should be located by the swept path requirements of vehicles likely to be using the road rather than the carriageway width requirements noted above.

4.05.05 PAVEMENT MESSAGES

The words "ONE", "LANE" and "BRIDGE" should be marked on sealed carriageway approaches to one-lane bridges.

Refer to Figure 4.23 for the arrangement of the pavement message.

Refer to Section 4.01 for letter proportions.

Colour	:	Reflectorised white
Height	:	2.4 m in urban areas, and 3.6 m in rural areas
Location	:	"BRIDGE" 10 m max. after the RG - 19 SINGLE LANE - GIVE WAY or RG - 20 SINGLE LANE - PRIORITY warning sign, "LANE" 25 m after "BRIDGE", and "ONE" 25 m after "LANE".

4.05.06 TRAFFIC SIGNS

The location of traffic signs approaching one-lane bridges are shown on Figure 4.23.

Refer to PART I of this manual for the specific layout details for each sign.

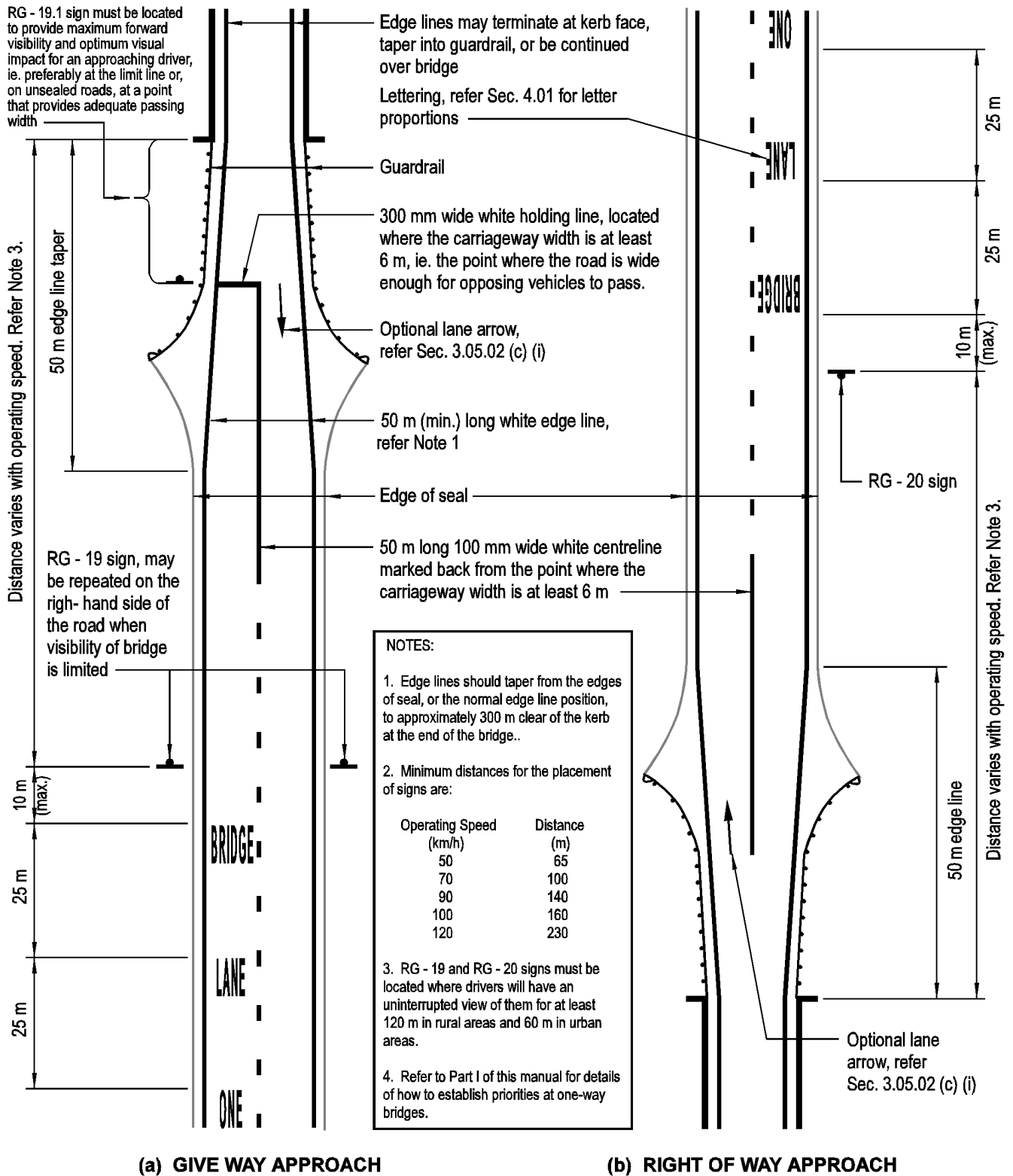
4.05.07 DELINEATION

Refer to Section 5.02 for the application of delineators and hazard markers on the approaches to one-lane bridges.

4.05.08 LANE ARROWS

A single straight-ahead arrow may be used on the departure side of a one-lane bridge to remind drivers that they should drive on the left.

Care must be taken when locating the straight-ahead lane arrow near an intersection to ensure that the arrow does not mislead



Correction: Dimension shown in Note 1 above should read 300 mm.

