SECTION 3

INTERSECTION PAVEMENT MARKINGS

March 2011

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTENTS

CONTENTS

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/

3.01 INTERSECTIONS - GENERAL

3.01.01 GENERAL

On approaches to intersections the standard centreline, edge line, no-overtaking and lane line markings will require special treatment depending on the characteristics of the intersection. Some additional markings are often necessary, these include:

- limit lines,
- continuity lines,
- crosswalk lines,
- lane arrows, and
- pavement messages and symbols.

Intersections with high approach speeds may require different treatment from those with low approach speeds. Likewise, roads with higher traffic volumes or status in the roading hierarchy will be treated differently from those with lower traffic volumes or status in the hierarchy.

3.01.02 ROAD HIERARCHY

Refer to MOT/TNZ *RTS 1: Guidelines for the Implementation of Traffic Control At Crossroads*.

To reflect the importance of a roading hierarchy and driver expectation of route priority, all cross roads shall be controlled by a Give Way sign (Section 3.09) or a Stop sign (Section 3.10), unless some other form of priority control is warranted.

Similarly, it is recommended that all 'T'-intersections on state highways, and arterial or principal roads, are controlled by a Give Way sign (Section 3.09) or a Stop sign (Section 3.10), unless some other form of priority control is warranted.

3.02 CENTRELINES AT INTERSECTIONS

3.02.01 GENERAL

Generally, centrelines on the approaches to intersections should be marked as described in paragraphs 3.02.02 to 3.02.05 below.

Examples of typical centreline markings for various traffic control and intersection configurations are shown in Sections 3.08 to 3.18.

Refer to Section 2.01 for non intersection centreline marking details, including the marking of centrelines on sharp bends and curves.

Refer to Section 2.08 for the marking of centrelines in advance of traffic islands and medians.

3.02.02 RURAL ROADS

Centrelines on the approaches to rural road intersections shall be marked as follows:

Refer to Figure 3.1.

Colour	:	Reflectorised white
Width	:	100 mm
Length	:	50 m
Stripe	:	Continuous

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Centrelines on side roads should terminate 1.5 m clear of the nearest lane or at the limit line.

Centrelines on main roads should have at least a 12 m gap at intersections.

3.02.03 URBAN ROADS

Centrelines on the approaches to urban road intersections shall be marked as follows:

Refer to Figure 3.1

Colour	:	Reflectorised white
Width	:	100 mm
Length	:	30 m
Stripe	:	Continuous

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Side road centrelines should terminate 1.5 m clear of the nearest traffic lane, at the prolongation of the kerb line, or at the limit line.

Centrelines should not normally be marked through intersections. However, where one is necessary to show the normal path of vehicles, thus defining turning and non-turning movements (Ref Land Transport (Road User Rule) 1.6 Interpretation), then it should be marked as described in Section 3.02.05.

Centrelines on main roads should have at least a 12 m gap at intersections.

A solid white centreline may be marked on tight curves where it is impractical to mark a normal broken centreline.

Refer to Section 2.01.02(b) for details of centreline marking on sharp curves.

3.02.04 MULTI LANE ROADS

Centrelines on the approaches to multi lane road intersections should be marked as follows:

Colour	:	Reflectorised yellow
Width	:	Double 100 mm lines 100 mm apart
Length	:	50 m minimum - rural * 30 m minimum - urban *
Stripe	:	Continuous

** A double yellow line may also be used as a continuous centerline over an entire route.*

NOTE: In urban areas a single 150 mm wide reflectorised white line may be used for the centreline of a multi lane road as an alternative to a double yellow line.

Centrelines on side roads should terminate 1.5 m clear of the nearest lane or at the limit line.

Centrelines on main roads should have at least a 12 m gap at the intersection.

3.02.05 CENTRELINES TO ESTABLISH PRIORITY AT INTERSECTIONS

Centrelines to establish route priority, should only be used when the main road through the intersection does not follow a straight line.

NOTE: Where the main road route through an intersection is on a curve with a radius of 100 m, or more, it should be treated as a straight road.

The centreline to establish priority at intersections should be marked as follows:

Refer to Figure 3.1.

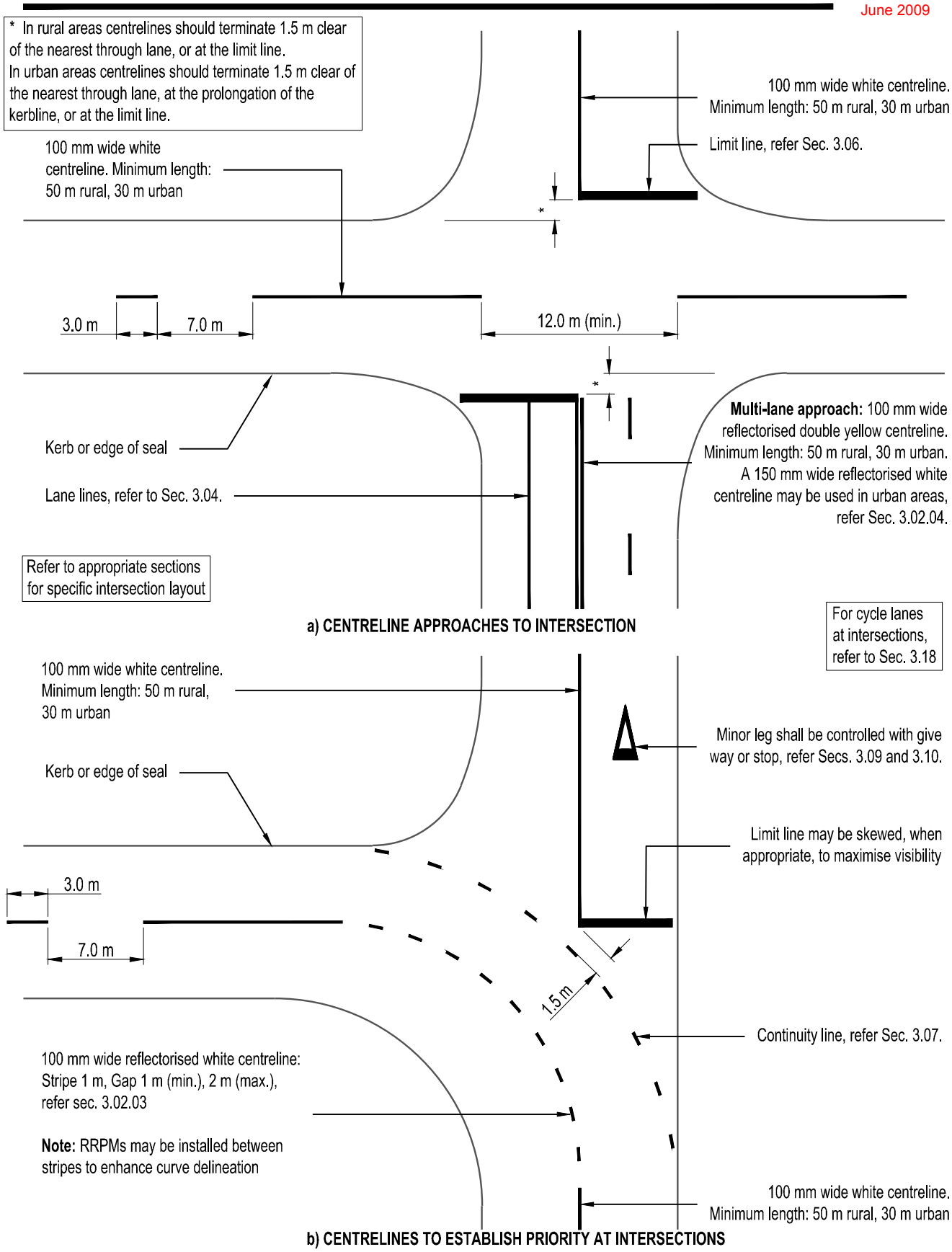
Colour	:	Reflectorised white
Width	:	100 mm
Stripe	:	1 m
Gap	:	1 m (2 m optional)

Raised pavement markers and/or advance warning signs may be used to supplement centreline markings at intersections.

Continuity lines, as described in Section 3.07 may be marked to provide delineation of the edges of the main road through an intersection.

Limit lines may be skewed to maximise visibility for vehicles leaving side roads. Refer to Figure 3.1.

INTERSECTIONS - CENTRELINES



MARKINGS FOR CENTRELINES AT INTERSECTIONS — FIGURE 3.1

3.03 EDGE LINES AT INTERSECTIONS

3.03.01 GENERAL

Refer to Section 2.03 for general information on where edge lines may be used, and also for details on non intersection pavement markings.

It is important that individual road controlling authorities establish consistent guidelines for edge line treatments at intersections appropriate to the needs of their own defined roading hierarchy and individual road environment. Edge line treatments should maintain consistency with national practices.

Refer to the AUSTROADS *Guide to Road Design Part 4A Unsignalised and signalised intersections* and the LTSA/Transit New Zealand *RTS 5: Guidelines for Rural Road Marking and Delineation*.

Typical examples of edge line treatment for various traffic control and intersection configurations are shown in Sections 3.08 to 3.18.

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3.03.02 RURAL ROADS

Rural intersections should provide tapers in and out of all side roads that generate moderate amounts of traffic.

Treatment may vary slightly according to the layout of the intersection.

Refer to Figure 3.2 for typical edge line taper treatments for rural roads.

Colour : Reflectorised white
Width : 100mm
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Stripe : Continuous

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3.03.03 URBAN ROADS

Low to medium volume local and collector roads do not normally require any edge line treatment.

Edge lines on arterial/principal urban roads should taper into side roads, in order to prevent left turning vehicles obstructing traffic in the through lane. Exit tapers from side roads should be tight and marked to reflect the desired merging manoeuver for traffic turning left from the side road.

Edge line treatment is dependent on the intersection layout and may need to be varied slightly to suit each individual intersection.

Edge lines on the approaches to urban intersections should be marked as follows:

Refer to Figure 3.3.

Colour : Reflectorised white
Width : 100 mm
Stripe : Continuous
.

3.03.04 DRIVEWAYS

Edge lines should not be tapered into private or commercial access ways (including service stations, sports clubs and schools) in urban or rural areas.

Activities that generate large volumes of turning traffic such as shopping mall and supermarket carparks, may at the discretion of the road controlling authority warrant full intersection treatment including full edge line tapers, right turn bays etc.

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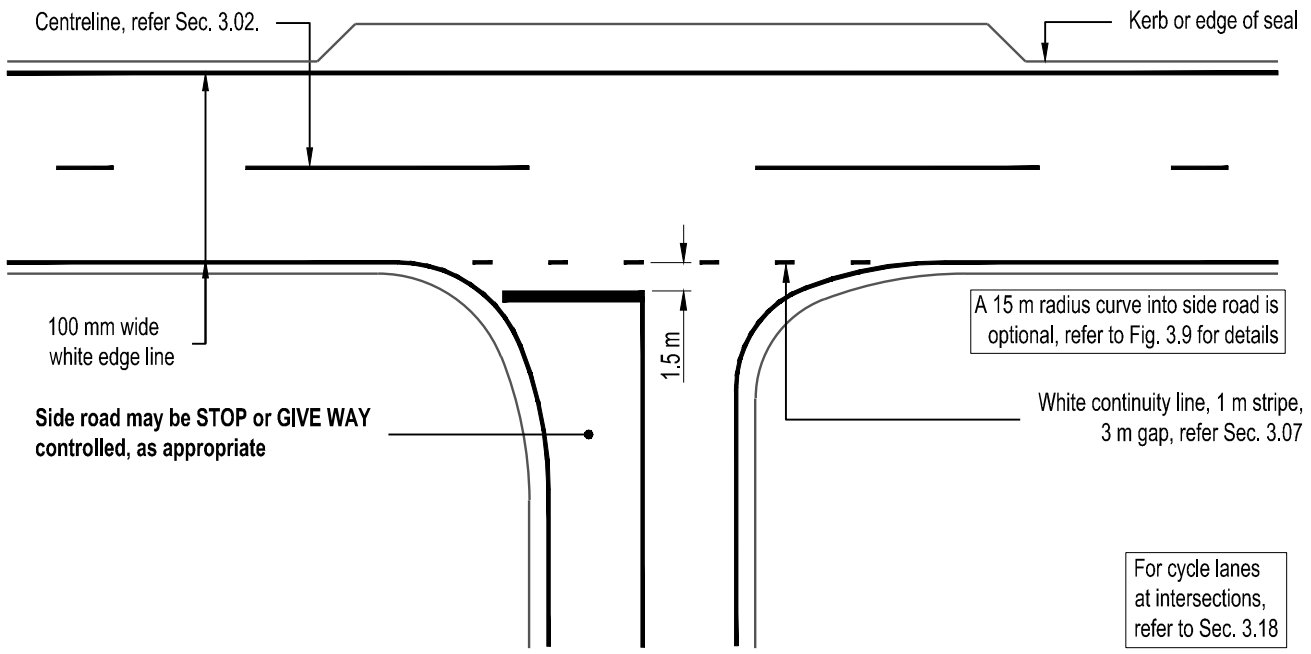
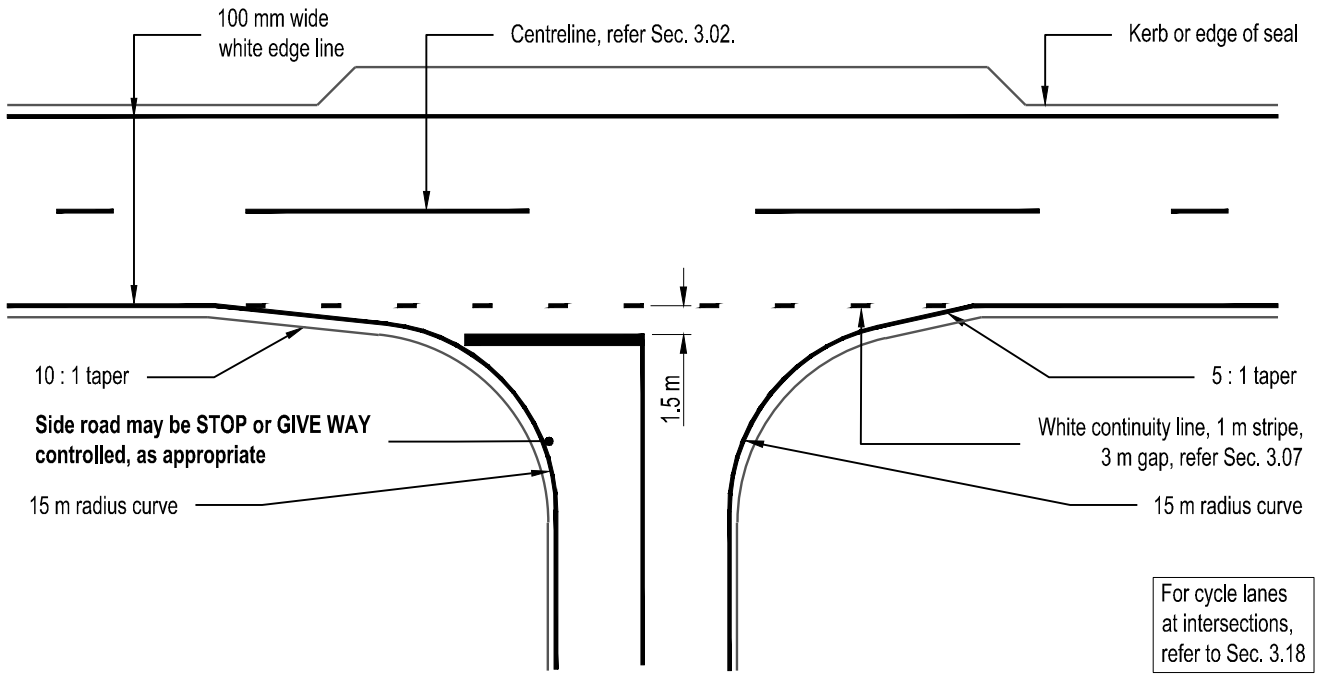
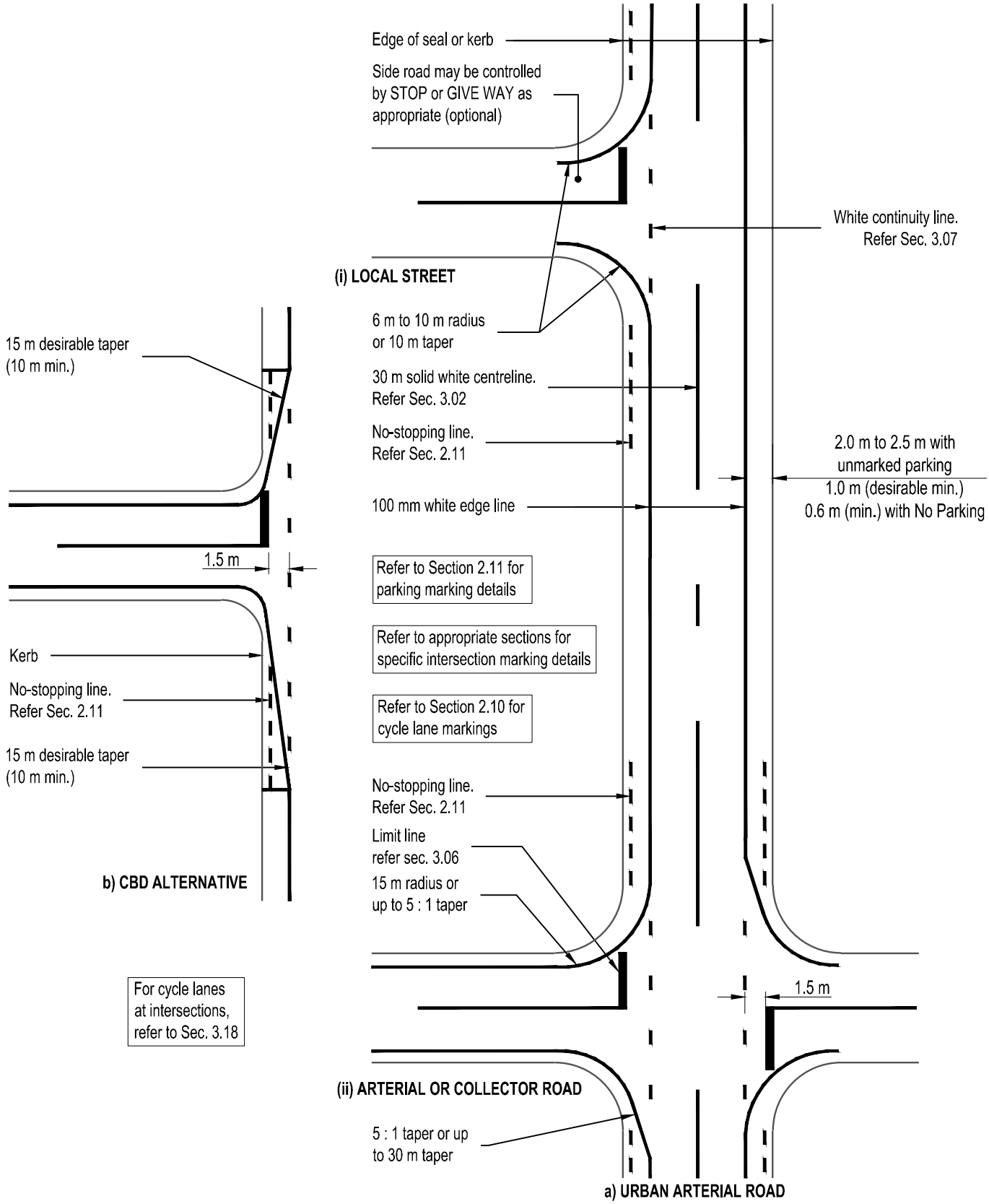


a) MINOR ROAD LOW VOLUME



b) MINOR ROAD MEDIUM OR HIGH VOLUME

MARKINGS FOR
FIGURE 3.2 EDGE LINES AT RURAL INTERSECTIONS



MARKINGS FOR EDGE LINES AT URBAN INTERSECTIONS FIGURE 3.3

3.04 LANE LINES AT INTERSECTIONS

3.04.01 GENERAL

Refer to Section 2.02 for non intersection lane line marking details.

All side roads that intersect with multi lane intersections should be controlled by a Give Way sign, a Stop sign or traffic signals.

Refer to Sections 3.09, 3.10 and 3.11 for typical pavement marking details for give way, stop and traffic signal controlled intersections.

Refer to Section 3.12 for typical pavement marking details for multi lane roundabout approaches.

3.04.02 URBAN AND RURAL ROADS

Lane lines on urban and rural multi-lane intersection approaches shall be marked as follows:

Refer to Figure 3.4.

Lane lines on the approaches to a controlled leg of an intersection shall be marked as follows:

Colour : Reflectorised white
Width : 100 mm
Stripe : Continuous
Length : 15 m minimum, terminating at the limit line.

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Lane lines on the approaches to an uncontrolled leg of an intersection shall be marked as described in Section 2.02.03 and shall terminate and commence clear of the intersection traffic turning paths.

Except in the circumstances described in Section 3.04.04 below, lane lines should not be marked through intersections.

3.04.03 AUXILIARY LANES

Refer to Sections 3.14 and 3.15 for lane lines at left turn and right turn lanes.

The lane line separating a through lane from auxiliary turn lane shall comprise of a broken section followed by a solid section.

Auxiliary Lane line details are:

(a) Broken Section (Continuity Line):

Colour : Reflectorised white
Width : 100 to 200 mm **
Stripe : 1 m **
Gap : 3 m **

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.

*** Line configuration may vary depending on individual road controlling authority standards. Refer to Section 3.07 for continuity lines.*

(b) Solid Section (Lane Line):

Where length of deceleration lane is greater than 50 m a continuous lane line should be marked from the end of the diverge taper to the commencement of the chevron markings.

Colour : Reflectorised white
Width : 200 mm
Stripe : Continuous (length to suit intersection layout)

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The lane line may be supplemented with white mono directional reflective raised pavement markers at 10 m centres.

3.04.04 PRIORITY ROUTES THROUGH INTERSECTIONS

Lane lines to guide traffic on priority routes should only be used when the major route through the intersection, or curve, does not follow a straight line. Curves with a radius of 100 m or more should be treated as straight road.

Where used, lane lines through intersections should be marked as follows:

Refer to Figure 3.4.