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4.06 RAISED PAVEMENT MARKERS

4.06.01 GENERAL

- (a) The *Land Transport Rule: Traffic Control Devices 2004* specifies permitted colours and uses of raised pavement markers and requires the removal of non-complying ones by 30 June 2009.

Raised pavement markers must be white or yellow or:

- blue if used to mark the presence of a fire hydrant (refer to section 4.07);
- red if used to mark the left hand side of the road;
- green if used to mark the presence of a culvert or other drain under the roadway.

(b) Reflective Raised Pavement Markers:

Reflective Raised Pavement Markers (RRPM's) may be used as an enhancement to the appropriate line marking on coarse textured surfaces such as chip seal, or in conjunction with non-reflective ceramic raised pavement markers on fine textured surfaces such as asphaltic and cement concrete.

RRPM's for lane lines and edge lines shall be mono directional.

RRPM's for centrelines and borders of flush medians shall be bi-directional.

(c) Ceramic Raised Pavement Markers:

Ceramic raised pavement markers (RPM's) are used because of their resistance to wear. They are only installed on fine textured road surfaces however and are not necessary, or practical, on roads with coarse textured surfacing.

(d) Internally Illuminated Pavement Markers:

In special circumstances, such as tunnels or where centrally located end terminals are particularly at risk, mains or solar powered pavement markers may be considered in lieu of RRPMs. For state highway sites, proposals should be discussed first with Transit's Traffic & Safety Manager.

4.06.02 CONSTRUCTION AND INSTALLATION OF RAISED PAVEMENT MARKERS

The construction of RPM's shall conform to Transit New Zealand Specification *M/12* and *M/12 Notes for Reflective and Non-reflective Traffic Lane Markers*.

The installation of RPM's shall conform to Transit New Zealand Specification *P/14* and *P/12 Notes for Installation of Raised Pavement Markers*.

Ceramic pavement markers shall be white, domed and have a circular base of 100 mm nominal diameter.

Refer to MOT/TNZ *RTS 5: Guidelines For Rural Road Marking and Delineation* for the recommended positioning of RRPM's on rural roads.

4.06.03 CENTRELINES

(a) Roads with Fine Textured Surfaces:

On two-lane roads with fine textured surfaces, white centreline markings **may** be replaced with RPM's according to the patterns detailed below:

Refer to Figure 4.24

- (i) **Lit Urban and Rural Roads:** RPM's shall be set in groups of four at 10 m intervals with 1 m spacing between individual markers in each group.
- Three RPM's shall be non-reflective and the fourth, a reflective marker, shall be located in the second or third position in the group. (Nominally every 10 m)
- (ii) **Unlit Rural Roads:** Markers shall be set in groups of four at 10 m intervals with 1 m spacing between individual markers in each group.
- Groups should alternate between:
- 1 Four non-reflective markers, and
 - 2 Three non-reflective markers and one reflective marker. The reflective marker should be located in the second or third position in the group, to give a nominal 20 m RRPM spacing.
- (iii) **Multi Lane Roads:** Where sections of multi lane undivided road are surfaced with fine textured asphalt, and the centreline is marked with double yellow lines, yellow reflective markers should be installed as detailed in Section 4.06.05.

(b) Roads not marked as specified above:

RRPM's accompanying white marked urban and rural centrelines shall show the following reflective face pattern:

Refer to Figure 4.25.

Colour	:	White reflective faces
Orientation	:	Bi-directional
Spacing	:	Nominal 20 m
Location	:	Central in every second gap between centreline stripes.

In urban areas RRPM spacing may be reduced to 10 m and they will be located between each centreline stripe.

The pattern of RRPM's shall not be interrupted except where centrelines are terminated at intersections and on tight curves.

On tight alignments, the spacing between RRPM's may be reduced to a minimum of 10 m and arranged so that at least 3 consecutive markers are always visible to approaching drivers.

At intersections, RRPM's shall be placed at the intersection end of each solid centreline. RRPM's shall also be placed at equal intervals, not exceeding 20 m, along the full length of solid centrelines.

4.06.04 LANE LINES

(a) Roads with Fine Textured Surfaces:

On multi lane roads with fine textured surfaces, white lane line markings may be replaced with RPM's in the following patterns:

Refer to Figure 4.24.

- (i) **Lit Urban and Rural roads:** RPM's shall be set in groups of four at 10 m intervals with 1 m spacing between individual markers in each group.

The first RPM shall be a reflective marker, to give a nominal 10 m RRPM spacing, followed by three non-reflective RPM's.

- (ii) **Unlit Rural roads:** RPM's shall be set in groups of four at 10 m intervals, with 1 m spacing between individual markers in each group.

Groups should alternate between:

- 1 Four non-reflective markers, and
- 2 Three non-reflective markers and one reflective marker. The reflective marker should be located in the first position in the group, to give a nominal 20 m RRPM spacing.

(b) Roads not marked as specified above:

The arrangement of RRPM's accompanying white marked lane lines in urban and rural areas shall show the following reflective face pattern:

Refer to Figure 4.25.

Colour	:	White reflective faces
Orientation	:	Mono-directional
Spacing	:	Nominal 10 m
Location	:	Within 100mm before the leading end of each lane line stripe

When this arrangement is used on motorways/expressways, the lane line markings should be profiled.

The patterns of RRPM's shall not be interrupted except where lane lines are terminated at intersections.

At intersections, RRPM's shall be placed at the intersection end of each solid lane line approaching an intersection, including auxiliary lane lines when appropriate. RRPM's shall also be placed at equal intervals, not exceeding 20 m, on solid lane lines, to suit the location of the first (or last) marker on the preceding lane line.

4.06.05 NO-OVERTAKING LINES

(a) Roads with Fine Textured Surfaces:

Non reflective RPMs shall not be used to indicate no-overtaking lines.

No-overtaking lines on roads with fine textured surfaces shall be supplemented with Type A RRPM's in the manner described for roads with coarse textured surfaces.

(b) Roads with Coarse Textured Surfaces:

The arrangement of reflective raised pavement markers accompanying no-overtaking lines in urban and rural areas shall show the following reflective face patterns:

Refer to Figure 4.25

(i) No-overtaking Lines:

Colour	:	Yellow reflective faces
Orientation	:	Mono-directional if no-overtaking applies to traffic in one direction only, and Bi-directional if no-overtaking applies to traffic in both directions.
Spacing	:	10 m
Location	:	In the gap between centreline and no-overtaking line or between two no-overtaking lines.

(ii) No-overtaking Advance Warning Lines:

Colour	:	Yellow reflective faces
Orientation	:	Mono-directional if the no-overtaking restriction applies to traffic in one direction only, and Bi-directional if no-overtaking applies to traffic in both directions.
Spacing	:	Nominal 20 m
Location	:	Central in every gap between the painted advance warning line stripes.

The pattern of RRPM's shall not be interrupted except where no-overtaking markings are stopped at intersections.

A RRPM shall be placed on the end of each no-overtaking line at intersections.

4.06.06 EDGE LINES

(a) Rural Roads (Left Hand Edge Lines):

Along unlit corridors where there is a proven need for better route guidance, the left hand edgeline may be supplemented with red reflective pavement markers.

Red RRPM's may also be used for edge line delineation when:

- (i) normal roadside delineation cannot be achieved, eg. roads with lay-by areas or with environmental constraints that make it impossible to install normal roadside delineators,
- (ii) there is a proven accident blackspot or route that requires additional night time edge delineation,
- (iii) there are abrupt transitions in sealed road width that may constitute a hazard - refer to MOT/TNZ RTS 5: *Guidelines for Rural Road Marking and Delineation* Section 6.1.3, and
- (iv) an improvement to the delineation of the outside of a right hand curve at intersections is deemed necessary.

The arrangement of red RRPM's used in conjunction with rural white painted edge lines should show the following reflective face pattern:

Colour	:	Red reflective faces
Orientation	:	Mono-directional
Spacing	:	20 m *
Location	:	Within, or immediately to the left of a continuous edge line**.

* *The spacing of red RRPM's may be reduced to suit specific site requirements in the following manner:*

- 1 *a minimum of 3 markers should always be visible to drivers on tight bends with limited visibility, and*
- 2 *RRPM's may be installed between alternate continuity line stripes on the outside of right hand bends at intersections, if an improvement to delineation is deemed necessary.*

(b) Raised Median or Median Barrier Edge Lines:

Along unlit corridors where either a raised median or a median barrier is installed, the edge lines adjacent to that facility should be supplemented with yellow reflective pavement markers arranged as follows:

Colour	:	Yellow reflective faces
Orientation	:	Mono-directional
Spacing	:	10 m
Location	:	Within, or immediately to the right of the continuous edge line.

(c) Urban Roads:

Red RRPM's may be used in urban areas as follows:

(i) In Advance of Kerb Extensions:

Six red mono-directional red RRPM's at 5m intervals beside the approach edge line. The last RRPM shall be located adjacent to the kerb extension.

Refer to Section 3.12.09 for the placement of red RRPM's on the approaches to kerb extensions at roundabouts.

(ii) Urban Arterial Roads:

Red RRPM's may be used on urban arterial roads where street lighting is deemed to be inadequate and where there are a proven, or potential, accident hazards due to poor delineation of a road edges.

(iii) Transitions in Road Width:

Red RRPM's may be used where there are abrupt transitions in road width that may constitute a hazard. Refer to Section 4.05: One-lane Bridges and MOT/TNZ RTS 5: *Guidelines for Rural Road Marking and Delineation, Section 6.1.3.*

The arrangement of Type A red RRPM's accompanying white painted edge lines in urban areas should show the following reflective face pattern:

Colour	:	Red reflective faces
Orientation	:	Mono-directional
Spacing	:	Nominal 20 m
Location	:	Within, or immediately to the left of a continuous edge line**.