Colour : Reflectorsed white
Width : 100 mm
Stripe : 1 m
Gap : 1 m (2 m optional)

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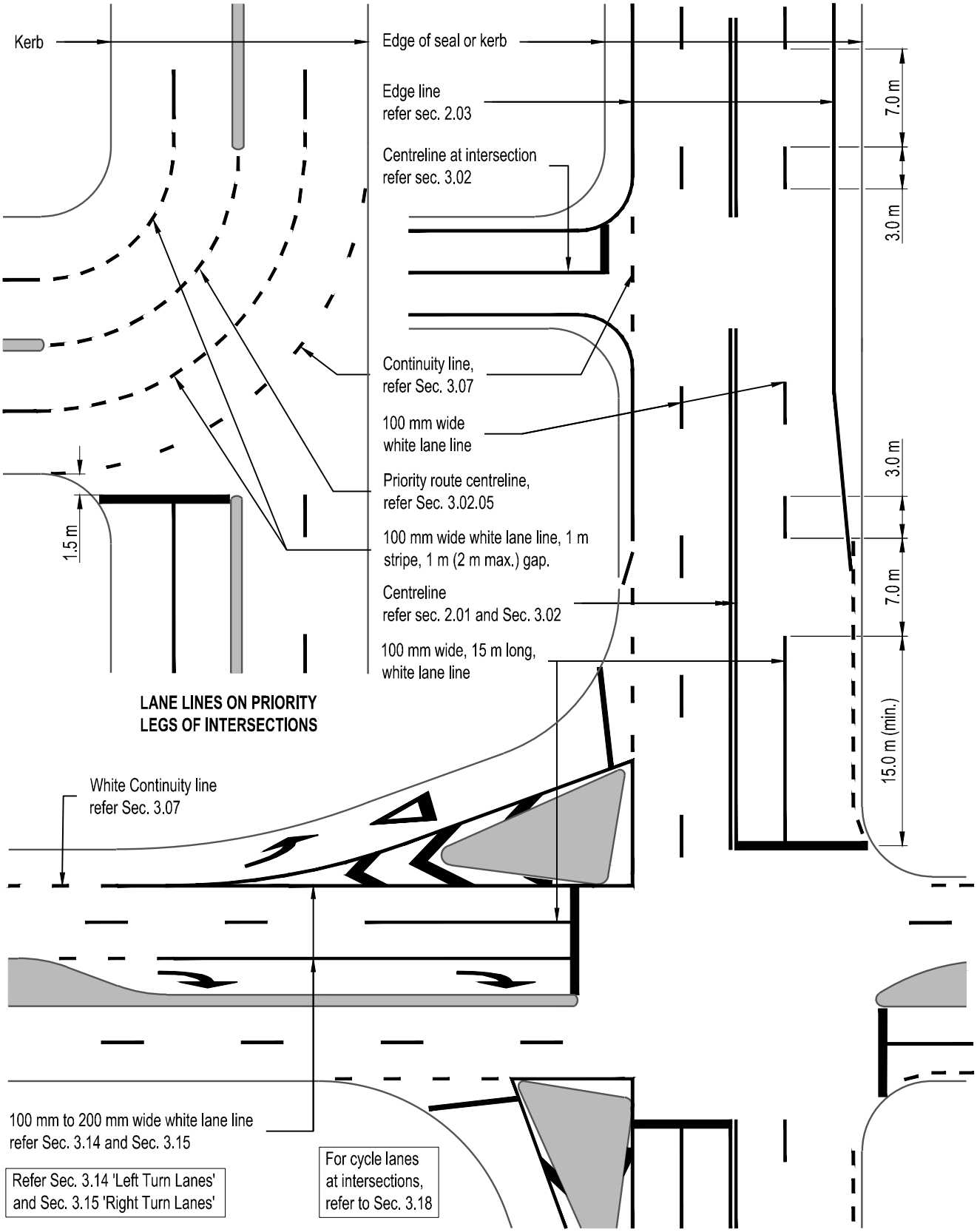
Raised pavement markers and /or advance warning signs may be used to supplement the lane markings at some intersections.

Continuity lines as described in Section 3.07 may also be marked to provide added delineation of the major route through the intersection.

Refer to Section 3.02.05 for pavement marking details for centrelines on priority routes through intersections.



MARKINGS FOR LANE LINES AT INTERSECTIONS

FIGURE 3.4

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3.05 LANE ARROWS

3.05.01 GENERAL

(a) Legislation:

The *Land Transport (Road User) Rule 2004, Part 2*specifies that if road markings or traffic signs designate specific lanes for specific maneouvres at the approaches to an intersection, a driver must not use any lane except for the maneouvre appropriate to its marking or signage.

- A road controlling authority may mark lane arrows before any intersection or entrance where traffic approaches in more than one- lane, to restrict the movements which drivers in those lanes may make at the intersection or entrance,
- lane arrows must conform to Schedule 2 of the *Land Transport Rule: Traffic Control Devices** and these are shown in Figures 3.5 and 3.6 of this manual,
- any two-lane ar rows may be combined to show the movements required or permitted from that lane,
- lane arrows must be marked far enough in advance of the intersection or entrance to which they apply to give drivers adequate warning of the movements permitted from that lane, and
- signs showing the movements required or permitted by lane arrows marked on the road may be erected above the lane.

(b) Application:

Lane arrows are used on approaches to intersections to direct road users into the correct lane for their intended manoeuvre.

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Lane arrows should be used for lane use definition and no other purpose, other than those situations described in 3.05.02 (c).

Care must be taken when locating lane arrows relative to intersections, and any other side roads or entrances, to avoid giving misleading directions to drivers.

Lane arrows must comply with the specifications given in Figure 3.5 and Figure 3.6.

3.05.02 RURAL ROADS

(a) General:

All lane arrows on rural roads should be marked in accordance with Figures 3.5 and 3.6, summarised as follows:

Colour:	Reflectorised white
Dimension:	As shown in Figures 3.5 and 3.6
Proportion:	length dimensions only shall be increased by 50%

(b) Intersections:

Where a traffic lane approaching an intersection becomes a mandatory turn lane, lane-use arrows must be marked in the other lanes. Refer Figure 3.15.

On an approach to an intersection, sets of lanes arrows should be placed in all lanes where auxiliary lanes have been formed, and approximately 20 m from the limit line or turning point. Any intermediate sets of arrows should be placed at about 80m spacing, however distances may be varied to suit individual situations.

Refer to Figure 3.15 for an example of the placement of lane arrows on the approaches to rural intersections.

* Refer to Amendment to Schedule 2 in the Land Transport Rule: Traffic Control Devices Amendment 2005.

(c) Other Locations:

Lane arrows may be marked at the locations described below as a reminder to drivers, particularly those visitors to New Zealand that are more used to driving on the right, that they should be driving on the left. Consideration should be given to using the arrows only in locations where there are accidents caused by drivers not keeping to the left or on routes used by tourist.

(i) One-Lane Bridges

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.

These arrows should not be installed on the approaches to intersections unless they are required in accordance with section 3.05.02(b).

(ii) Rest Areas and Tourist Facilities

Straight ahead lane arrows, as shown in Figure 3.5(b) may be marked on the main road traffic lane on the departure side of a rest area or other tourist facility.

(iii) Tourist Routes and Intersections

On low volume tourist routes, eg: less than about 5000 AADT, straight ahead arrows may be marked as a reminder to drivers that they should be driving on the left.

Such arrows may also be marked in the main traffic lane on the departure side of intersections where tourist traffic turning volumes are high and owing to the layout there is a risk of confusion.

Sometimes it may be appropriate to install a pair of arrows, one in each lane, to adequately remind drivers that they should drive on the left

3.05.03 URBAN ROADS

(a) General:

All lane arrows on urban roads should be marked in accordance with Figures 3.5 and 3.6, summarised as follows:

Colour:	Reflectorised white
Dimension:	As specified in Figures 3.5 and 3.6
Proportion:	As per Figures 3.5 and 3.6

(b) Intersections:

Where a traffic lane approaching an intersection becomes a mandatory turn lane, lane-use arrow(s) must be marked in the turn lane, and may be marked in other lanes.

On approach to an intersection, sets of lane arrows should be placed in all lanes where auxiliary lanes have been formed, and approximately 10 m from the limit line or turning point. Any intermediate sets of arrows should be placed at about 80m spacing, however distances may be varied to suit individual situations.

Refer to Figure 3.16 for an example of the placement of lane arrows on the approaches to urban intersections.

3.05.04 ONE- WAY ROADS

Lane-use arrows may be marked to convey mandatory directional message on one-way roads.

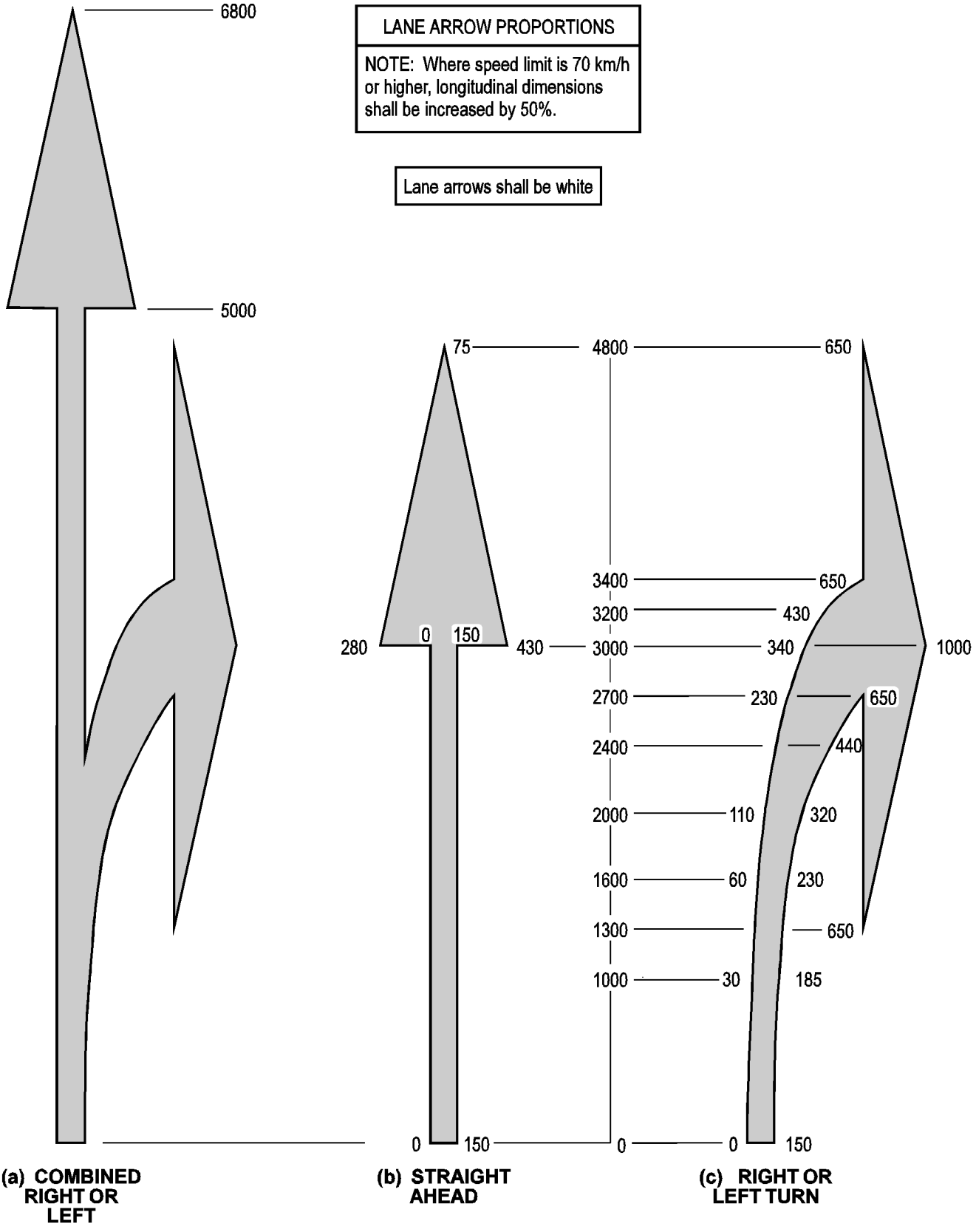
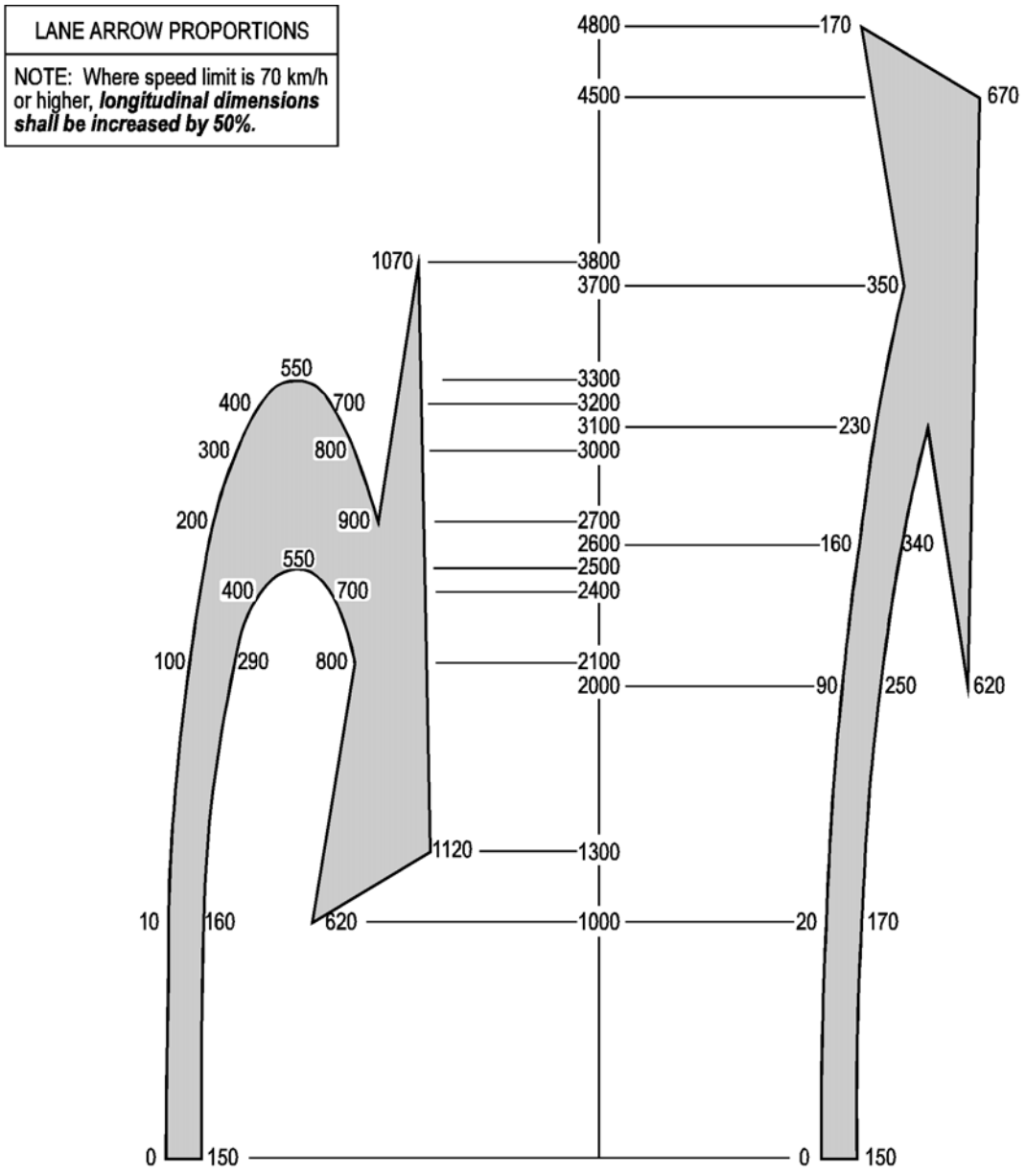


FIGURE 3.5 LANE ARROW MARKINGS - 1



(a) ACUTE RIGHT OR LEFT TURN

(b) BEAR RIGHT OR LEFT

LANE ARROW MARKINGS - 2 FIGURE 3.6

3.06 LIMIT LINES

3.06.01 GENERAL

(a) Legal Requirements:

The *Land Transport Rule: Traffic Control Devices 2004*, defines a limit line as a line marked on the surface of the roadway to indicate the place where traffic is required to stop for the purpose of complying with a stop sign, give-way sign, pedestrian crossing, school crossing point or traffic signal.

Refer to the *Traffic Control Devices Rule* 2004 for the statutory requirements for marking limit lines.

(b) Application:

From 27 February 2005, except where the road surface makes it impracticable, a single 300 mm wide continuous limit line must be provided on all controlled approaches to intersections, to indicate the point where a vehicle should stop.

> ***NOTE: All limit lines installed legally before 27 February 2005 may continue to be used for as long as they remain fit for purpose. However, when any new controls are installed or when the road is resealed, a limit line in the format described above must be provided.***

Limit lines should not be skewed more than 30° from a line normal to the direction of the approach lanes but, where appropriate, may be marked tangential to the edge line or through lane to improve inter-visibility at the intersection. For an example of skewed limit lines refer to Figure 3.17: Markings for Multi-Lane Roundabouts.

Where there are two or more traffic lanes on an angled approach to an intersection the limit line may need to be stepped and marked at right angles to each approach lane, so drivers in the left lane can see past adjacent vehicles on their right.

For examples of typical limit line and holding line treatment for various traffic control and intersection configurations refer to the appropriate Sections from 3.09 to 3.17. Refer also to Section 4.03 Railway Level Crossings, and Section 4.04 Flashing Red Signals.

3.06.02 RURAL ROADS

Limit lines in rural areas shall be marked as follows:

Colour	:	Reflectorised yellow for RG-5 STOP sign control, and Reflectorised white for traffic signal, RG-6 GIVE WAY sign and RG-6R ROUNDABOUT GIVE WAY sign control.
Width	:	300 mm, single
Stripe	:	Continuous

(a) Location - General:

Where edge lines are marked, the limit line at a controlled intersection should be located 1.5 m back from the nearest traffic lane or continuity line.

Where edge lines are not marked, the limit line at a controlled intersection should be located at the prolongation of the kerb or edge of seal line.

Limit lines should be located to ensure that:

- from a position 1.8 m behind the limit line and 1.05 m above the road surface adequate visibility of approaching traffic is available, and
- a stationary vehicle at the limit line should not conflict with the turning paths of other vehicles using the intersection.

The appropriate traffic sign should be as close as possible (within 10 m) to the limit line, consistent with providing adequate visibility of the sign for approaching drivers.

(b) Cross Roads:

At cross roads that do not warrant auxiliary turn lanes, allowance may be made for through traffic to slip past on the left side of vehicles waiting at the centreline to make a right turn. It is recommended that this may be achieved by localised widening of the through lane to 4.5 m.

The side road limit line in this situation should still be positioned 1.5 m clear of the defined through lane.

3.06.03 URBAN ROADS

Limit lines in urban areas shall be marked as follows:

Colour	:	Reflectorised yellow for RG-5 STOP sign control, and Reflectorised white for traffic signal, RG-6 GIVE WAY sign and RG-6R ROUNDABOUT GIVE WAY sign control.
Width	:	300 mm, single
Stripe	:	Continuous

(a) Location:

Where edge lines are marked, the limit line at a controlled intersection should be located 1.5 m back from the nearest traffic lane or continuity line.

Where edge lines are not marked, the limit line at a controlled intersection should be located at the prolongation of the kerb or edge of seal line.

Where edge lines are not marked, the limit line at a controlled intersection should be located at the prolongation of the kerb or edge of seal line.

A limit line should be located to ensure that:

- from a position 1.8 m behind the limit line and 1.05 m above the road surface adequate visibility of approaching traffic is available, and
- a stationary vehicle at the limit line should not conflict with the turning paths of other vehicles using the intersection.

The appropriate traffic sign should be as close as possible (within 10 m) to the limit line, consistent with providing adequate visibility of the sign for approaching drivers.

3.06.04 HOLDING LINES

A single line marked at right angles across the lane to indicate a point where a vehicle should stop may be used in a right turn lane, a right turn bay and a flush median.

NOTE: A holding line is not a legal limit line and must not be used in situations that may confuse priority or mislead drivers.

Where used, a holding line should be marked as follows:

Colour	:	Reflectorised white
Width	:	300 mm, single
Stripe	:	Continuous

Holding lines shall be marked at right angles to the road centreline or median.

For application of single lines refer to the following Sections:

- Section 3.15 Right Turn Lanes,
- Section 3.16 Right Turn Bays, and
- Section 3.17 Flush Medians.

3.07 CONTINUITY LINES

3.07.01 GENERAL

A continuity line is a white broken line which may be used in place of an edgeline to indicate the edge of the traffic lane either across an intersection or wherever the intended vehicle path is not readily apparent. Continuity lines are a means of confirming the edge of the through traffic lane.

Continuity lines should not be used to replace an edge line across private and commercial entrances except where:

- parking is marked in accordance with Section 2.11.03 and Figure 2.14(b), or
- the volume of traffic using the entrance way is high enough to warrant full intersection markings. Refer to Section 3.03.02. Edge lines at driveways.

3.07.02 RURAL ROADS

In rural areas continuity lines shall be broken lines marked as follows:

Colour	:	Reflectorised white
Width	:	200 mm
Stripe	:	1 m
Gap	:	3 m

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For typical details of edge line tapers at intersections refer to Section 3.03.

For intersections on the outside of right hand curves RRPMs may be added if improvement to the delineation of the curve is deemed necessary.

3.07.03 URBAN ROADS

In urban areas continuity lines shall be broken lines marked as follows:

Colour	:	Reflectorised white
Width	:	100 to 150 mm
Stripe	:	1 m
Gap	:	3 m (max) **

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*** Gap may vary from 1.5 m to 3 m depending on individual road controlling authority guidelines, however, the standard widths and gaps adopted should be consistent throughout a road controlling authority area.*

For typical edge line and intersection taper details refer to Section 3.03.

3.08 UNCONTROLLED INTERSECTIONS

3.08.01 GENERAL

All cross roads should be controlled in accordance with MOT/TNZ *RTS 1: Guidelines for the Implementation of Traffic Control at Crossroads*.

It is also recommended that 'T'-intersections on state highways and arterial or principal roads should also be controlled.

All other 'T'-intersections that do not warrant Give Way or Stop controls should be marked as follows:

Refer to Figure 3.7 for rural uncontrolled intersections with unsealed side road.

Refer to Figure 3.8 for rural uncontrolled intersections with sealed side road.