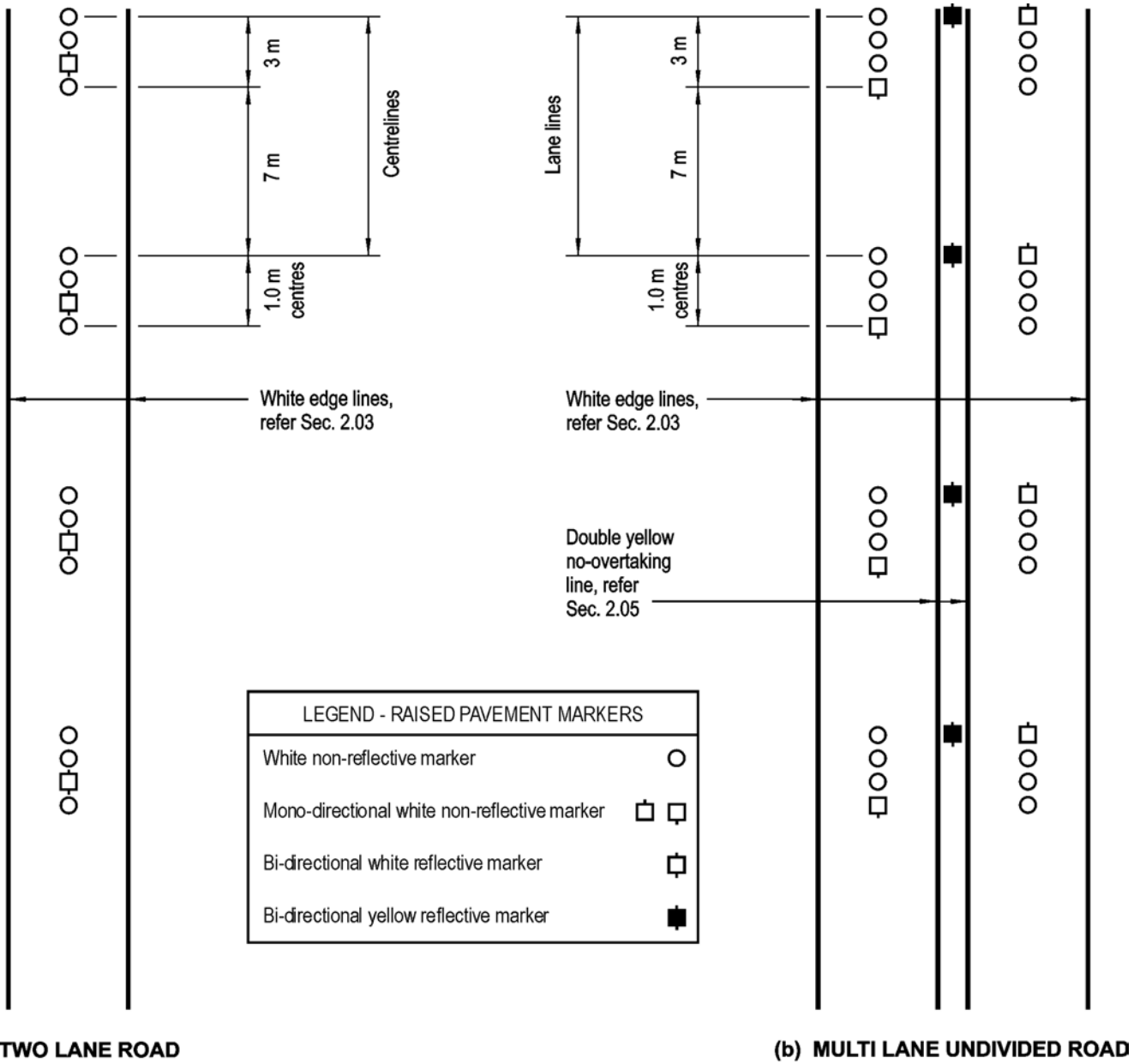
4.06.07 FLUSH MEDIANS

Refer to Sections 2.09 and 3.17 for details of markings for flush medians.

The placement of RRPM's on flush medians should be as shown in Figure 2.10 and as defined below:

- (a) **Only white RRPM's should be used on flush medians.**
- (b) The minimum spacing of RRPM's on border lines is 10 metres.
- (c) The minimum spacing of RRPM's on diagonal bars is 20 metres.
- (d) Where the bar spacing is less than 10 m, central RRPM's should be located on every third diagonal bar. The border line RRPM's should be located midway between each third bar, refer to Figure 2.10 (c).
- (e) RRPM's shall be laid at least 50 mm clear of an adjacent paint or thermoplastic marking.

****Note:** The needs of cyclists must be considered when RRPM's are installed at edge lines, especially if the sealed shoulder is narrower than about 1.2 metres.

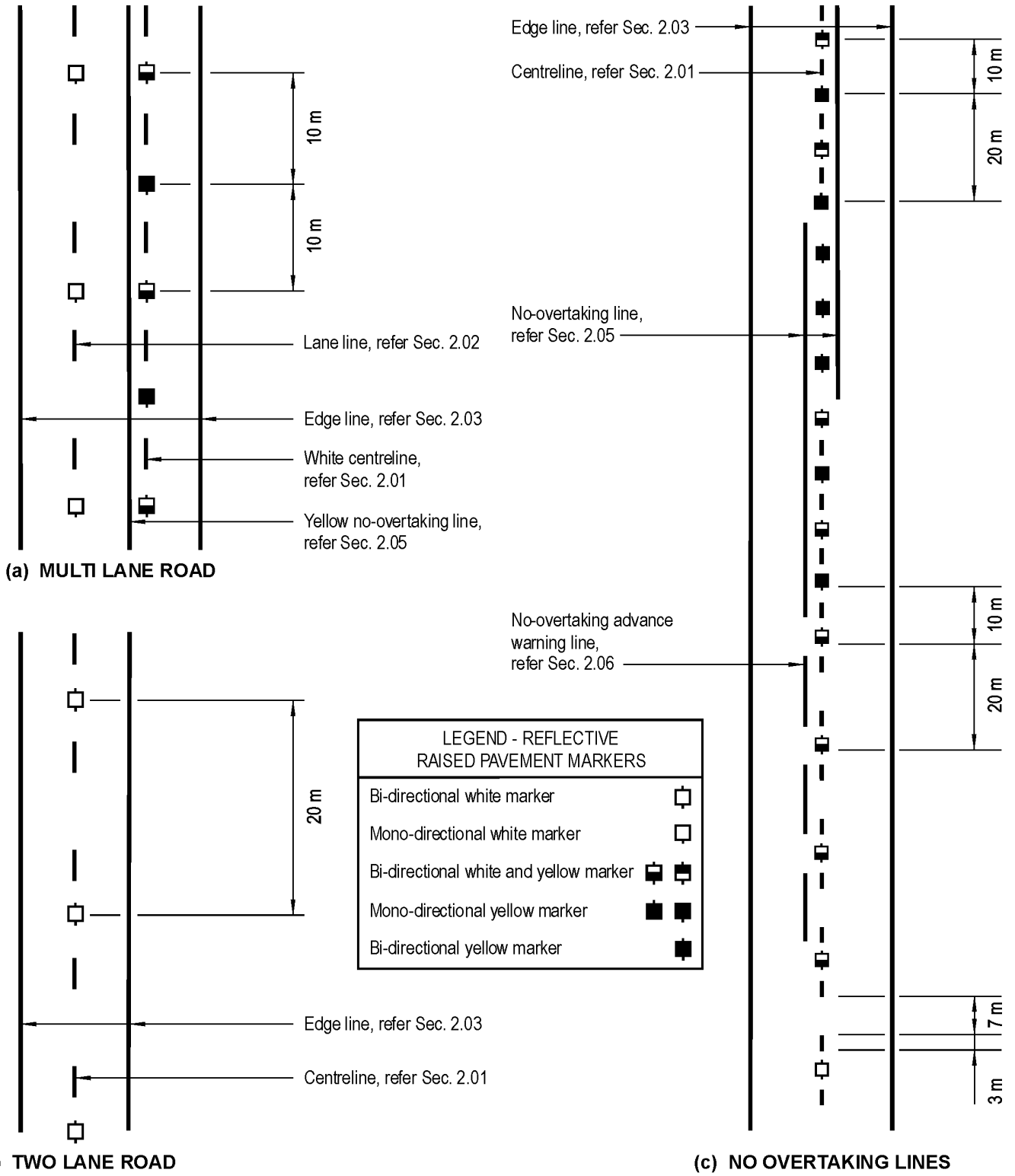


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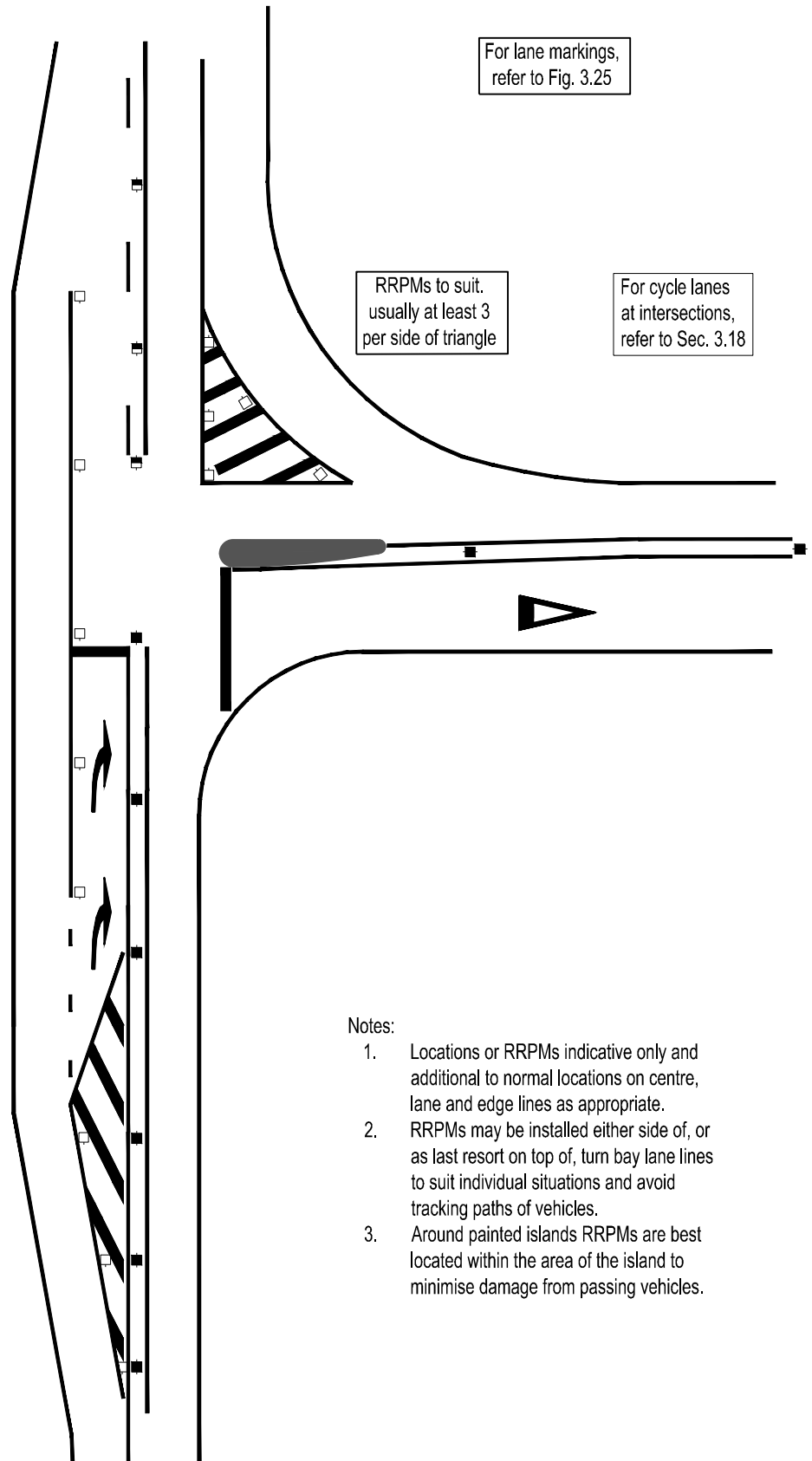
1. The diagrams above apply where the speed limit is 70 km/h or less and street lighting is installed.
2. Where the speed limit is > 70 km/h, and street lighting is not installed, every second group of lane line markers may consist of four non-reflective markers.