3.08.02 CENTRELINES

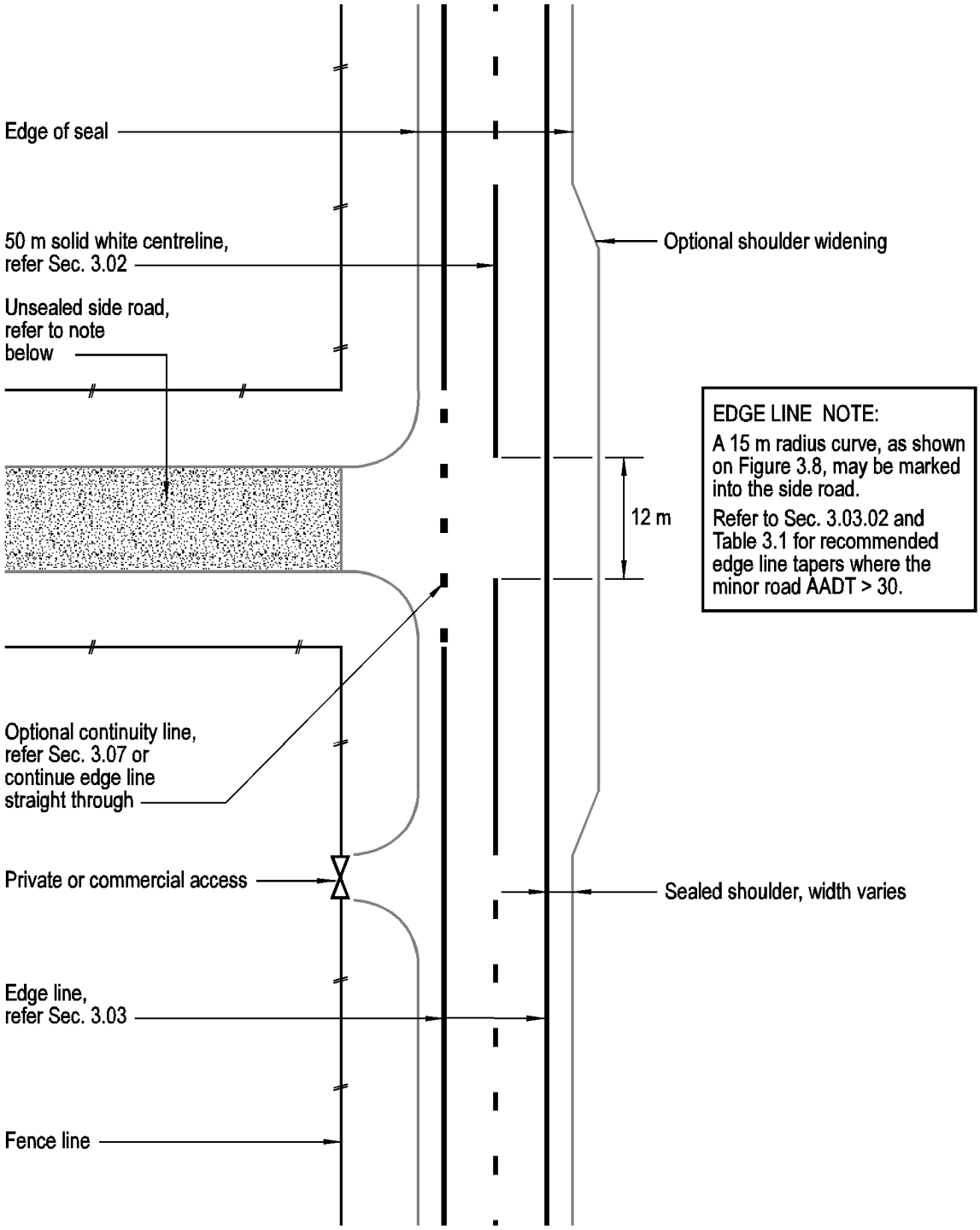
Where the road surface permits, ie on sealed roads, intersections should be marked with solid white centrelines as described in Section 3.02.

3.08.03 EDGE LINES

Edge lines may be marked as defined in Sections 2.03 and 3.03.

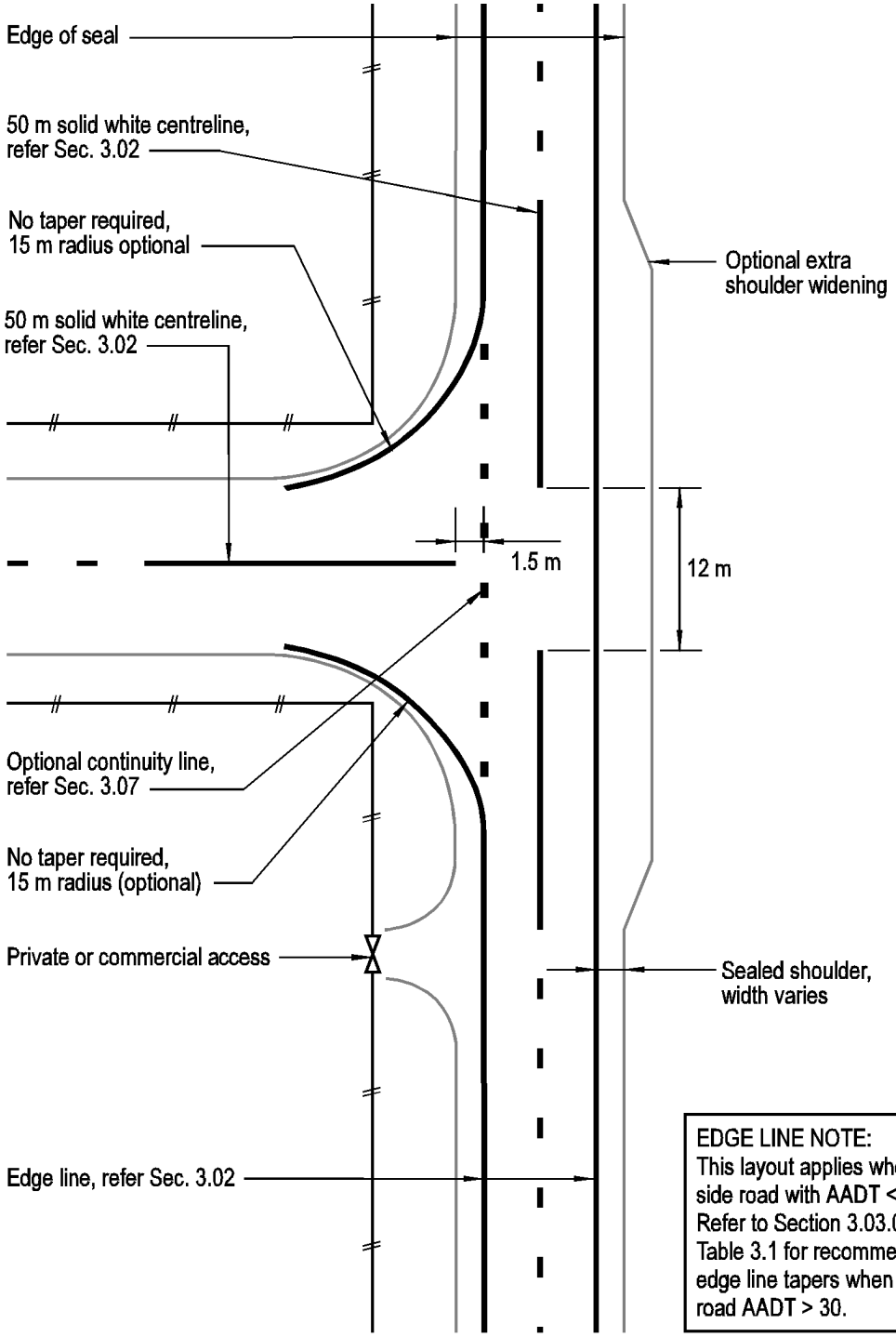
3.08.04 CONTINUITY LINES

Where edge lines exist, a continuity line as defined in Section 3.07 should be marked across the intersection of the minor road. Refer to Figures 3.7 and 3.8



NOTE: Loose material on the surface of sealed roads can be hazardous, particularly at intersections located on curves. To help prevent this material from an unsealed road migrating onto the main road the side road should be sealed from the main road fence or boundary line to the main road pavement.

FIGURE 3.7 MARKINGS FOR UNCONTROLLED RURAL INTERSECTIONS - UNSEALED SIDE ROAD



MARKINGS FOR UNCONTROLLED RURAL INTERSECTIONS - SEALED SIDE ROAD FIGURE 3.8

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3.09 GIVE WAY CONTROLLED INTERSECTIONS

3.09.01 GENERAL

Refer to PART I of this manual for the policy for the installation of RG-6 GIVE WAY signs. A summary of the signing policy is outlined below.

RG-6 GIVE WAY signs must be installed (with suitable legislation by the Road Controlling Authority) at every intersection with four or more approaching roadways, unless traffic signals or RG-5 STOP signs are installed,

and should also be installed:

- at intersections of an unusual layout, or with an unusual traffic pattern, to clearly define the priorities, and
- where it is otherwise desirable to override the normal application of the giving way rules, eg. at 'T'-intersections on arterial roads or state highways.

Pavement markings for *'GIVE WAY'* controlled intersections shall be installed as shown in:

- Figure 3.9: Rural intersection where the minor road AADT is less than 30,
- Figure 3.10: Rural intersection where the minor road AADT is greater than 30,
- Figure 3.11: Urban intersection without edge lines on the main road, and
- Figure 3.12 : Urban intersection with edge lines on the main road.

3.09.02 CENTRELINES

Centrelines should be marked as defined in Section 3.02.

3.09.03 LIMIT LINES

Limit lines shall be marked as defined in Section 3.06.

3.09.04 EDGE LINES

Where used, edge lines should be marked as defined in Sections 2.03 and 3.03.

Refer Figure 3.9 and 3.10 for the rural treatment of edge lines at intersections and Figure 3.12 for the urban treatment.

3.09.05 CONTINUITY LINES

Where edge lines exist, a continuity line as defined in Section 3.07 should be marked across the intersection with the minor road.

3.09.06 *'GIVE WAY'* TRIANGLE SYMBOL MARKING

Except where the road surface makes it impracticable, a *'GIVE WAY'* triangle symbol must be marked on the pavement of each RG-6 GIVE WAY sign controlled lane approaching an intersection.

NOTE: A lane approaching an intersection that, before 27 February 2005, was marked by the word 'WAY' preceded by the word 'GIVE', in white capital letters at least 2 m high, may:

- ***continue to be marked in that way until the words are either permanently removed or overlaid, and***
- ***should have a triangular 'GIVE WAY' symbol marked between the word 'WAY' and 'GIVE', the symbol being located no more than 20m, and not less than 2 m from the limit line, or***
- ***the lane must be resealed and the triangular 'GIVE WAY' symbol, limit line and any lane use arrows marked to the new standard.***

Refer to Figure 3.9a for details of the *'GIVE WAY'* triangle symbol.

The *'GIVE WAY'* triangle symbol shall be marked in the following manner:

(a) Urban

Colour	:	Reflectorised white
Height	:	4.0 m
Location	:	No more than 20 m from the limit line and, to ensure clear demarcation between the symbol and limit line, there should be a gap of at least 2 m

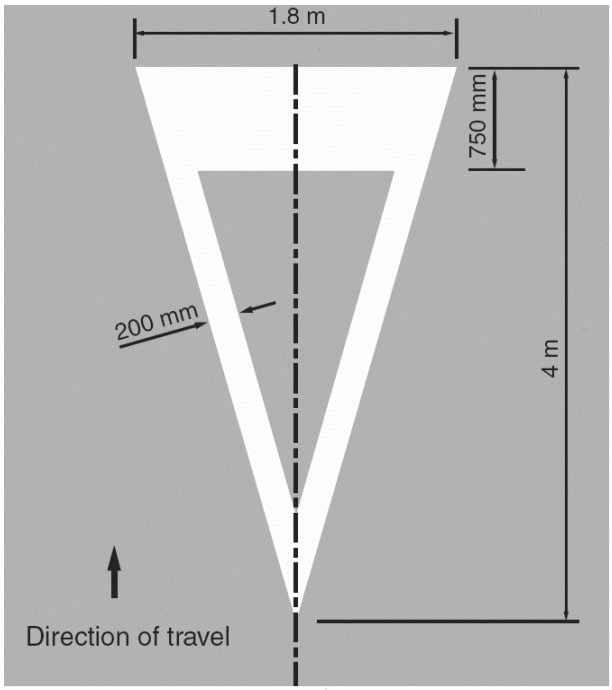
(b) Rural

Colour	:	Reflectorised White
Height	:	6.1 m
Location	:	No more than 20 m from the limit line and, to ensure clear demarcation between the symbol and limit line, there should be a gap of at least 2 m

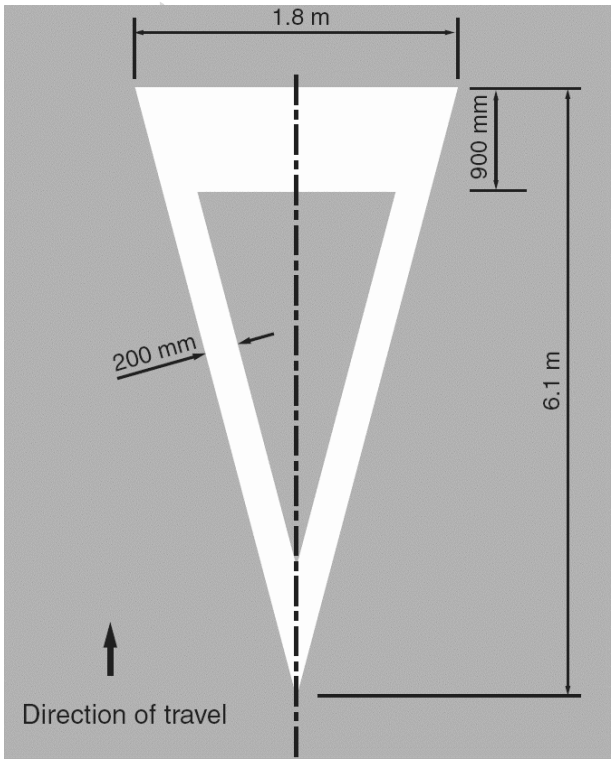
3.09.07 RURAL CROSSROADS

At crossroads that do not warrant auxiliary turn lanes, allowance may be made for through traffic to slip past vehicles waiting to make a right turn at the centreline. It is recommended that this may be achieved by localised widening of the through lane to 4.5 m.

The limit line in this situation should still be positioned 1.5 m clear of the defined through lane.

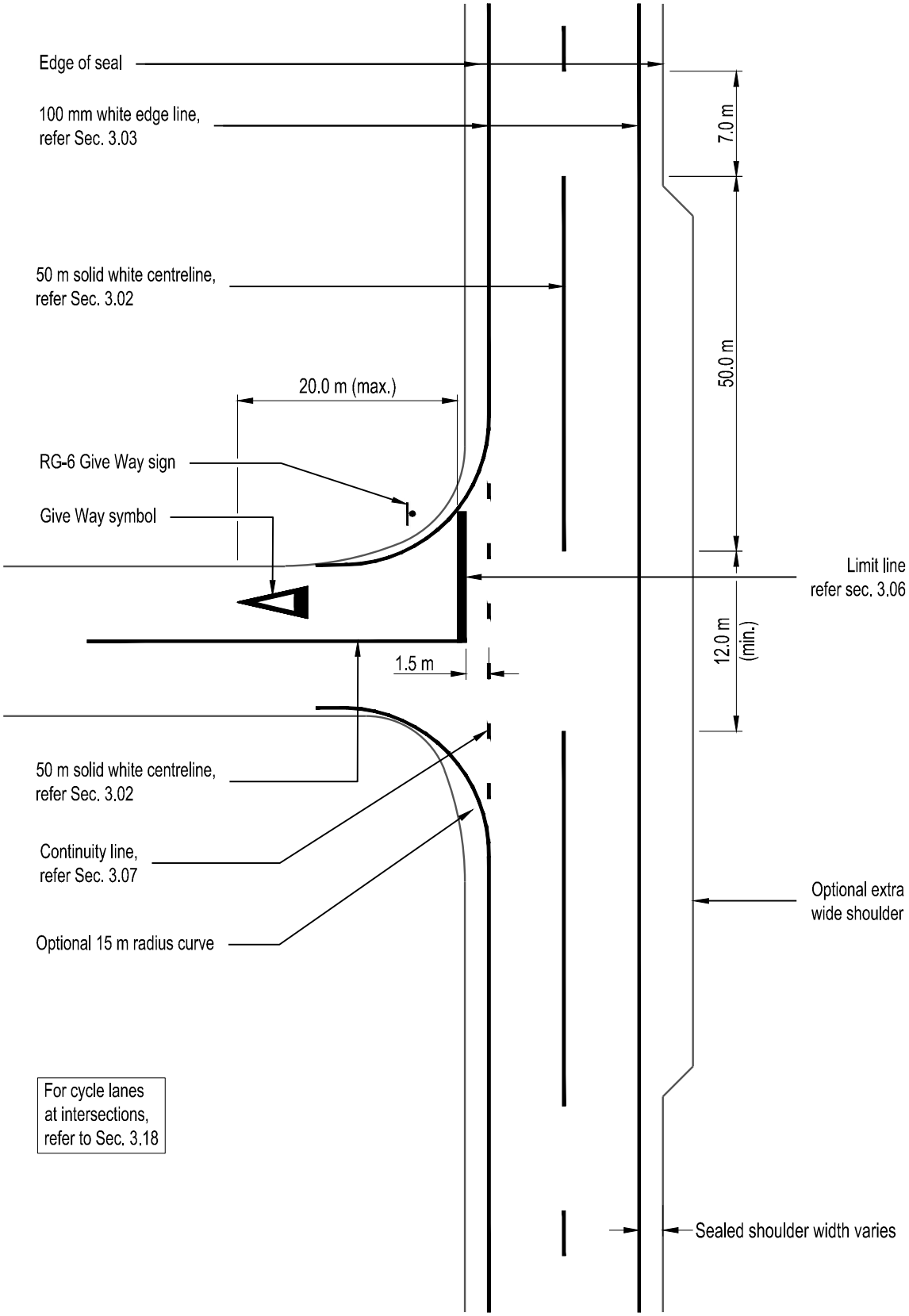


(a) Urban Marking
(Posted Speed Limit ≤ 70 km/h)



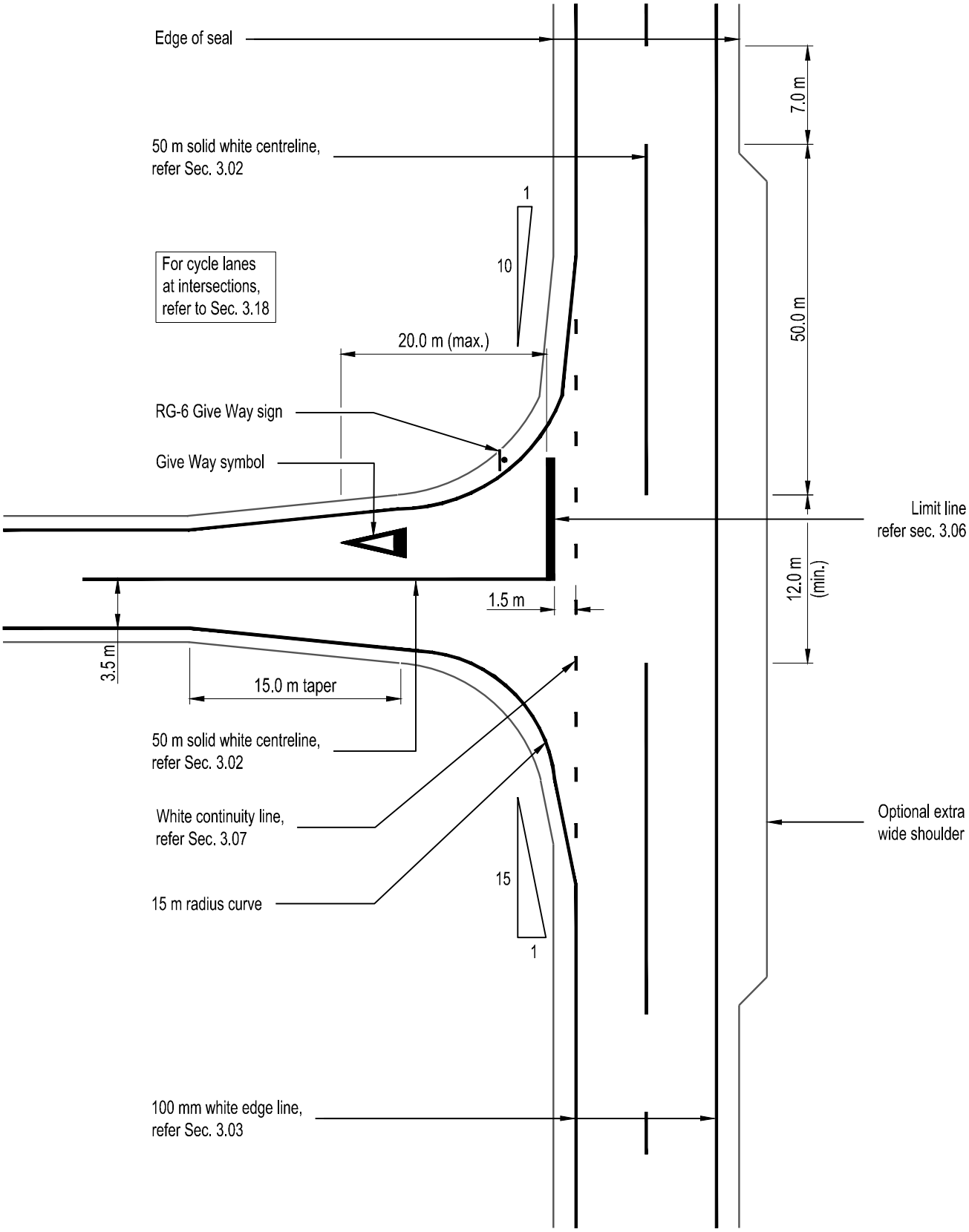
(a) Rural Marking
(Posted Speed Limit > 70 km/h)