FIGURE 4.24

RAISED PAVEMENT MARKER LAYOUTS



LEGEND - REFLECTIVE RAISED PAVEMENT MARKERS	
Mono-directional white marker	□
Bi-directional white marker	◻
Bi-directional white and yellow marker	◻
Mono-directional yellow marker	■
Bi-directional yellow marker	◼



Notes:

1. Locations or RRPMs indicative only and additional to normal locations on centre, lane and edge lines as appropriate.
2. RRPMs may be installed either side of, or as last resort on top of, turn bay lane lines to suit individual situations and avoid tracking paths of vehicles.
3. Around painted islands RRPMs are best located within the area of the island to minimise damage from passing vehicles.

RAISED REFLECTIVE PAVEMENT MARKERS FOR RIGHT TURN BAYS
FIGURE 4.25a

4.07 FIRE HYDRANTS

4.07.01 GENERAL

Every local authority is required by law to indicate the position of fire hydrants by conspicuous marks or notices. Further details on this topic are provided in SNZ PAS 4509:2003 *NEW ZEALAND FIRE SERVICE FIRE FIGHTING WATER SUPPLIES CODE OF PRACTICE*

This publicly available specification can be downloaded from the New Zealand Fire Service website at: http://www.fire.org.nz/download/CoPWater_web.pdf

4.07.02 YELLOW TRIANGULAR MARKING

Yellow isosceles triangles are used to indicate the proximity of fire hydrants.

Refer to Figure 4.26.

A yellow isosceles triangle to indicate a fire hydrant shall be marked close to the road centreline with its base parallel to the centreline or median, and its apex pointing towards the hydrant.

Solid triangles shall be marked to indicate normal hydrants.

Open triangles, with 100 mm wide borders, shall be marked to indicate ball type hydrants.

4.07.03 BLUE RRPM's

Blue RRPM's may be used to enhance the night time identification of fire hydrant locations.

Where blue RRPM's they are used they must:

- the be located close to, and on the fire hydrant side of, the centre of the roadway, and
- at, or near, the base of any yellow triangle marked on the surface.

4.07.03 YELLOW CIRCULAR CLEARANCE MARKING

Yellow rings shall be marked on the road surface around a fire hydrant box.

Refer to Figure 4.26.