FIGURE 3.9a *'GIVE WAY'* TRIANGLE MARKINGS

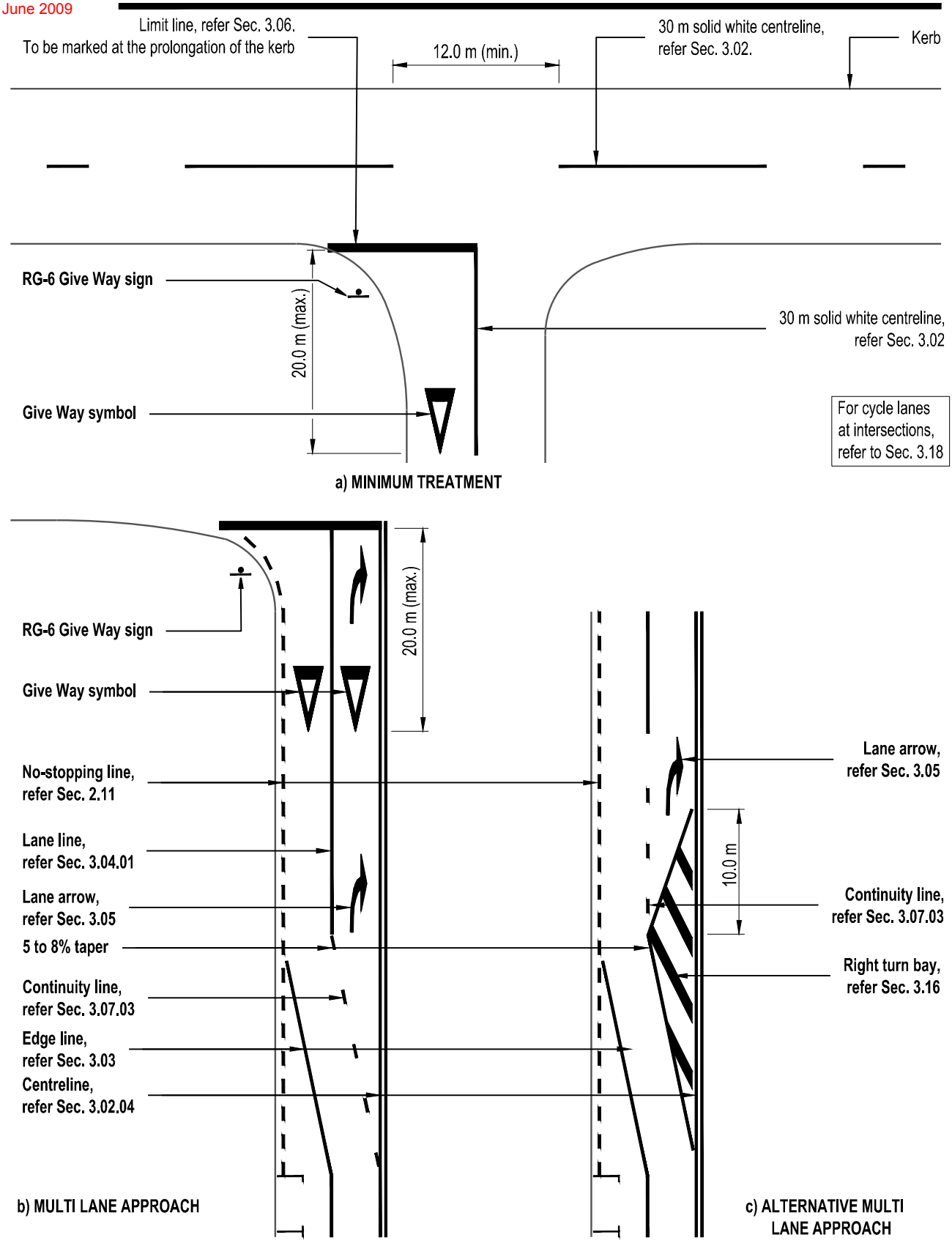


MARKINGS FOR GIVE WAY CONTROLLED RURAL INTERSECTIONS - SIDE ROAD LOW VOLUME

FIGURE 3.9

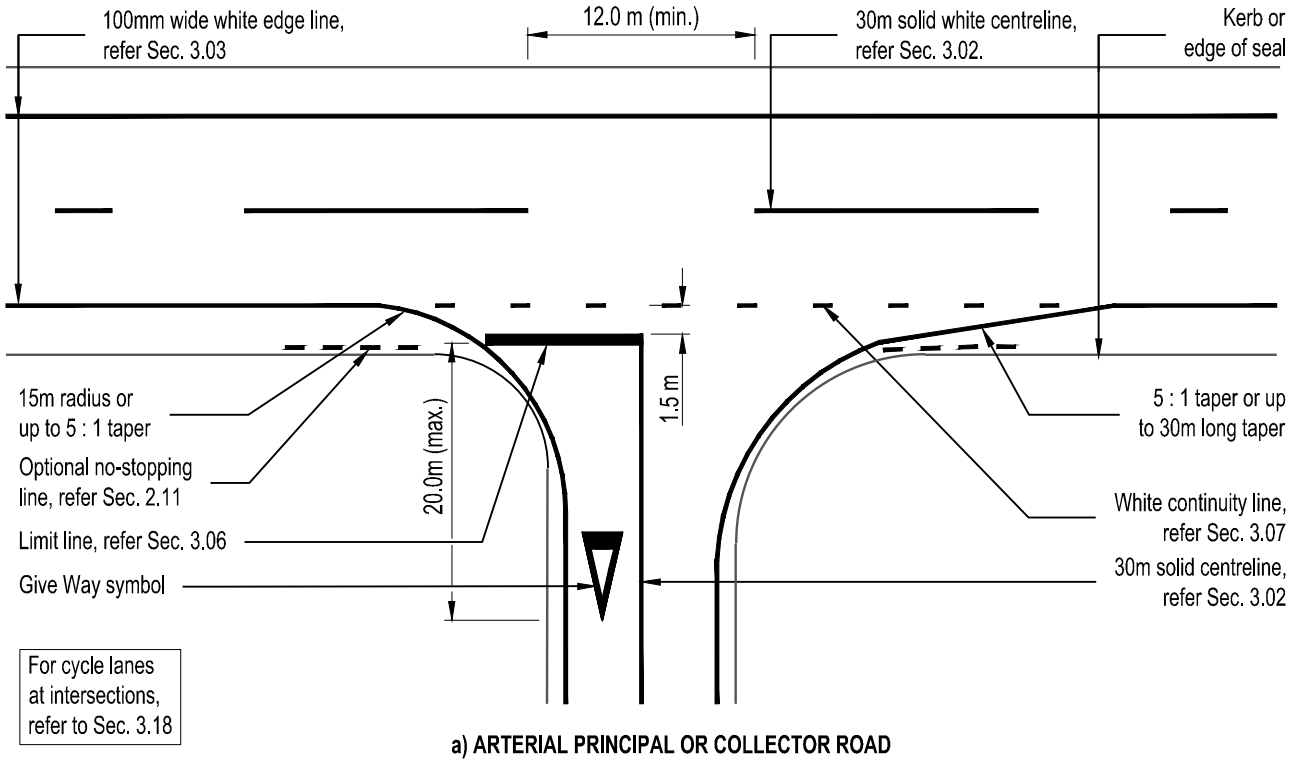


MARKINGS FOR GIVE WAY CONTROLLED RURAL INTERSECTIONS - SIDE ROAD MEDIUM TO HIGH VOLUME FIGURE 3.10

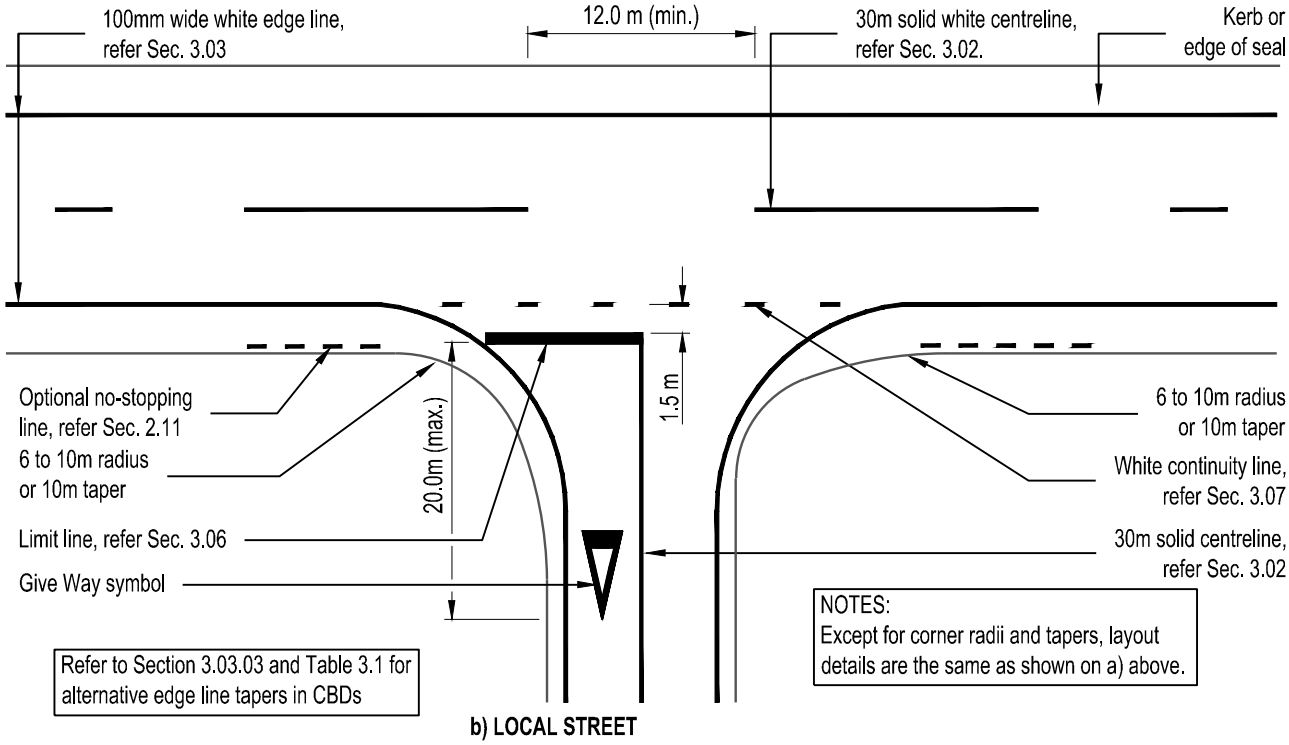


MARKINGS FOR GIVE WAY CONTROLLED URBAN INTERSECTIONS - WITHOUT EDGE LINES

FIGURE 3.11



a) ARTERIAL PRINCIPAL OR COLLECTOR ROAD



b) LOCAL STREET

MARKINGS FOR GIVE WAY CONTROLLED URBAN INTERSECTIONS - WITH EDGE LINES

FIGURE 3.12

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3.10 STOP CONTROLLED INTERSECTIONS

3.10.01 GENERAL

Refer to PART I of this manual for the policy on the installation of RG - 5 STOP signs. A summary of the signing policy is outlined below:

RG - 5 signs should be erected in the following situations:

- At blind intersections where lack of visibility makes it unsafe to approach the intersection at a speed greater than 10 km/h.

  NOTE: It is unsafe to approach an intersection at more than 10 km/h if from a point 9 m from the intersection limit line on the controlled approach, a driver cannot see a vehicle on the uncontrolled approach at a distance (in metres) of 1.2 times the speed (in km/h) exceeded by 15% of the vehicles on the priority route).

- At intersections of an unusual lay out or unusual traffic pattern where it is essential to give one controlled approach priority over another controlled approach.

  Note: Traffic at a STOP sign is required to give way to those at a GIVE WAY sign).

- At railways level crossings which are not controlled by automatic alarms where the driver of a vehicle has insufficient visibility of an approaching train.

Pavement markings for *STOP* controlled intersections should be installed as shown in:

- Figure 3.13: Rural Intersections, and
- Figure 3.14: Urban Intersections

3.10.02 CENTRELINES

Centrelines should be marked as defined in Section 3.02.

3.10.03 LIMIT LINES

Limit lines shall be marked as defined in Section 3.06.

Colour: Reflectorised yellow

3.10.04 EDGE LINES

Where used, edge lines may be marked as defined in Sections 2.03 and 3.03.

Edge line treatments for *STOP* controlled intersections should be similar to those detailed for *GIVE WAY* controlled intersections.

Refer to Figures 3.9 and 3.10 for rural edge line treatment, and Figure 3.12 for urban edge line treatment.

3.10.05 CONTINUITY LINES

Where edge line exist, a continuity line as defined in Section 3.07 should be marked across the minor road.

3.10.06 PAVEMENT MESSAGE

The pavement message *'STOP'* shall be marked on each approach lane to Stop controlled intersections unless the surface makes it impracticable to do so.

The words shall be marked as follows:

Refer to Section 4.01 for letter proportions

(a) Urban:

Colour : Reflectorised white
Height : 2.4 m
Location : Within 10 m of limit line

(b) Rural:

Colour : Reflectorised white
Height : 3.6 m
Location : Within 10 m of limit line

3.10.07 RURAL CROSS ROADS

At cross roads that do not warrant auxiliary turn lanes, allowance may be made for through traffic to slip past vehicles waiting to make a right turn at the centreline. It is recommended that this may be achieved by localised widening of the through lane to 4.5 m.

The limit line in this situation should still be positioned 1.5 m behind the defined through lane.

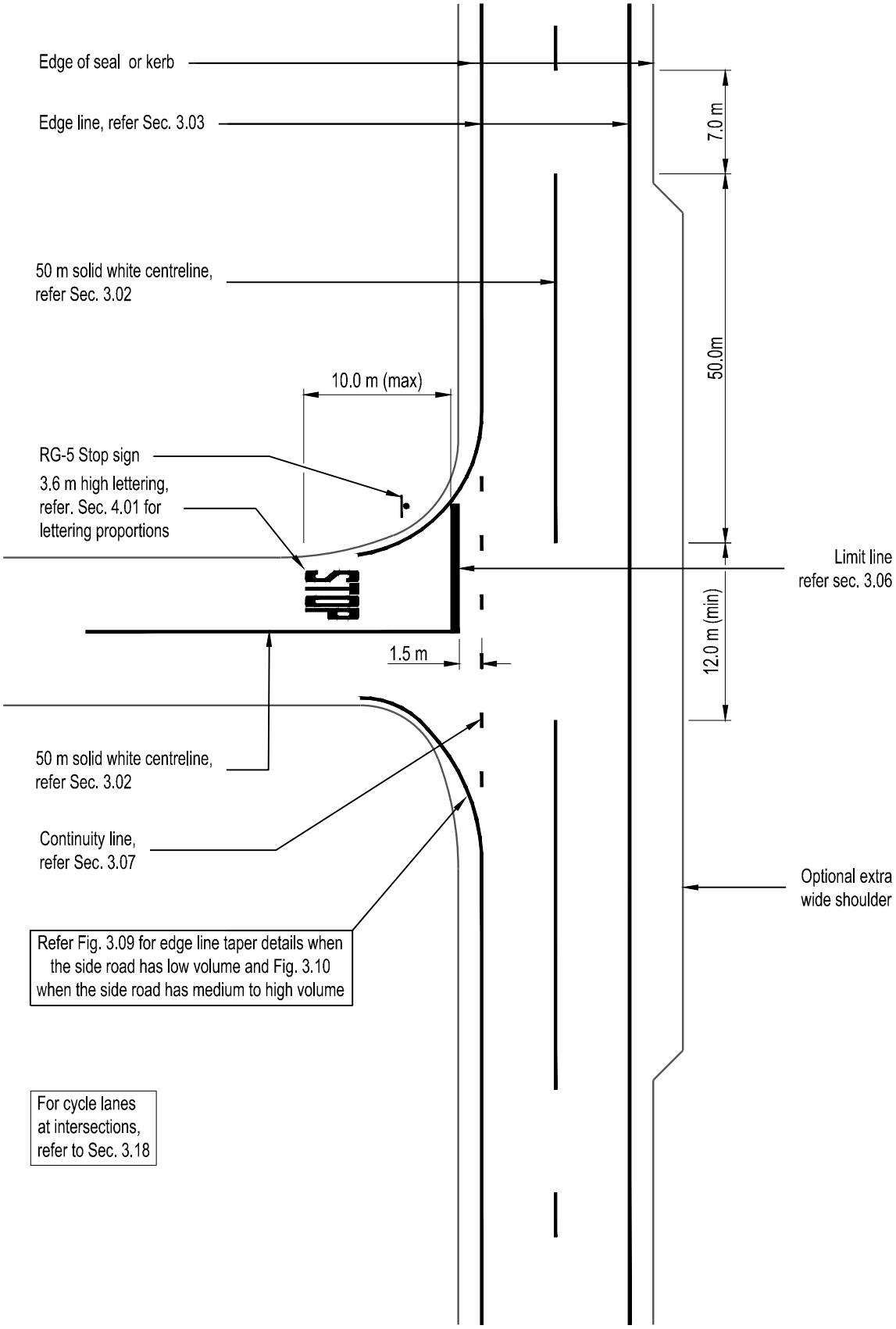
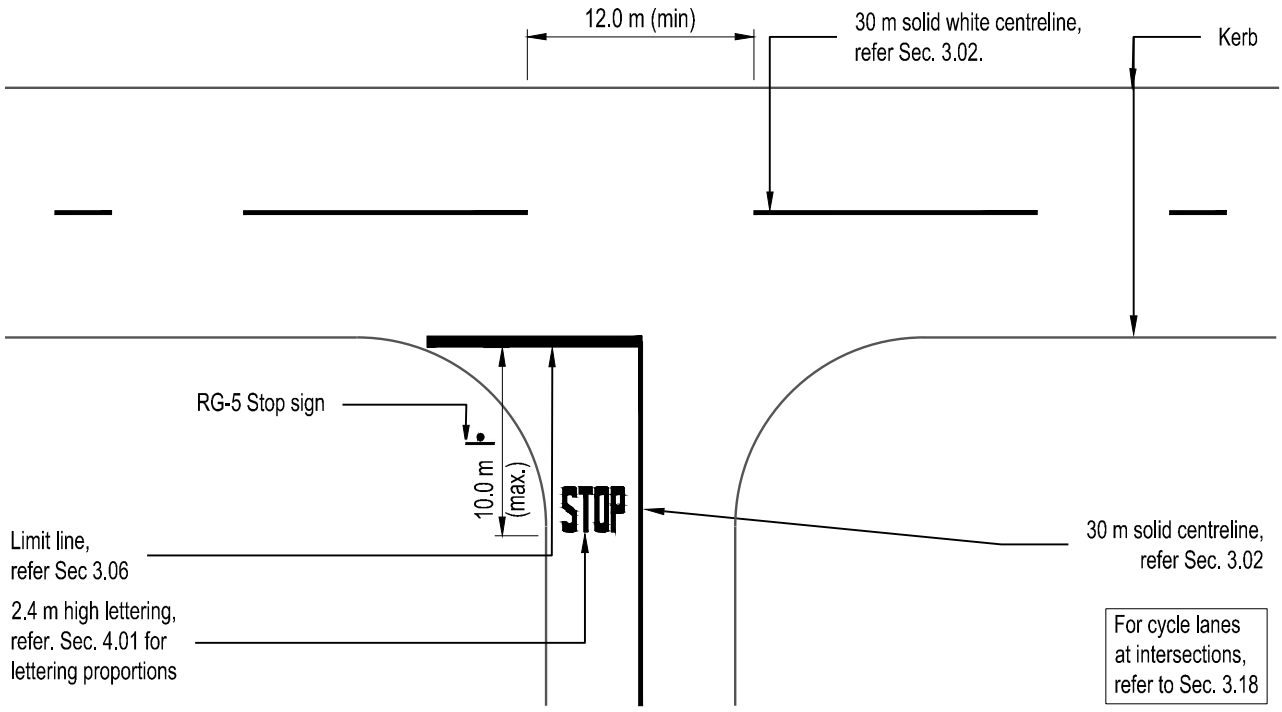
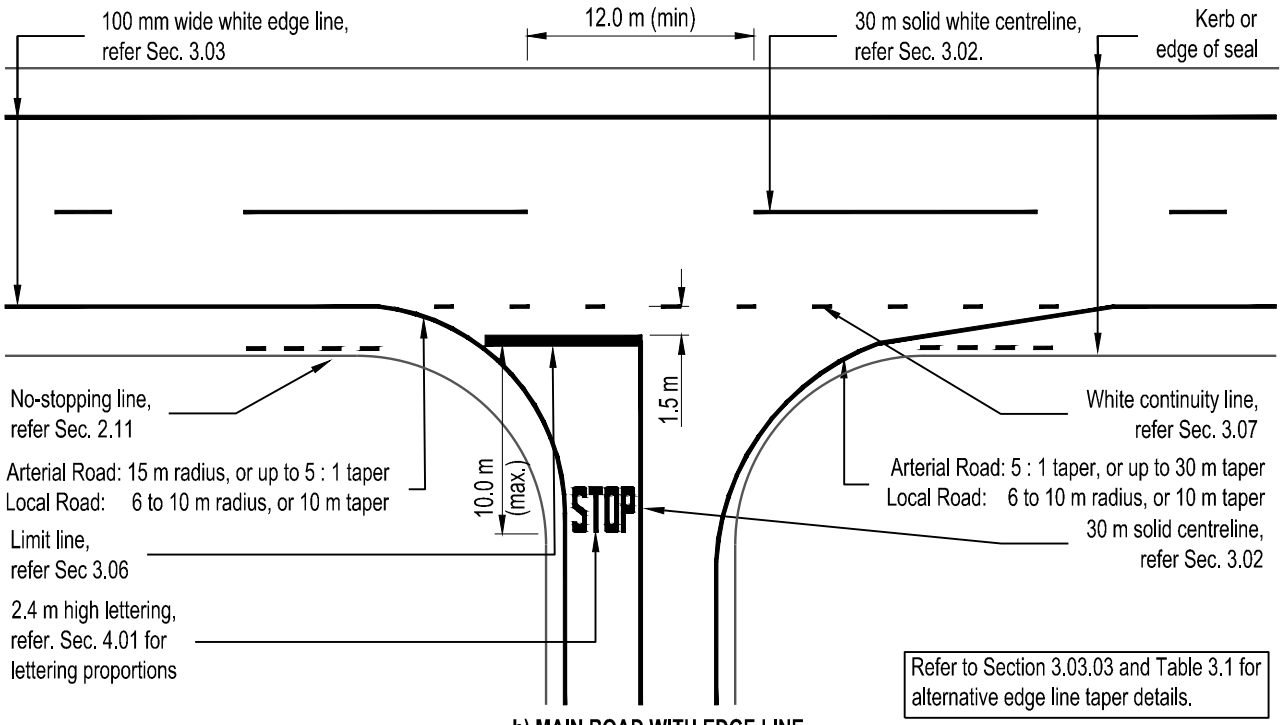


FIGURE 3.13 **MARKINGS FOR STOP CONTROLLED RURAL INTERSECTIONS**



a) MAIN ROAD WITHOUT EDGE LINE



b) MAIN ROAD WITH EDGE LINE

MARKINGS FOR STOP CONTROLLED URBAN INTERSECTIONS

FIGURE 3.14

3.11 TRAFFIC SIGNAL CONTROLLED INTERSECTION

3.11.01 GENERAL

(a) Legislation:

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

Refer also to:

- Limit Lines described in Section 3.06.01, and .
- Lane Usage Arrows described in Section 3.05.01. .

(b) Application:

In intersection design, the possible use of traffic control devices and other road furniture should be carefully considered. The lay out of a traffic signal controlled intersection can differ significantly from those requiring only channelisation and signs.

Within certain flow limits traffic signals can provide the least expensive method of:

- reducing delay to side road traffic and pedestrians,
- increasing overall capacity of the intersection,
- reducing the number of accidents (particularly crossing-turning type accidents), and
- providing orderly movement of conflicting traffic flows.

Pavement markings for traffic signal controlled intersection should be marked as indicated in:

- Figure 3.15 for rural intersections, and
- Figure 3.16 for urban intersections.

Refer to Section 4.02.08 Signalised pedestrian Crossing Crosswalk Lines.

Refer to PART I of this manual for the application and placement of PW-31 traffic signal advance warning signs.

3.11.02 CENTRELINES

(a) Urban:

Centrelines on the approaches to signalised urban intersections should be marked as defined in Section 3.02.

Where raised traffic islands have been installed, the appropriate advance warning marking as defined in Section 2.08 should be used.

(b) Rural:

Raised traffic islands are used to separate opposing traffic on the approaches to rural traffic signal controlled intersections.

Raised traffic islands should have the appropriate advance warning markings as defined in Section 2.08.02

3.11.03 LIMIT LINES

Limit lines shall be marked as defined in Section 3.06.

Traffic signal limit lines shall be located at least 1.8 m clear of the nearest traffic lane or 1 m clear of the pedestrian crosswalk line (Refer to Section 3.11.08). The primary traffic signal head should be as close as possible to the limit line.

3.11.04 EDGE LINES

Edge lines shall not continue through signalised controlled intersections.

Edge lines should end at the limit line or at the commencement of a No-stopping restriction marked on the approach to the intersection.

Where used, edge lines should be marked as defined in Sections 2.03 and 3.03.

3.11.05 CONTINUITY LINES

Continuity lines should not be marked through traffic signal controlled intersections.

Refer to Section 3.11.07 for the appropriate marking of turning guide lines.

3.11.06 LANE ARROWS

Lane arrows are marked in association with through lane and turning lane markings at traffic signal controlled intersections to indicate the movement for which that lane has been designed.

Care must be taken in locating arrows to avoid falsely indicating other side roads or private access ways.

Lane arrows should be marked as defined in Section 3.05.

3.11.07 TURNING GUIDE LINES

Turning guide lines may be used within major or complex traffic signal controlled intersections to indicate the proper course to be followed by turning vehicles.

They should be used within an intersection to assist separation of traffic in the case of multiple turning lanes.

Turning guide lines should be marked as follows:

Colour : Reflectorised white
Width : 100 mm
Stripe : 1 m
Gap : 1 m **

.

** *Gap may be increased if deemed necessary by the road controlling authority.*

Clearance should be left between turning lines guiding opposing right turn movements unless the opposing movements do not occur in the same phase.

Turning guide lines should not be carried through pedestrian crosswalk areas.

3.11.08 CROSSWALK LINES

Whenever pedestrians are provided for at signalised intersections crosswalk lines should be provided to guide them across the road.

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

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

At unsignalised crossings, *'Zebra'* markings shall always be used. Refer to Section 4.02 Pedestrian Crossings.

Refer to Section 4.02.08 for traffic signal controlled intersection pavement marking details.

At an intersection controlled by traffic signals crosswalk lines shall be provided as follows:

Refer to Figure 3.15: Crosswalk Lines at rural signal controlled intersections.

Refer to Figure 3.16: Crosswalk Lines for parallel and scramble pedestrian phases for urban signal controlled intersections.

Colour : Reflectorised white
Line width : 100 mm
Stripe : Continuous
Crosswalk width : 2.5 m desirable
1.8 m absolute minimum.

The outside crosswalk line should be inset at least 600 mm from the projected edge of the kerb of the intersection.

The limit line should be no closer than 1 m to the nearest crosswalk line.

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

Where the intersection is controlled by a scramble pedestrian control, the inner crosswalk lines may be omitted.

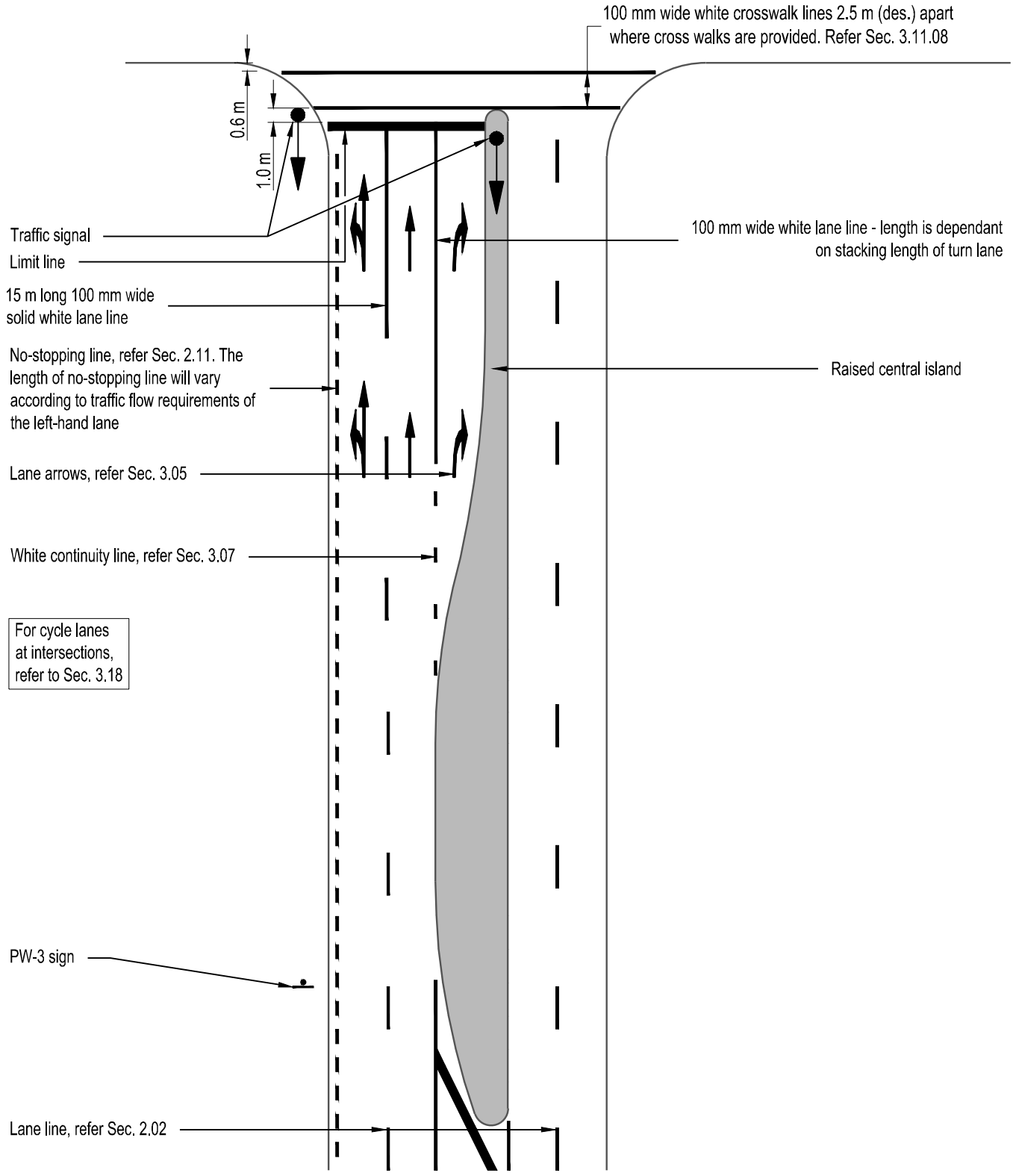
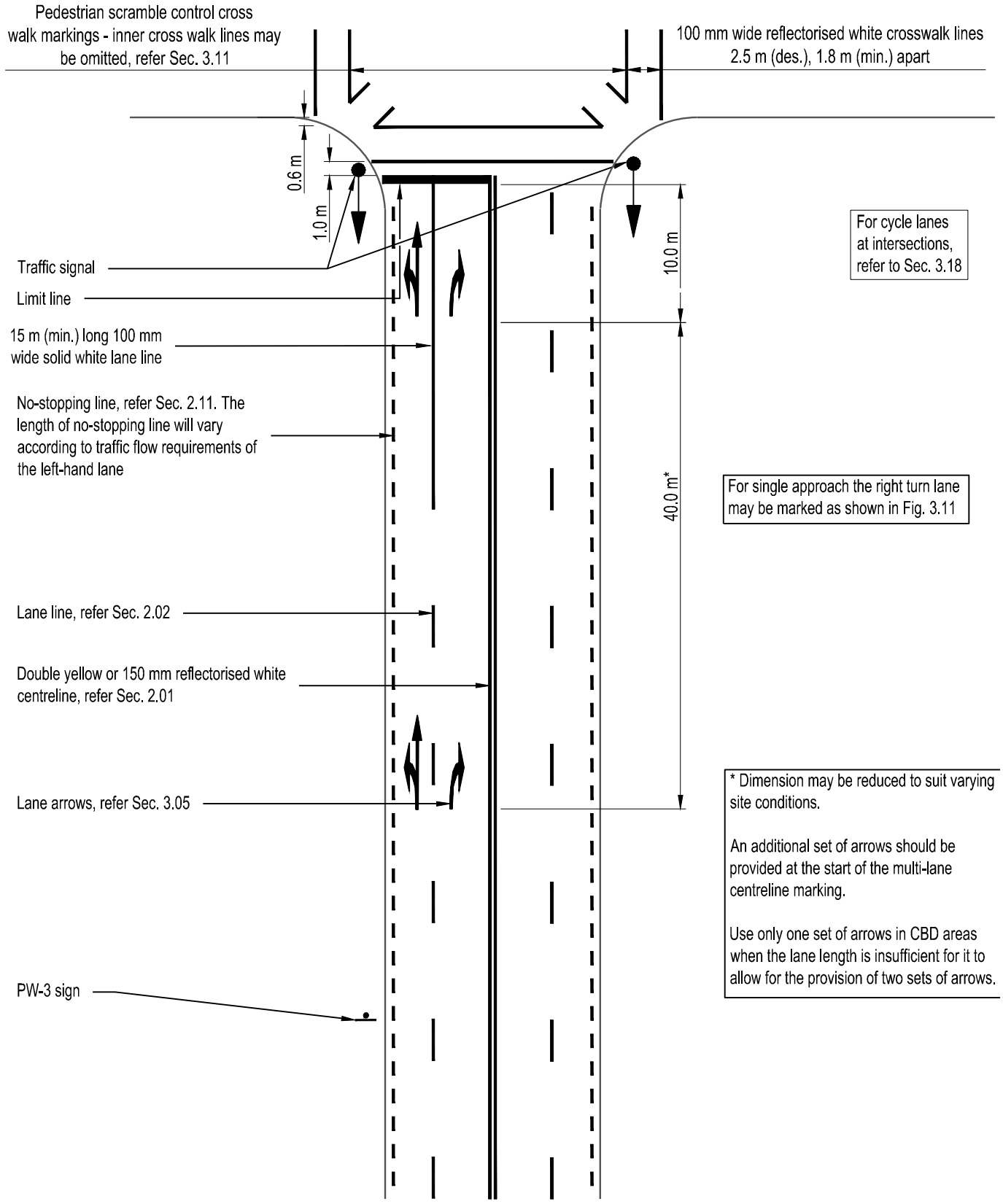


FIGURE 3.15 MARKINGS FOR TRAFFIC SIGNAL CONTROLLED RURAL INTERSECTIONS



MARKINGS FOR TRAFFIC SIGNAL CONTROLLED URBAN INTERSECTIONS FIGURE 3.16

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3.12 APPROACHES TO ROUNDABOUTS

3.12.01 GENERAL

Approaches to roundabouts are treated similarly to the approaches to GIVE WAY controlled intersections but RG-6R ROUNDABOUT GIVE WAY signs are used instead of R-6 GIVE WAY signs. Subtle differences also occur in the marking of limit lines, the treatment of traffic islands and kerb extensions and the marking of multi-lane approaches.

Roundabouts must be conspicuous if they are to function safely and effectively. High standards of delineation and signing shall be provided. It is important that consistent arrangements of signs and other devices are provided to enhance driver expectations.

Roundabouts should be designed in accordance with Austroads Guide to Road Design - Part 4B:Roundabouts.

The individual components of a typical roundabout approach shall be marked as shown in Figure 3.17.

3.12.02 CENTRELINES

Approaches to roundabouts should have kerbed splitter islands to slow and guide traffic on the approaches onto the roundabout.

The centreline should be continued along the left hand side of the raised traffic island to terminate at the limit line.

Centrelines in advance of raised traffic islands should be marked as shown in Section 2.08.02.

3.12.03 EDGE LINES

Edge lines are normally necessary on the final approaches to, and within roundabouts in rural areas.

In urban or fringe urban areas, edgelines may be not be needed where raised kerbs are installed and road lighting is good. If it is appropriate to install dotted yellow no-stopping lines on the approach to a roundabout, these should be reflectorised and will then perform the function of an edge line.

If an edge line exists on a roadway leading to a roundabout and is located more than about 0.5 m from the edge of seal, then it must terminate without taper at least 30 m in advance of the roundabout limit line.

Refer to Figures 3.17 and 3.33 for examples of the required stepped transition between the normal roadway edgeline and the final approach edge line, or no-stopping line, near roundabouts. This step is to remind cyclists who may be approaching the roundabout behind the edge line that they should now enter the normal traffic stream until beyond the roundabout.

3.12.04 LIMIT LINES

Limit lines shall be marked as defined in Section 3.06.

Limit lines on the approaches to roundabouts should generally be marked tangentially to the circulating carriageway.

Where there are two or more traffic lanes on an approach to a roundabout the limit line may need to be stepped and marked at right angles to each approach lane, so drivers in the left lane can see past adjacent vehicles on their right.

3.12.05 *'GIVE WAY'* TRIANGLE SYMBOL MARKING

From 27 February 2005, except where the road surface makes it impracticable, a *'GIVE WAY'* triangle symbol must be marked on the pavement of each lane approaching a roundabout.

NOTE: A lane approaching a roundabout that, before 27 February 2005, was marked by the word 'WAY' preceded by the word 'GIVE', in white capital letters at least 2 m high, may:

- ***continue to be marked in that way until the words are either permanently removed or overlaid, and***
- ***should have a triangular 'GIVE WAY' symbol marked between the word 'WAY' and 'GIVE', the symbol being located no more than 20m, and not less than 2 m from the limit line, or***
- ***the lane must be resealed and the triangular 'GIVE WAY' symbol, limit line and any lane use arrows marked to the new standard.***

Refer to Figure 3.9a for details of the *'GIVE WAY'* triangle symbol.

The *'GIVE WAY'* triangle symbol shall be marked in the following manner:

(a) Urban

Colour :	Reflectorised white
Height :	4.0 m
Location :	No more than 20 m from the limit line and, to ensure clear demarcation between the symbol and limit line, there should be a gap of at least 2 m

(b) Rural

Colour :	Reflectorised White
Height :	6.1 m
Location :	No more than 20 m from the limit line and, to ensure clear demarcation between the symbol and limit line, there should be a gap of at least 2 m.

3.12.06 CIRCULATING AND EXIT LANE MARKING AT MULTI-LANE ROUNDABOUTS

Sections of roadway around multi-lane roundabouts that have more than one traffic lane, and exits from those sections of roadway that also have more than one traffic lane, must be marked with lane lines to direct the flow of traffic.

The *'Alberta'* system is recommended to mark lane lines to direct the flow of traffic at multi-lane roundabouts.

Refer to Figure 3.17 and to the

Guidelines for Marking Multi-lane Roundabouts at

www.nzta.govt.nz/resources/guidelines-marking-multi-roundabouts/

Colour : Reflectorised white

Existing markings different to this should be corrected

when the roundabout is next resurfaced.

Lane line proportions may be altered to suit geometric layout of roundabout, at the discretion of the road controlling authority.

Lane lines should be marked across the extent of the throat islands and matched smoothly into the lane lines on the exit legs of roundabouts. The marking provides delineation for drivers of vehicles exiting multi-lane roundabouts and also legally defines that the driver of a vehicle to the left of the line is changing lanes when they are continuing on the roundabout past the next exit.

3.12.07 LANE ARROWS

From 27 February 2005, except where the road surface makes it impracticable, approaches to roundabouts that have more than one traffic lane must have arrows marked on each approach lane, to direct drivers into the correct lane.

Lane arrows should conform to the dimensions and details given in Section 3.05.

3.12.08 CHEVRON SIGHT BOARDS

Chevron sight boards for roundabouts, PW-69 (see part1 of this manual) should be provided for each approach lane.

On small roundabouts in urban areas a larger than normal but low mounted ID-1, ID-2, ID-3 guide signs or SN-1 street name signs may replace the chevron sight board.

Chevron sight boards, ID guide signs and street name plates shall be located on the central island, as indicated in Figure 3.17. Care should be taken that the sight boards are not, or do not become, hidden by vegetation on the central island.

3.12.09 RAISED REFLECTIVE PAVEMENT MARKERS

Red raised reflective pavement markers may be used to delineate kerb extensions on the approaches to roundabouts. RRPM's should be used on arterial roads, where lighting is deemed to be inadequate, or where there is a proven or potential accident hazard due to poor delineation of the road edge.

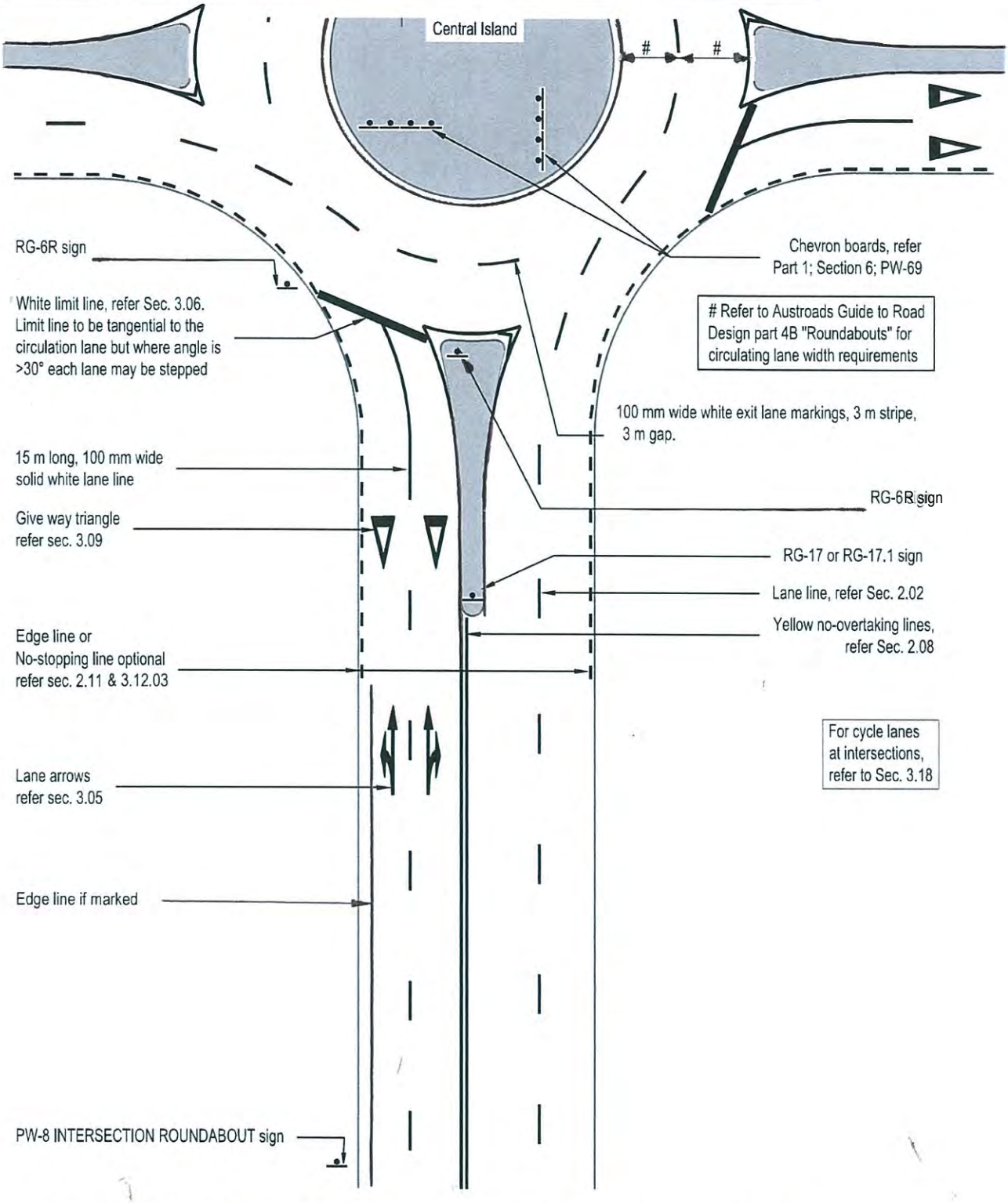
The minimum delineation requirements for RRPM's in advance of kerb extensions are as follows:

- white edge line 30 m minimum length
- six red mono directional RRPM's at 5 m intervals beside the edge line, the first RRPM is to be located adjacent to the obstruction.

3.12.10 SINGLE LANE ROUNDABOUTS

The markings specified above, with the exception of Section 3.12.06: CIRCULATING AND EXIT LANE MARKING AT MULTI-LANE ROUNDABOUTS and Section 3.12.07: LANE ARROWS, will also normally apply to single lane roundabouts.

APPROACHES TO ROUNDABOUTS



For various roundabout marking scenarios, refer to www.nzta.govt.nz/resources/guidelines-marking-multi-roundabouts/

MARKINGS FOR MULTI-LANE ROUNDABOUTS

FIGURE 3.17

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3.13 FLUSH TRAFFIC ISLANDS AT INTERSECTIONS

3.13.01 GENERAL

Traffic islands at intersections are normally kerbed. However, there are situations where kerbs could be hazardous, obstruct access to adjacent vehicle entrances or restrict the manoeuvring of unusual vehicles. In these situations a flush (or painted) traffic island may be used.

Chevron markings in advance of raised islands should be marked as indicated in Section 2.08.03.

3.13.02 RURAL

Flush traffic islands which indicate areas of pavement not intended for normal traffic use on rural roads should be marked as follows:

Refer to Figure 3.18

Colour	:	Reflectorised white
Border	:	300 mm des. 200 mm min.
Bar Width	:	600 mm min.
Bar Taper	:	2:1 *

** Bar taper may be varied to suit geometric layout of island.*

Bar spacing varies so that a minimum of two bars meet the border line along the main through road. The recommended spacing between bars is 1.2 m or at least twice the width of the bar.

3.13.03 URBAN ROADS

Flush traffic islands which indicate areas of pavement not intended for normal traffic use on urban roads should be marked as follows:

Refer to Figure 3.19

Colour :		Reflectorised White
Border Width	:	100 mm
Bar Width	:	600 mm
Bar Taper	:	2:1 *

** Bar taper may be varied to suit geometric layout of island.*

Bar spacing varies so that a minimum of two bars meet the border line along the main through road. The recommended spacing between bars is 1.2 m or atleast twice the width of the bar.

3.13.04 SEAGULL ISLANDS

The layout of seagull islands shall be determined by the turning paths of the design vehicles which are intended to use the intersection.

Pavement marked seagull islands maybe of similar detail to flush traffic islands defined above.