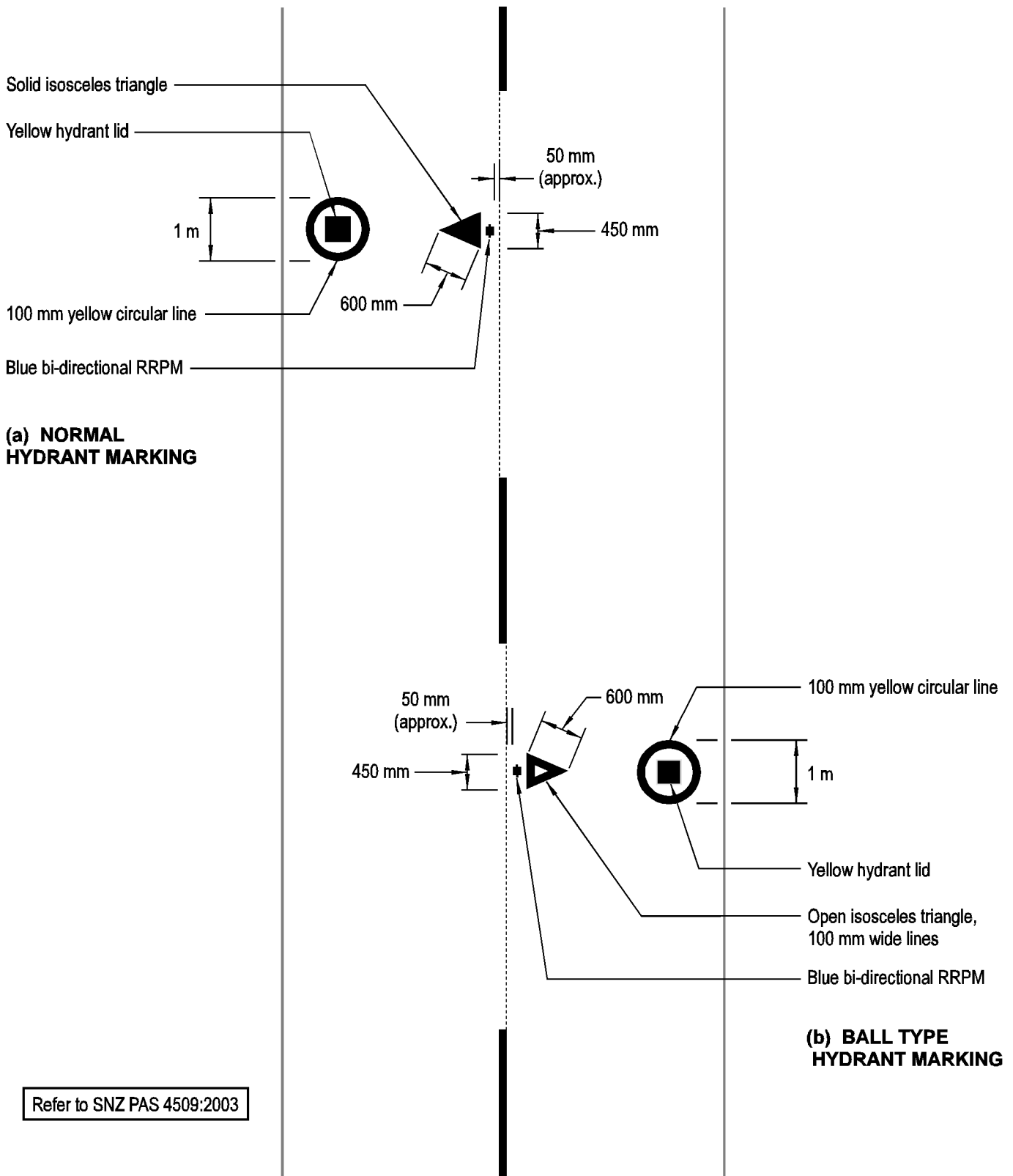
A yellow ring to mark a fire hydrant box shall have a minimum diameter of 1 m and a border width of approximately 100 mm.

The lids or surrounds of boxes containing fire hydrants shall also be marked yellow, irrespective of whether the road is sealed or not.

4.07A CULVERTS

4.07.04 GENERAL

The *Land Transport Rule: Traffic Control Devices 2004* permits the use of green raised pavement markers installed on, or just to the left of, the centre-line of the roadway and used only to mark the presence of a culvert or other drain under the roadway.



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4.08 AUDIO TACTILE PROFILED LINE MARKING

4.08.01 GENERAL

Audio Tactile Profiled (ATP) line marking, sometimes referred to as Rumble Strips, is a long life marking which has raised ribs or mounds oriented perpendicular to the direction of travel and spaced at regular intervals along it. If a driver strays from the traffic lane and runs over an ATP marking it will provide an audible and tactile warning.

Longitudinal ATP line markings can be used to:

- Warn drivers who are suffering the effects of fatigue,
- Reduce run-off-the-road crashes,
- Reduce head-on crashes particularly where used on no-overtaking lines, and
- Improve lane discipline.

ATP line markings are not appropriate for use in transverse situations.

The noise and vibration produced by vehicles travelling on an ATP line marking is highly dependant on vehicle type, travel speed, rib height and the spacing between ribs. The optimum ATP line dimensions have been determined by practical experiments and have proved to be suitable for use in most situations.

The raised ribs of ATP line markings project above surface water on the road. This improves line delineation in wet conditions and when installed in accordance with NZTA specification P30 also renders them more visible on wet nights. Profiled edge-line markings can also provide additional wear protection for both the shoulder and edge of seal.

ATP line markings can also provide increased safety for vulnerable road users, both cyclists and pedestrians, by providing a dividing and audible barrier line between the shoulder and the adjacent traffic lane.

Normally ATP line markings are appropriate only for use on rural arterials and on motorways and expressways (but noting the comments in 4.08.06(e) around noise issues). The following sections describe their use.

4.08.02 ATP EDGE LINES

(a) Application:

Refer to Section 2.03 of this manual for standard edge line marking details.

ATP edge line markings may replace or supplement standard edge line markings on sections of road where:

- Traffic volumes are high, and/or
- There is a significant number of road crashes in which fatigue or driver inattention is identified as a factor, and/or
- There are specific site problems such as poor visibility, frequent heavy rain fall, a night time crash history, etc

As run-off-the-road crashes resulting from fatigue or other things can occur in any location along a route, particularly where driver demand is low, ATP edge lines should be installed as a corridor treatment rather than at isolated sites.

ATP edge lines may be used alongside road-side or median barriers when part of a treatment for that corridor.

Refer to section 4.08.06 below for guidance about the discontinuation of ATP edge lines at intersections and major access-ways.