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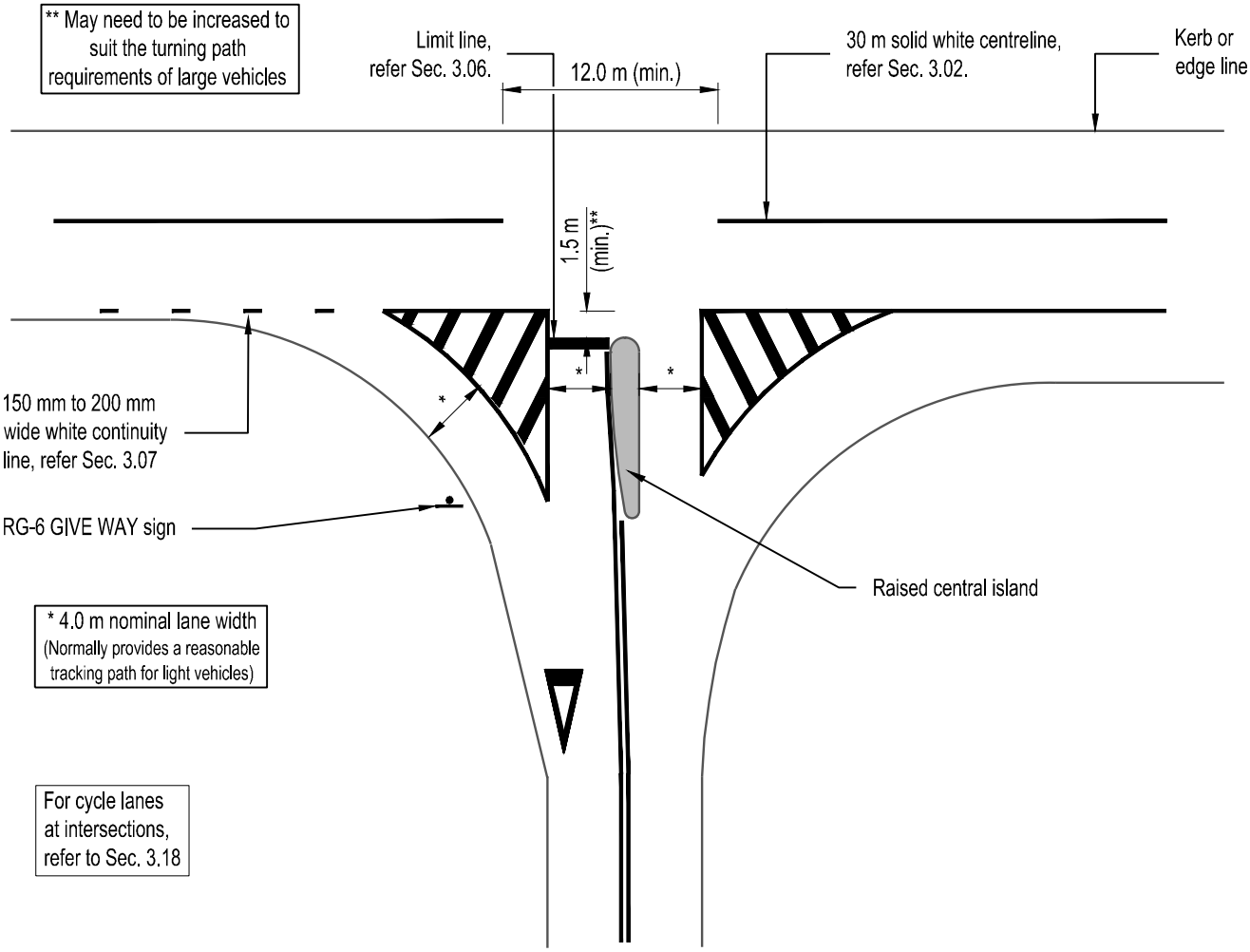
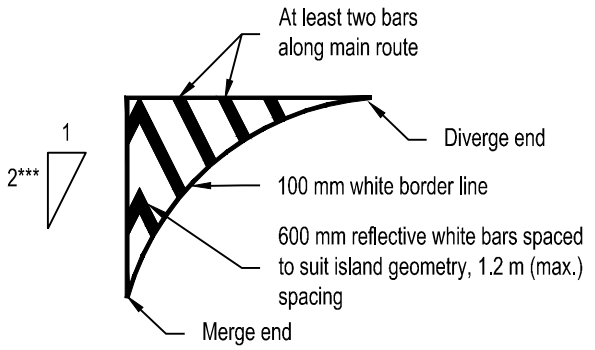
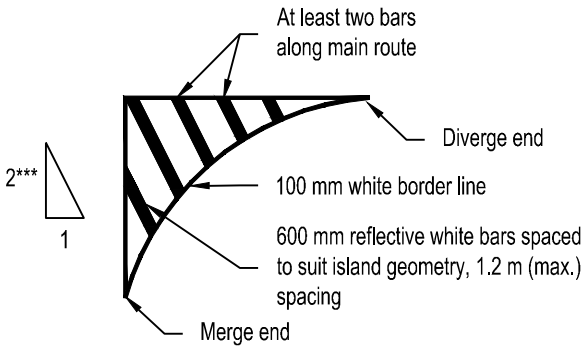
FLUSH TRAFFIC ISLANDS AT INTERSECTIONS



a) TYPICAL APPLICATION



b) RURAL FLUSH TRAFFIC ISLAND DETAIL



c) URBAN FLUSH TRAFFIC ISLAND DETAIL

*** Bar slope normally 2 : 1 but may vary to suit island geometry

MARKINGS FOR FLUSH TRAFFIC ISLANDS

FIGURE 3.19

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3.14 LEFT TURN LANES

3.14.01 GENERAL

Application:

Left turn lanes are provided at an intersection to improve safety, minimise delays to through vehicles or to ease the left turn movement where the angle of the intersection would result in an otherwise difficult movement.

Refer to AUSTROADS *Guide to Road Design Part 4A* Unsignalised and signalised intersections and also the LTSA guide *RTS 9: Guidelines for the Signing and Layout of Left Turn Slip Lanes*

Left turn flush traffic islands, refer Figure 3.20, should only be used when the conditions described in Section 3.13.01 apply or if there is insufficient space to build a raised traffic island.

Left turn flush traffic islands should never be installed at traffic signal controlled intersections.

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3.14.02 LANE LINES

The lane line separating a through lane from a left turn lane shall comprise of a broken Section followed by a solid Section.

Auxiliary lane lines should be marked as follows:

(a) Broken Section (Continuity Line):

Colour	:	Reflectorised white
Width	:	200 mm (rural), 100 to 150 mm (urban)
Stripe	:	1 m
Gap	:	3 m **

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*** In urban areas the gaps may vary from 1.5 m to 3.0 m depending on individual road controlling authority standards.*

Refer to Section 3.07 for continuity lines.

(b) Solid Section (Lane Line):

Where length of deceleration lane is greater than 50 m a continuous lane line should be painted from the end of the diverge taper to the commencement of the chevron markings.

Colour	:	Reflectorised white
Width	:	200 mm (rural), 100 mm to 150 mm (urban)
Stripe	:	Continuous (length to suit intersection layout)

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The lane line may be supplemented with white mono directional reflective raised pavement markers at 10 m centres.

3.14.03 ARROWS

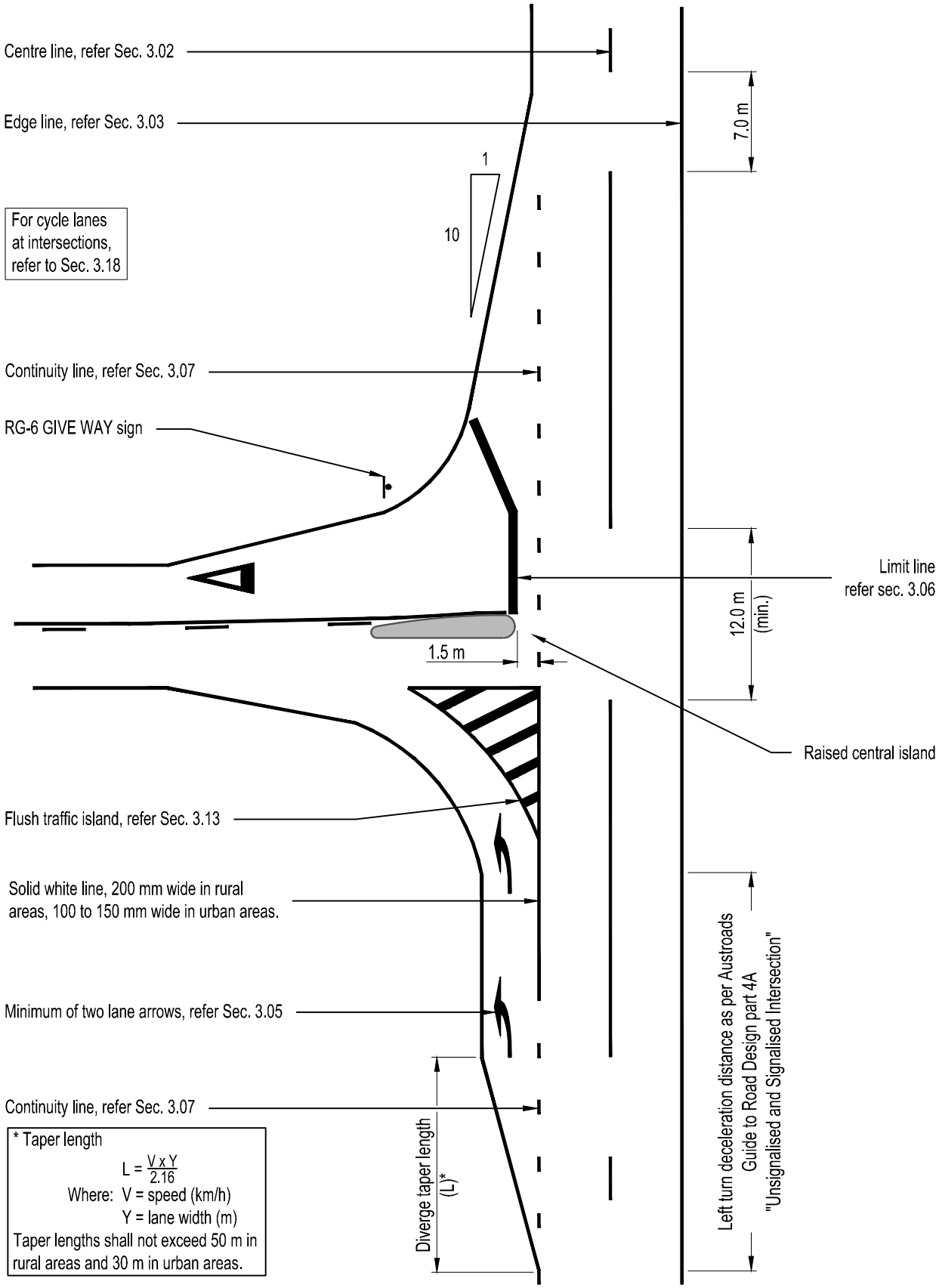
Left turn arrows should be marked as described in Section 3.05. A minimum of two arrows should be marked in each auxiliary lane.

3.14.04 FLUSH TRAFFIC ISLANDS

Refer to Figure 3.20

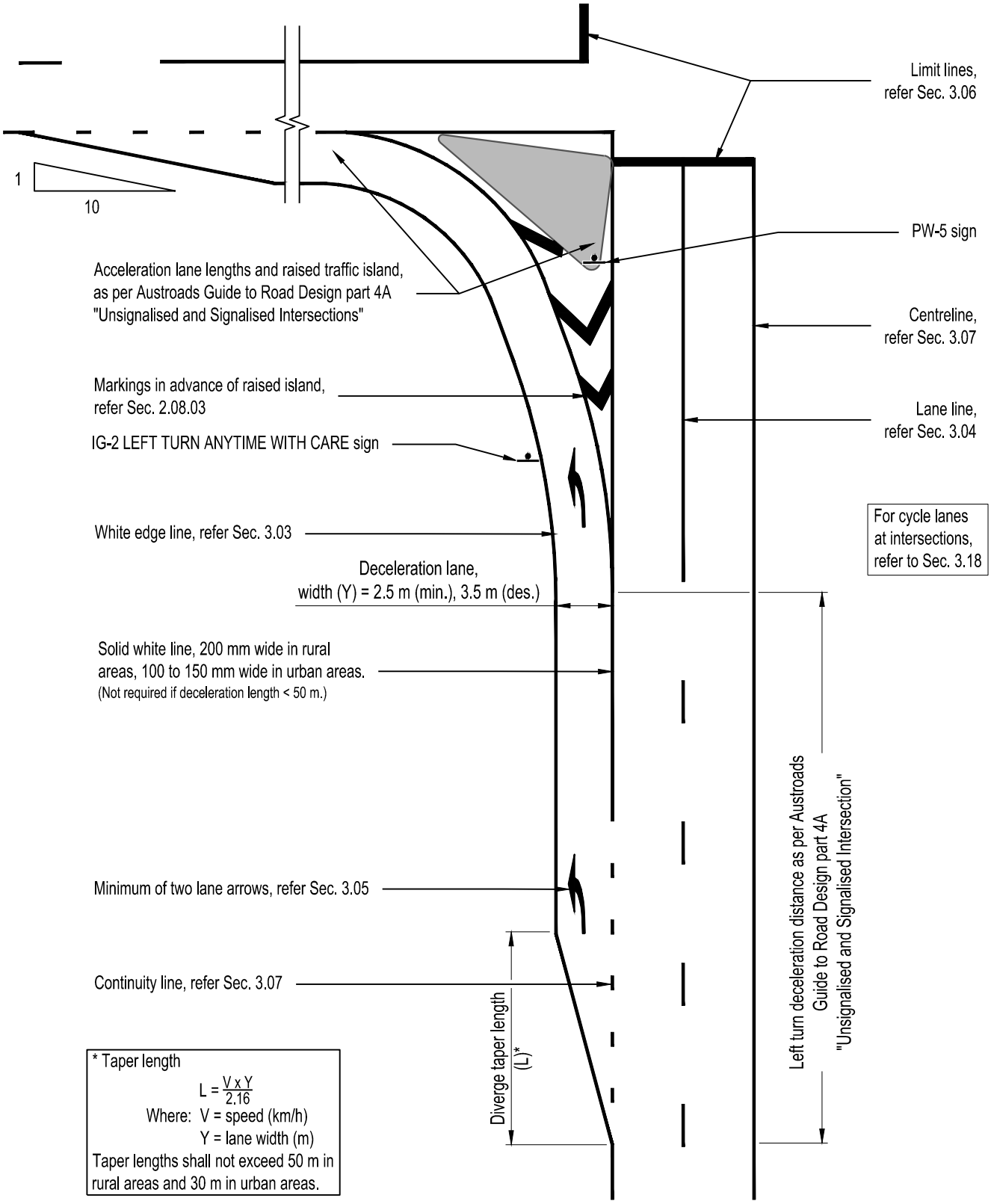
Flush islands that replace raised traffic islands should be marked as described in Section 3.13. Flush traffic islands shall not be used on left turn lanes at traffic signal controlled intersections.

Markings in advance of raised traffic islands should be marked as described in Section 2.08.03.



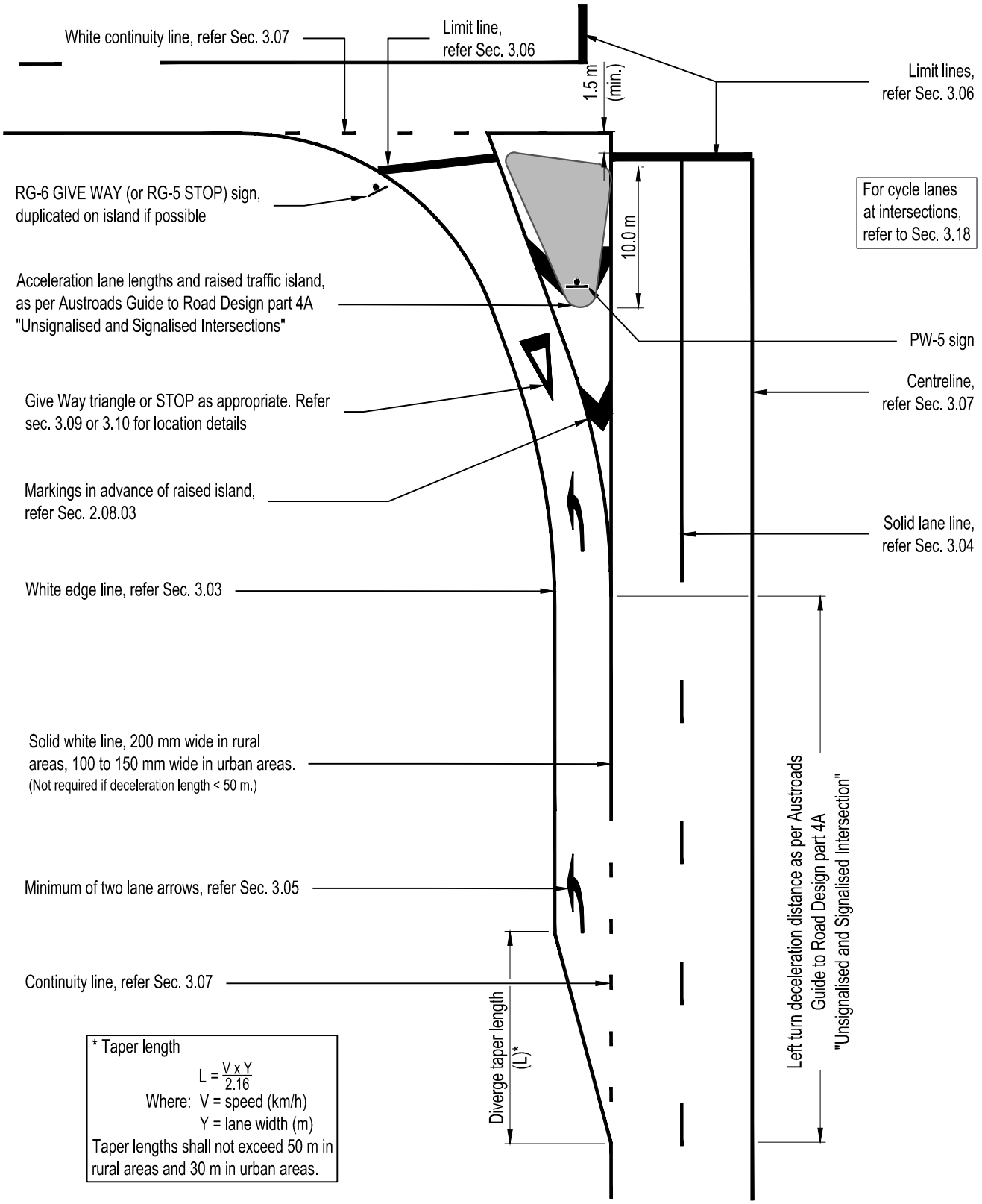
MARKINGS FOR LEFT TURN LANES
WITH A FLUSH TRAFFIC ISLAND

FIGURE 3.20



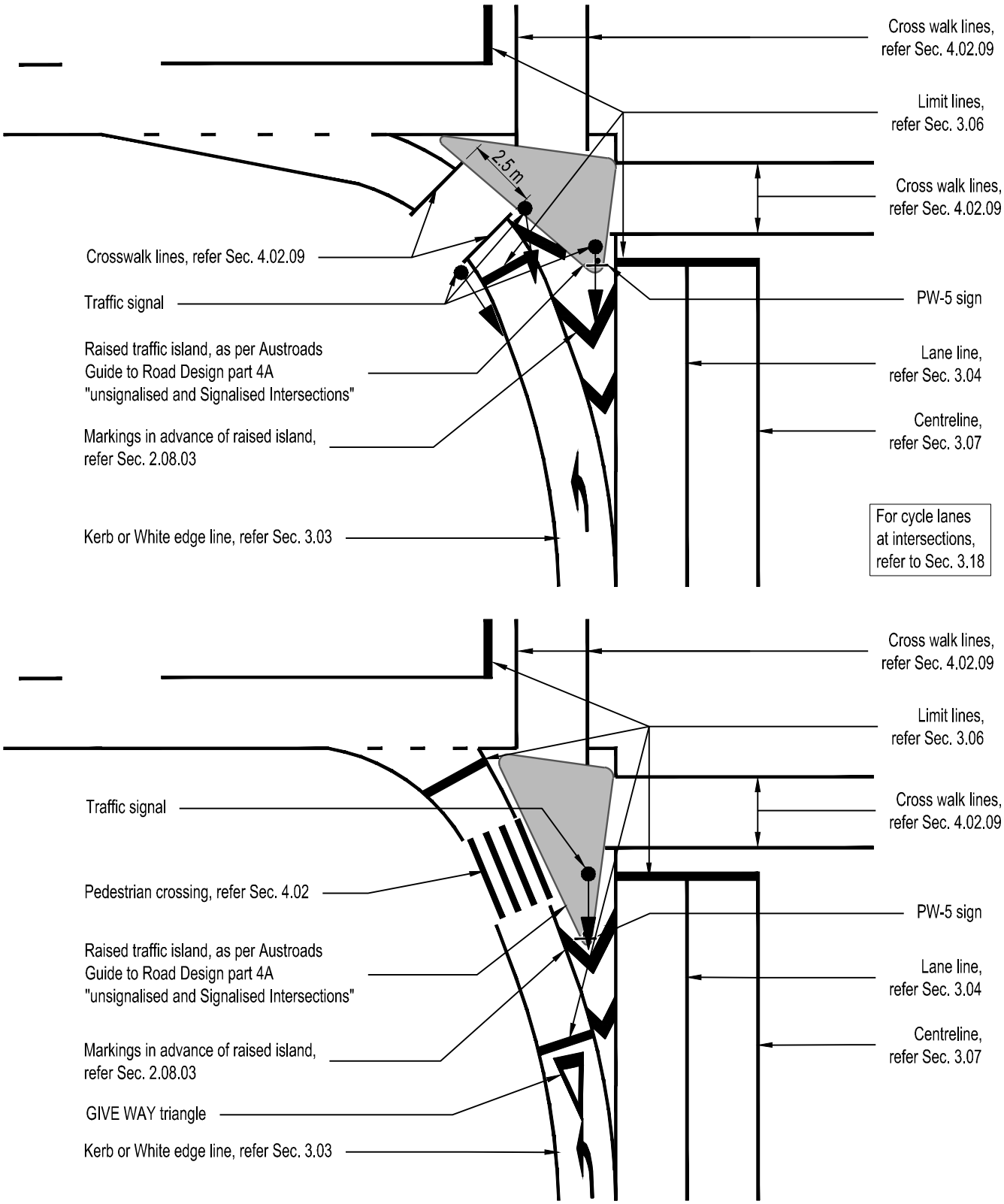
MARKINGS FOR LEFT TURN LANES - FREE FLOW WITH RAISED TRAFFIC ISLAND

FIGURE 3.21



MARKINGS FOR LEFT TURN LANES GIVE WAY CONTROL WITH A RAISED TRAFFIC ISLAND

FIGURE 3.22



MARKINGS FOR LEFT TURN LANES TRAFFIC SIGNAL CONTROL OR PEDESTRIAN CROSSING WITH A RAISED TRAFFIC ISLAND FIGURE 3.23

3.15 RIGHT TURN LANES IN RAISED MEDIANS

3.15.01 GENERAL

Where roads are divided by a raised median, right turn lanes may be provided at intersections where it is desirable to provide an adequate storage area for right turning vehicles clear of the through lanes.

On higher speed roads or major arterial roads, an adequate deceleration length should also be provided.

Refer to AUSTROADS *Guide to Road Design Part 4A* Unsignalised and Signalised Intersections, for the design of right turn lanes.

Right turn lanes in raised medians should be marked as shown in Figure 3.24.

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3.15.02 LANE LINES

The lane line separating a through lane from a right turn lane should be marked as follows:

(a) Broken Section (Continuity Line):

Colour	:	Reflectorised white
Width	:	200 mm (rural) 100 mm to 150 mm (urban)
Stripe	:	1 m
Gap	:	3 m **
Length	:	30 m generally.

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.

** *In urban areas the gap may vary between 1.5 m and 3 m depending on individual road controlling authority standards.*

Refer to Section 3.07 for continuity lines.

(b) Solid Section (Lane Line):

Colour	:	Reflectorised white
Width	:	200 mm (rural) 100 to 150 mm (urban)
Stripe	:	Continuous (length to suit intersection layout)

.
.

The lane line may be supplemented with white mono directional reflective raised pavement markers at 10 m centres.

3.15.03 ARROWS

Right turn arrows should be marked as described in Section 3.05.

A minimum of two arrows should be marked in the approach lane.

3.15.04 LIMIT LINE AND HOLDING LINE

(a) Limit line:

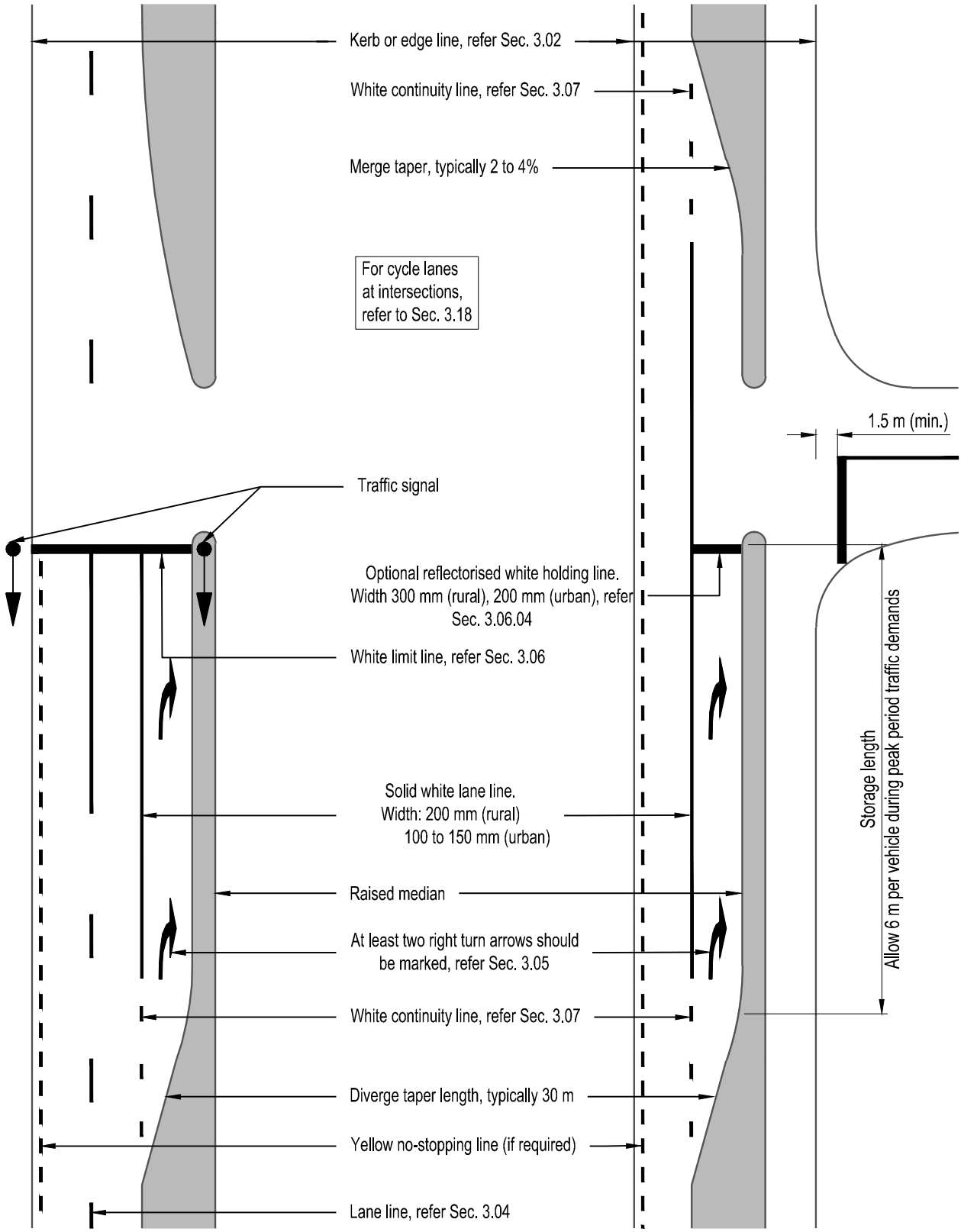
Where the right turn lane is on a controlled approach to an intersection a single limit line shall be marked as described in Section 3.06.

(b) Holding line:

Where the right turn lane is on an uncontrolled approach to an intersection a single reflectorised white holding line as described in Section 3.06.04 may be marked at the terminal of the right turn lane to indicate the point where a vehicle should stop.

The single holding line at right turn bays shall be marked at right angles to the centreline.

RIGHT TURN LANES IN RAISED MEDIANS



a) SIGNAL CONTROLLED INTERSECTION

b) PRIORITY CONTROL INTERSECTION

MARKINGS FOR RIGHT TURN LANES IN RAISED MEDIANS

FIGURE 3.24

3.16 RIGHT TURN BAYS

3.16.01 GENERAL

Where there are no raised median islands on the main road through an intersection and a right turn bay is provided, the paved area in advance of the bay should be marked to provide deceleration space for right turn vehicles clear of through traffic lanes.

A right turn bay results in less baulking of following through traffic and gives protection to the right turn queue, which is especially desirable in high speed rural areas.

The advance diagonal bars, their surrounding markings, the right turn bay markings and those through and beyond the intersection are shown in Figures 3.25 and 3.26.

An alternative right turn bay for use in constrained urban situations is shown in Figure 3.27.

Refer to Section 3.17 for details of right turn pockets in flush medians and Section 3.15 for details of right turn lanes in raised medians.

3.16.02 BORDER LINES AND DIAGONAL BARS

Details of bars and borders should be marked as follows:

(a) Rural:

Refer to Figure 3.25

Colour	:	Reflectorised white
Diagonal Bars	:	2 m wide at 10 m centres
Bay Width	:	3.5 m (desirable)#
		3.0 m (minimum)
Storage Bay Length	:	20 m (minimum) *

** The storage length in the bay should be adequate for the number and type of turning vehicles expected.*

(b) Urban:

Refer to Figure 3.26

Colour	:	Reflectorised white
Diagonal Bars	:	1.2 m wide at 6 m centres
Bay width	:	3.5 m (desirable)
		3.0 m (desirable minimum)
		2.5 m (absolute min)
Storage Bay Length	:	10 m (minimum) *

** The storage length in the bay should be adequate for the number and type of turning vehicles expected.*

3.16.03 DIVERGE AND MERGE TAPERS

Urban and rural right turn bay diverge and merge tapers are calculated as follows:

$$L = V \times Y / 2.16$$

Where:

L = Taper length (rounded to nearest 5 m)

V = 85th percentile approach speed (km/h)

Y = Lateral shift = Bay width (m)

3.16.04 HOLDING LINE

A single reflectorised white line may be marked at the terminal of the right turn bay to indicate the point where a vehicle should stop.

The holding line at right turn bays shall be marked at right angles to the centreline.

For pavement marking details of holding lines refer to Section 3.06.04

3.16.05 LANES

The lane line separating a through lane from a right turn lane shall be marked as follows:

Refer to in Figures 3.25 and 3.26.

(a) Broken Section (Continuity Line):

Colour	:	Reflectorised white
Width	:	200 mm (rural)
		150 mm (urban)
Stripe	:	1 m
Gap	:	3 m **

*** In urban areas the gap may vary between 1.5 m and 3 m depending on individual road controlling authority standards.*

Refer to Section 3.07 for details on continuity lines.

See also Figure 3.25a which shows a 5 metre wide right turn bay which is helpful in areas with high traffic volumes.

(b) Solid Section (Lane Line):

Colour : Reflectorised white
Width : 200 mm (rural)
100 to 150 mm (urban)
Stripe : Continuous (20 m minimum length)

.
.

3.16.06 ARROWS

Right turn arrows should be painted as early as possible in the right turn bay.

A minimum of two right turn arrows should be marked in rural right turn bay.

A minimum of one right turn arrow should be marked in urban right turn bays.

Right turn arrows should be marked as per Section 3.05.

3.06.07 CENTRELINES

Centrelines at right turn bays should be marked as shown in Figures 3.25 and 3.26.

In urban areas the centreline may be replaced with a solid 150 mm wide reflectorised white centreline as defined in Sections 2.01 and 3.02.

3.16.08 URBAN ALTERNATIVE

Where there is insufficient space available to mark a full right turn bay in a urban area, an alternative urban right turn bay may be marked as follows:

Refer to Figure 3.27

Bay Width : 3.5 m (desirable),
3.0 m (desirable minimum),
2.5 m (absolute minimum).

(a) Broken section (continuity line):

Colour : Reflectorised white
Width : 100 to 150 mm*
Stripe : 1 m
Gap : 1.5 to 3 m*
Tapers : As described in Figure 3.27.

** Approach taper markings are to be consistent with standard continuity line within a road controlling authority.*

Refer to Section 3.07.03 for continuity lines on urban roads.

(b) Solid Section (Lane Line):

Colour : Reflectorised White
Width : 100 mm to 150 mm
Stripe : Continuous (20 m minimum length)

(c) Lane Arrows:

A minimum of two right turn arrows shall be marked in the urban alternative right turn bay.

Right turn arrows should be marked as described in Section 3.05.

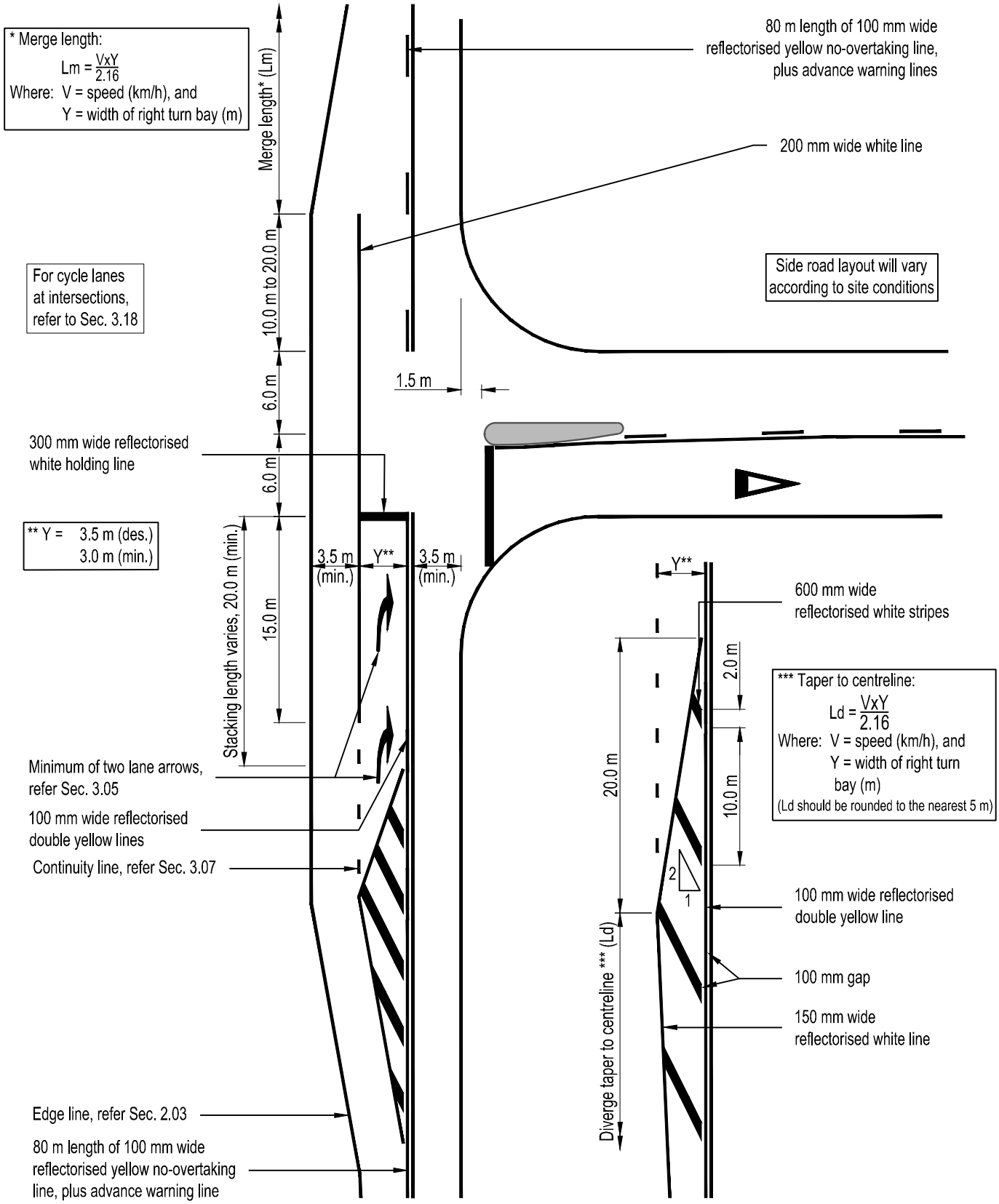


FIGURE 3.25 MARKINGS FOR RIGHT TURN BAYS IN RURAL AREAS

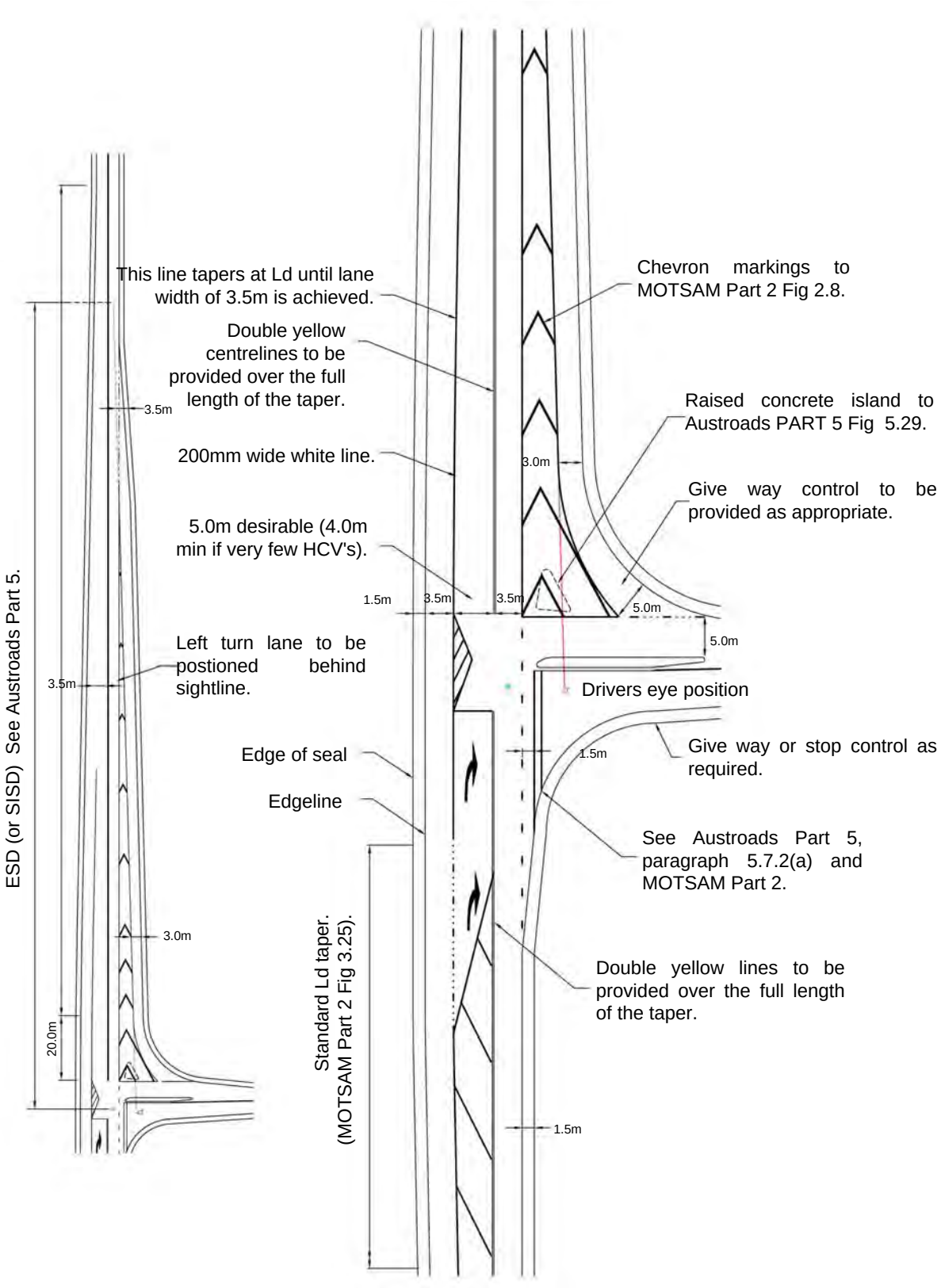
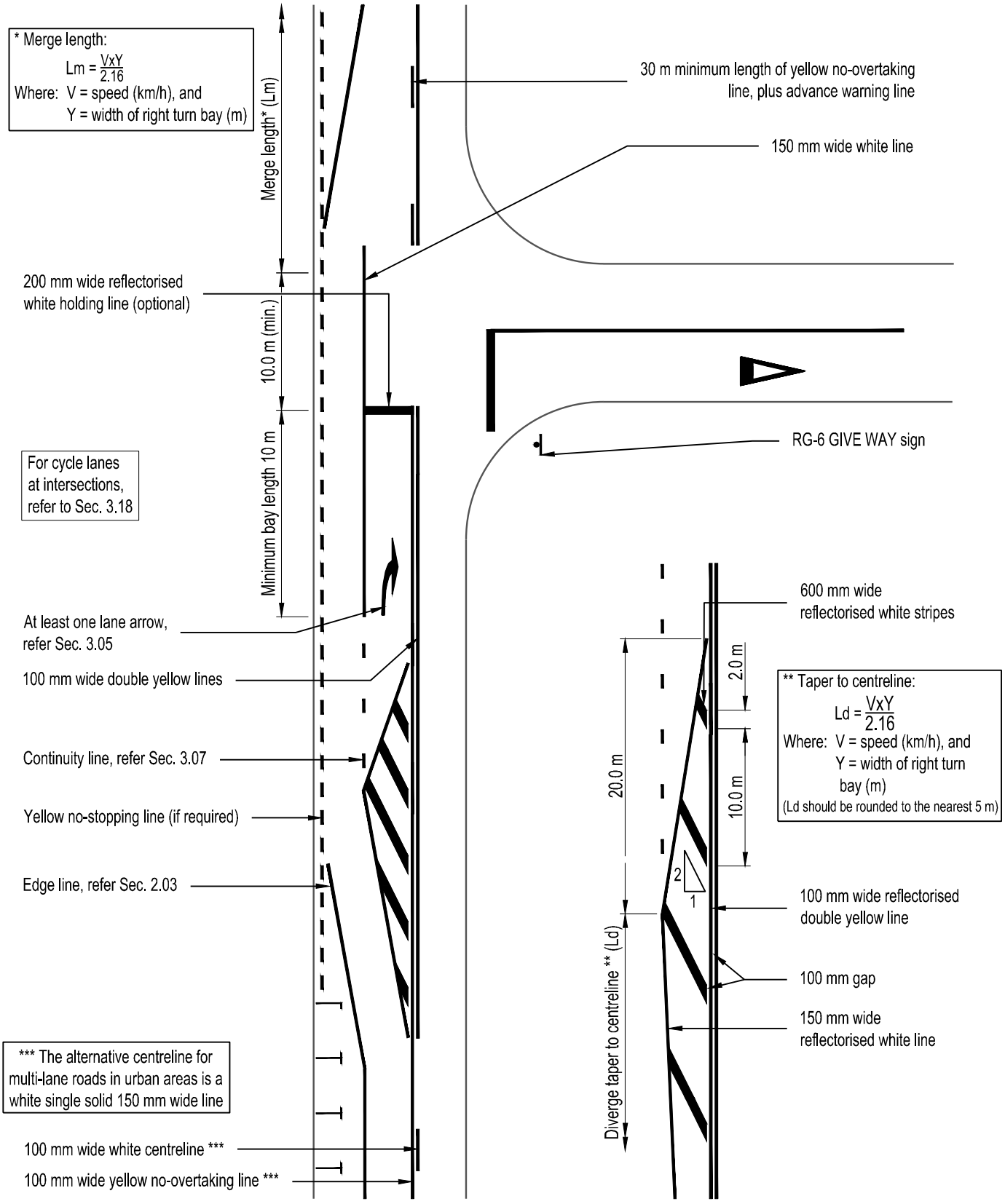


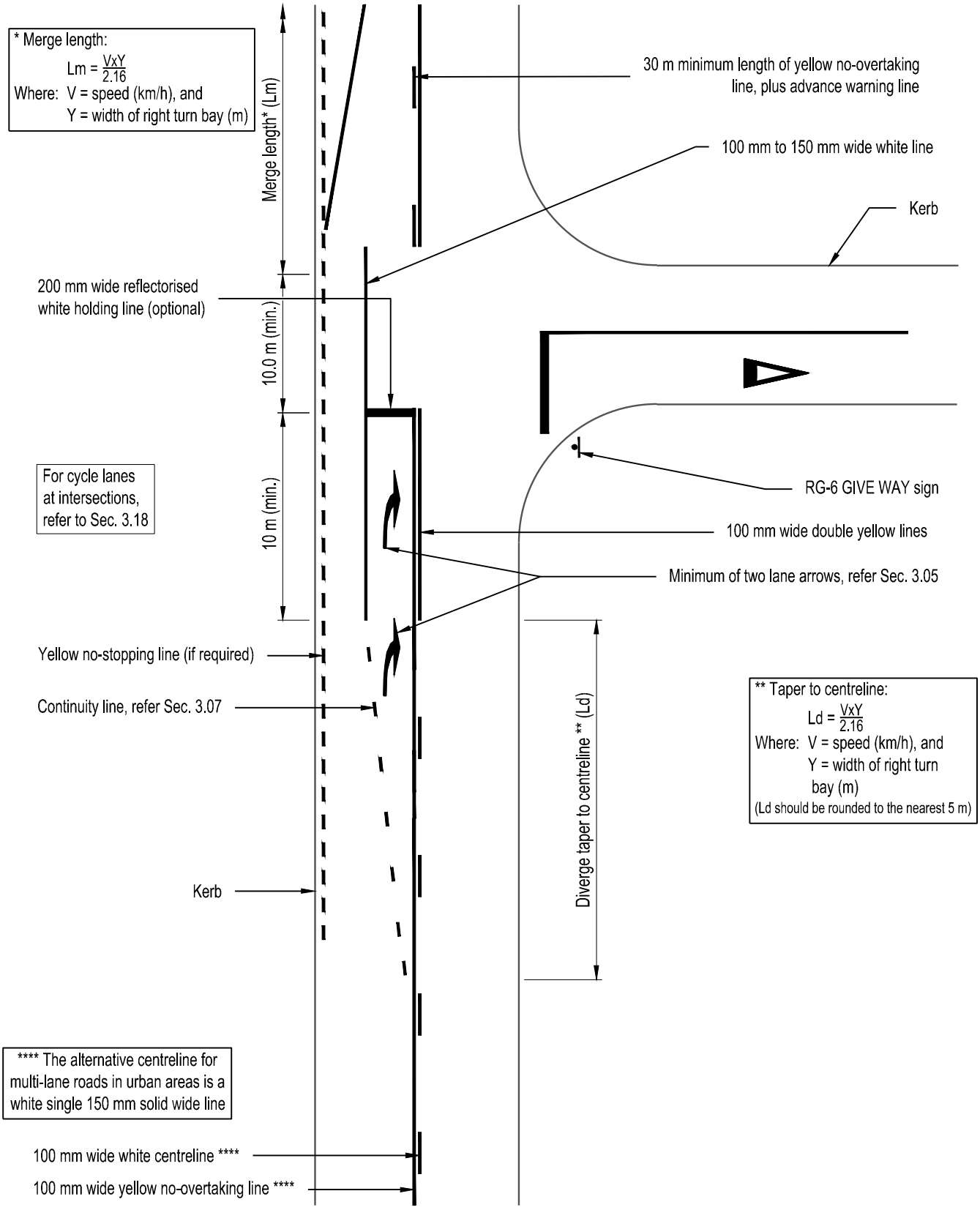
FIGURE 3.25a

EXAMPLE OF GOOD PRACTICE



MARKINGS FOR RIGHT TURN BAYS IN URBAN AREAS

FIGURE 3.26



MARKINGS FOR RIGHT TURN BAYS
FIGURE 3.27 URBAN AREA ALTERNATIVE

3.17 FLUSH MEDIANS AT INTERSECTIONS

3.17.01 GENERAL

Refer to Section 2.09 for pavement marking details of non intersection flush medians.