(b) Configuration:

ATP edge line markings should conform to the following dimensions:

ATP Edge Line Markings

Colour : Reflectorised white

Width : 150 mm minimum

Profile : In accordance with NZTA M24 Specification for Audio Tactile Profiled Roadmarkings and M24 Notes including type approvals.

The ribs may be laid either on top of, overlapping, or to the outside of the normal edge line.

4.08.03 ATP LANE LINES

(a) Application

Refer to Section 2.02 of this manual for standard lane line marking details.

ATP lane lines are normally only used on motorways and expressways, but they could be used elsewhere when clearly justified. Refer to the Traffic Control Devices Manual Part 10 for further details.

(b) Configuration

ATP lane line markings should conform to the following dimensions:

ATP Lane Line Markings

Colour : Reflectorised white

Width : 100 mm minimum

Profile : In accordance with NZTA M24 Specification for Audio Tactile Profiled Roadmarkings and M24 Notes including type approvals.

4.08.04 ATP CENTRE LINES

(a) Application

Refer to Section 2.01 of this manual for standard centre line marking details.

*Profiled centre lines may be used in similar situations to those described in Section 4.08.02 for profiled edge lines. They should not be installed on a section of road unless profiled edge lines are also installed there.

(b) Configuration

ATP centre line markings should conform to the following dimensions:

ATP Centre Line Markings

Colour : Reflectorised white

Width : 150 mm min, 200 mm desirable

Profile : In accordance with NZTA M24 Specification for Audio Tactile Profiled Roadmarkings and M24 Notes including type approvals.

The ribs should be laid over the top of the normal centre line with the ribs visibly extending into the traffic lane by at least 25 mm.

4.08.05 ATP NO-OVERTAKING LINES

(a) Application

Refer to Section 2.05 of this manual for standard no-overtaking line marking details.

Profiled no-overtaking lines may be used instead of standard ones:

- Where profiled centre lines are installed;
- In similar situations to those described in Section 4.08.02 for profiled edge lines.

(b) Configuration

ATP no-overtaking line markings should conform to the following dimensions:

ATP No-overtaking Line Markings and Pre-warning markings

Colour : Reflectorised yellow

Width : 100 mm min, 150 mm desirable

Profile : In accordance with NZTA M24 Specification for Audio Tactile Profiled Roadmarkings and M24 Notes including type approvals.

The ribs should be laid over the top of the normal no-overtaking line with the ribs visibly extending into the traffic lane by at least 25 mm.

4.08.06 GUIDELINES FOR USE

(a) General

- Refer to NZTA Specifications M24 and P30 and their Notes for full details;
- ATP line markings should be treated as a system and normally applied continuously along a route, except as noted below;
- *Consideration should be given to treating edge lines, lane lines and centre lines on routes where traffic volumes and crash history are such that the economics warrant it;
- Generally it is wise to omit the use of ATP line markings in particularly high wear areas such as the outside of bends on tightly winding roads, unless generous lane widths exist.

* The approval of the National Traffic & Safety Manager is required before ATP markings may be installed on State Highway centre lines.

(b) Dimensions

- The profiled ribs should normally be placed on top of, overlapping or alongside the flat or structured marking and protruding at least 25 mm but preferably 50 mm beyond it so as to be clearly visible to users of two wheeled vehicles, except that for edge lines the profiled ribs may be installed entirely on the shoulder side of the marking;
- Lane widths between profiled ribs must never be less than 3.35 metres measured clear space between those ribs;
- ATP edge line markings should be installed continuously across minor access-ways, but discontinued at least 20 metres clear of major access-ways and intersections and their diverge and merge areas;

(c) Cyclists

- Gaps of at least 20 metres must be left in ATP edge lines where-ever cyclists may have a need to cross them, eg on bridge approaches, near narrow shoulders, near intersections or junctions with off-road facilities;
- Shoulder widths clear of ATP edge lines must be a minimum of 1.0 metres to provide for cyclists – this requirement may only be contravened if all cycling interests in the area have been consulted, and agreement is reached with them;
- On very narrow roads without shoulders, but where ATP edge lines would provide significant safety benefits, they may be placed hard against the edge of seal where cyclists are unlikely to ride. As above, all cycling interests in the area must be consulted and agreement reached with them.

(d) Drainage

- Drainage gaps should be provided in ATP line markings where they are placed on top of normal raised markings, particularly where the longitudinal road gradient is less than 1% and the pavement cross-fall is towards the marking;
- Drainage gaps should be approximately 100 mm to 150 mm long and spaced at about 10 metre centres.

(e) Noise

- The noise generated by ATP line markings may cause disturbance to residents living in dwellings located close to the road;
- This can be a problem both when installed on urban motorways and expressways and when installed near rural settlements;
- Guidelines are being developed. At present the general consensus is that ATP line markings should not be laid closer than 200 metres from residences or other noise sensitive properties, although this may be reduced to 100 metres where lines are unlikely to be frequently trafficked.
- If complaints arise, consideration must be given to removing the offending ATP lines,

4.08.07

INSTALLATION, MAINTENANCE, & REMOVAL

- Refer to NZTA Specifications M24 and P30 and their Notes for full details of materials, profile designs, reflectivity, skid resistance and performance requirements;
- Special care is required if a ATP line marking must be removed and/or the pavement to which it is applied is in need of maintenance;