Refer to *RTS 4: Guidelines For Flush Medians*.

The markings described below are compatible with markings detailed in Section 3.16: Right Turn Bays.

Right turn pockets within a flush median differ from that of an isolated right turn bay as turning traffic is less exposed to a collision from the rear.

Where side roads have ***VERY*** low turning volumes (similar to that of a private driveway) or if the road controlling authority considers that for some reason it is better not to highlight the intersection by providing a gap in the median, the flush median may be marked straight through the intersection.

Flush medians at intersection treatments shall be marked as indicated in Figures 3.28 to 3.30.

3.17.02 BORDER LINES AND DIAGONAL BARS

For pavement marking details of border lines and diagonal bars refer to Section 2.09.

3.17.03 HOLDING LINE

A single white line may be marked at the terminal of the right turn pocket to indicate the point where a vehicle should stop.

The line at right turn pockets shall be marked at right angles to the median.

For pavement marking details of holding lines refer to Section 3.06.04.

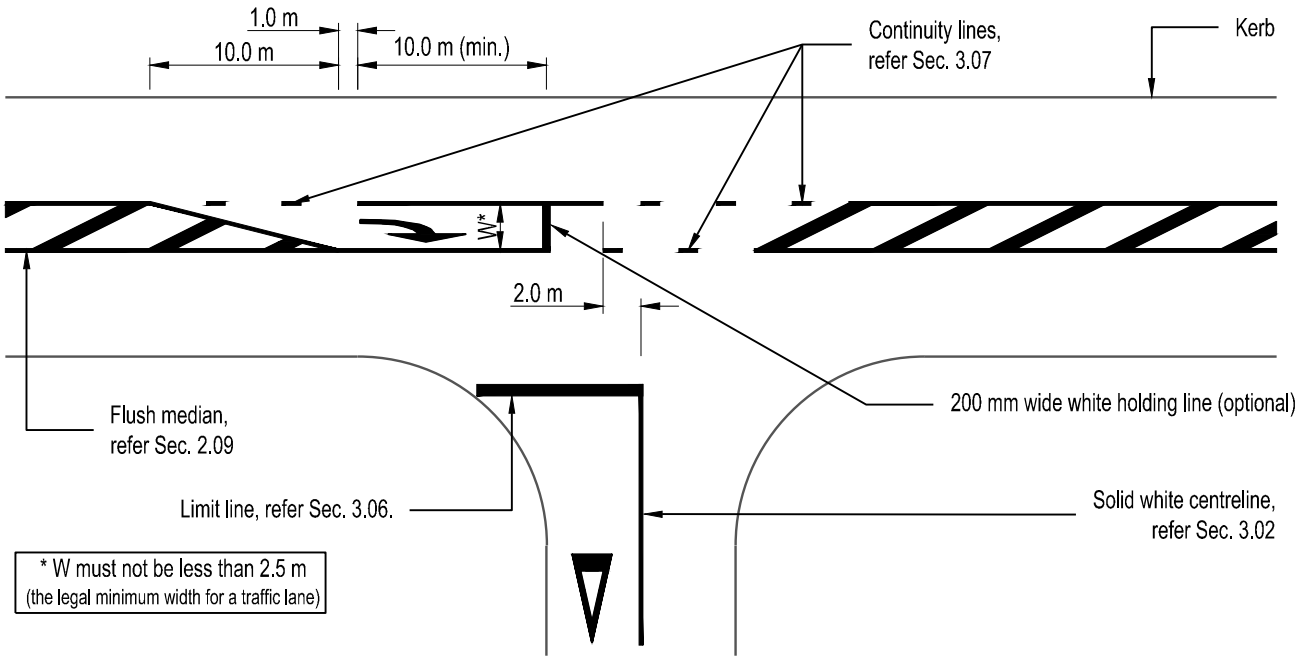
3.17.04 ARROWS

A single right turn arrow should be marked in right turn pockets in a flush median.

Refer to Section 3.05 for pavement marking details and proportions of right turn arrows.

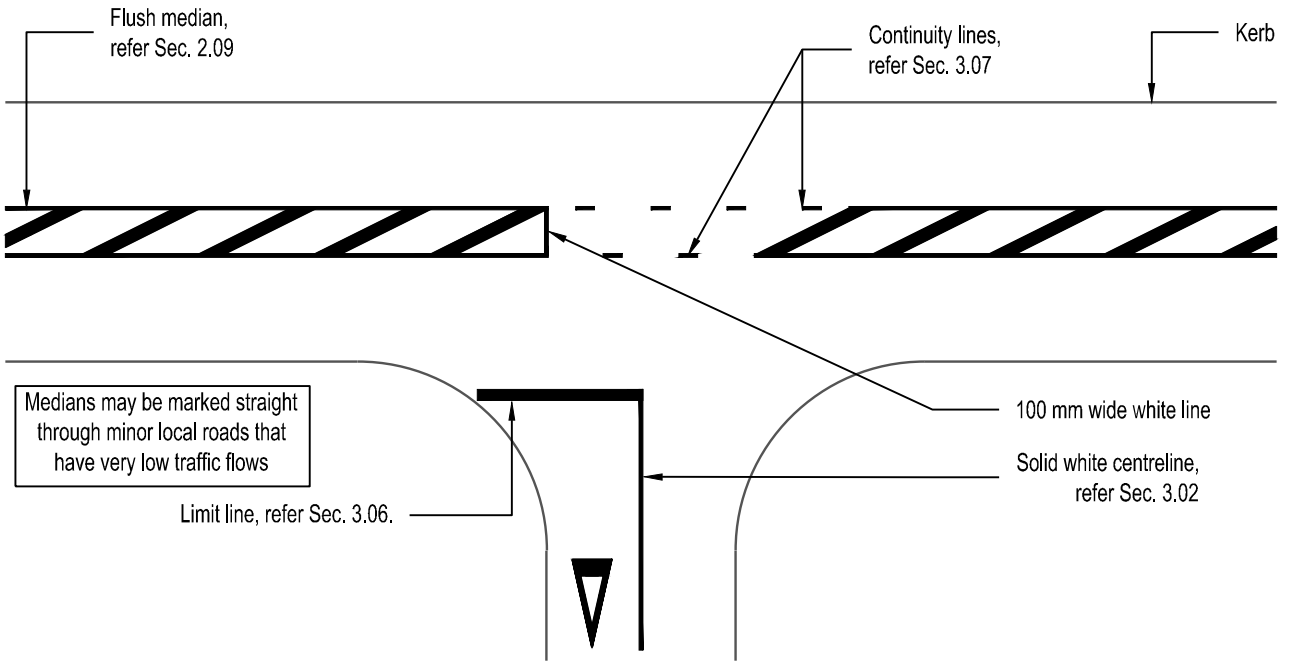
3.17.05 RAISED REFLECTIVE PAVEMENT MARKERS

Refer to Section 2.09.07 for details on the placement of RRPM's on flush medians.



a) SIMPLE 'T' INTERSECTION - MODERATE TURNING FLOW

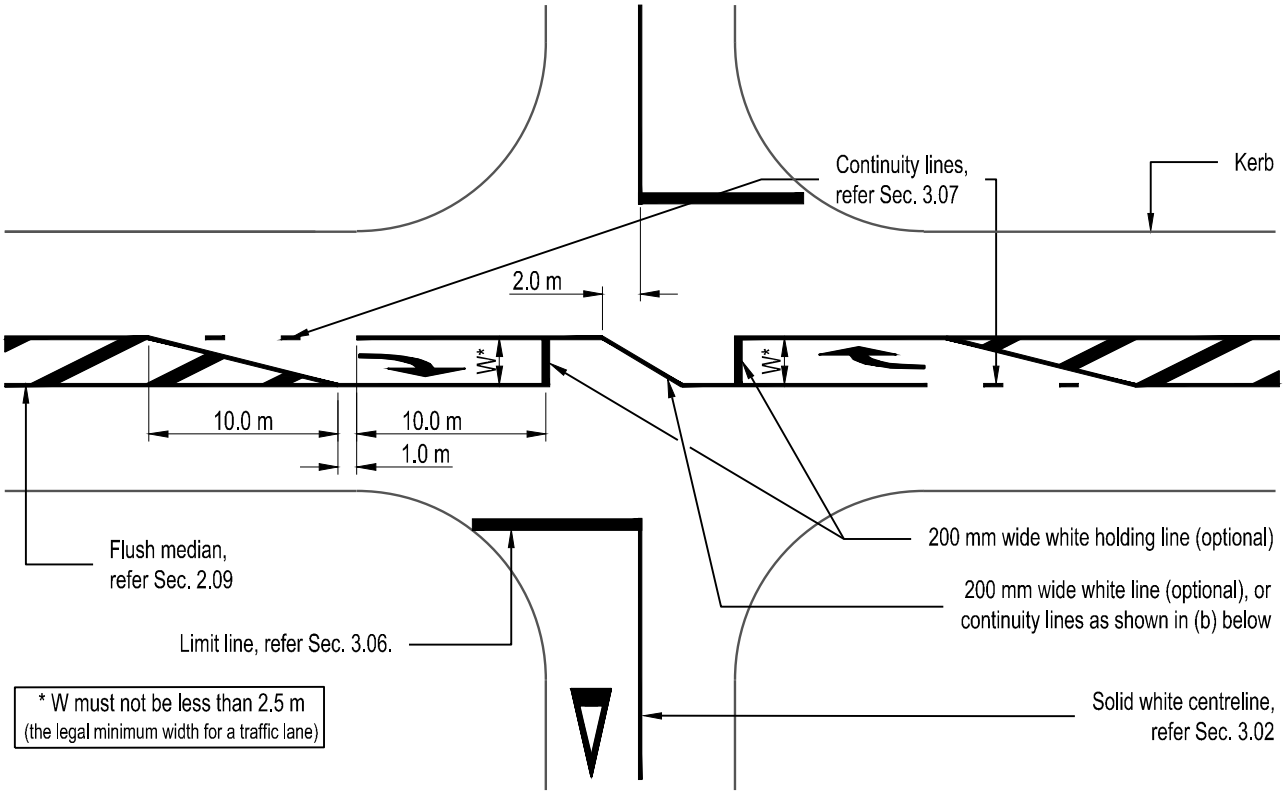
For cycle lanes at intersections, refer to Sec. 3.18



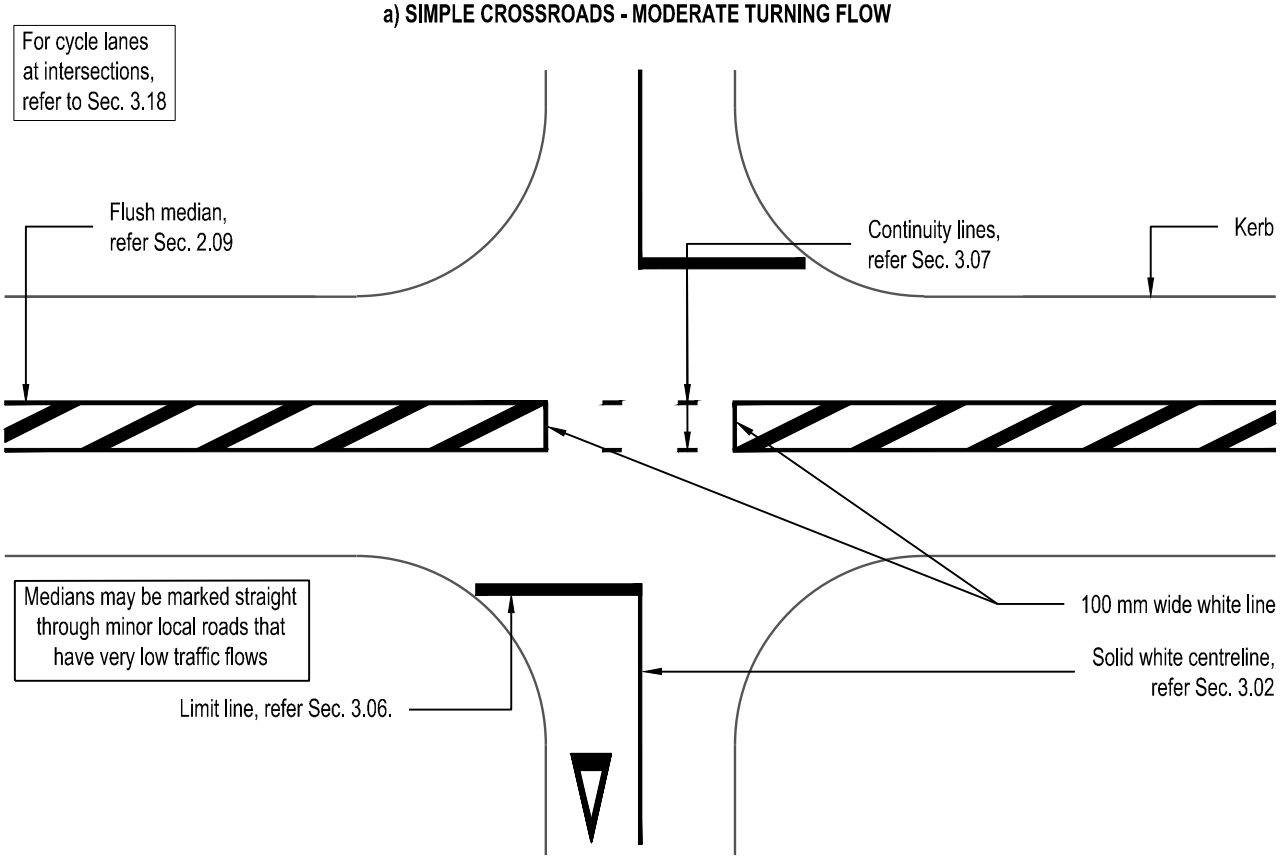
b) SIMPLE 'T' INTERSECTION - LOW TURNING FLOW

FIGURE 3.28 **MARKINGS FOR FLUSH MEDIANS AT 'T' INTERSECTIONS**

FLUSH MEDIANS AT INTERSECTIONS



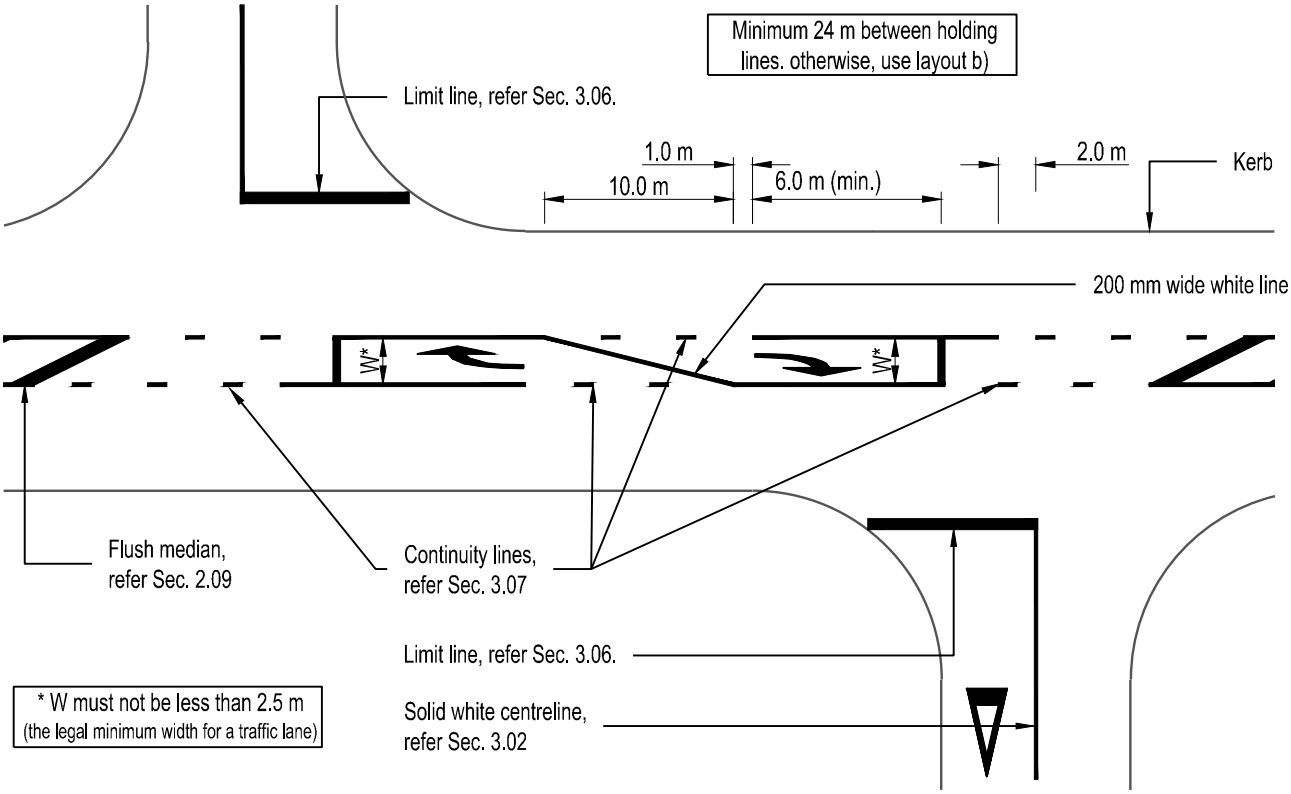
a) SIMPLE CROSSROADS - MODERATE TURNING FLOW



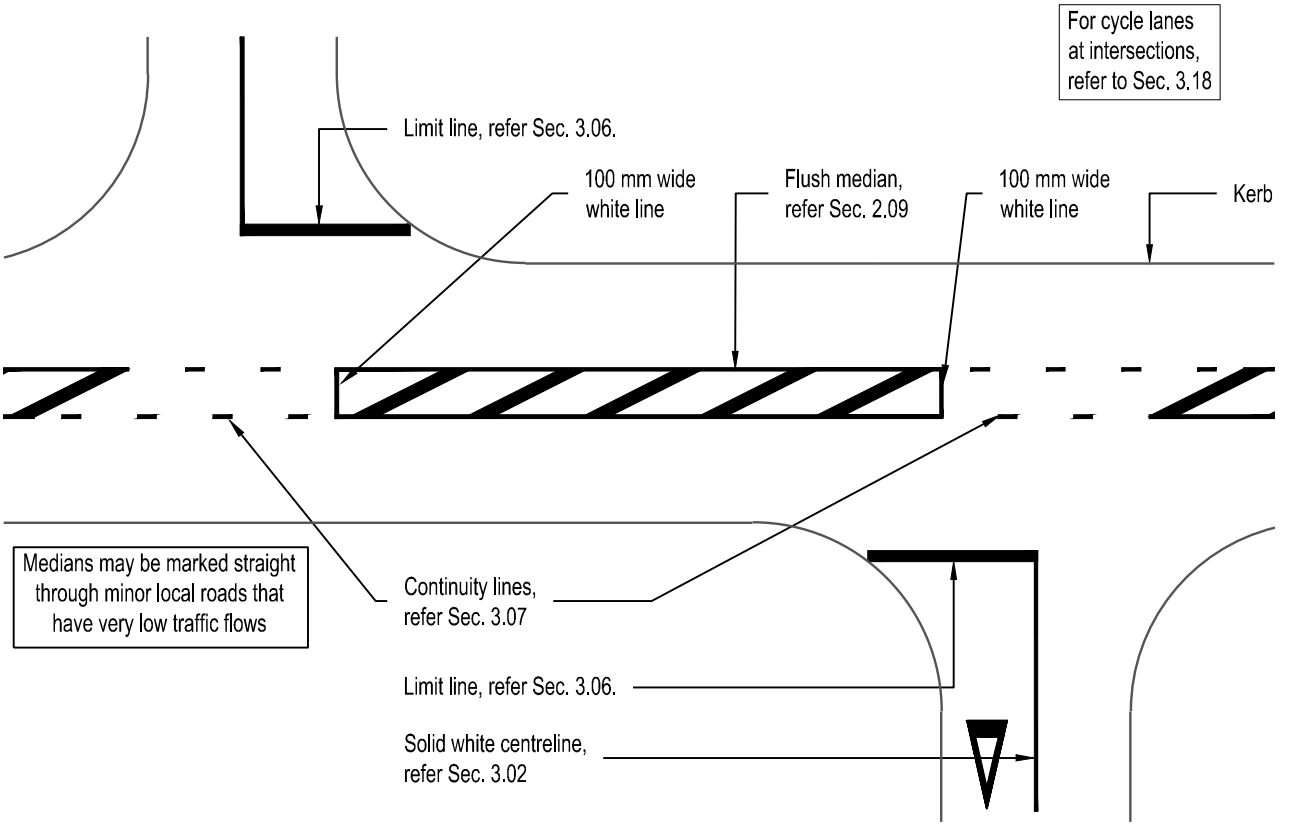
b) SIMPLE CROSSROADS - LOW TURNING FLOW

MARKINGS FOR FLUSH MEDIANS AT CROSS ROADS

FIGURE 3.29



a) OFFSET 'T' INTERSECTIONS - MODERATE TURNING FLOW



b) OFFSET 'T' INTERSECTIONS - LOW TURNING FLOW

FIGURE 3.30 MARKINGS FOR FLUSH MEDIANS AT OFFSET 'T' INTERSECTIONS

3.18 CYCLE LANES AT INTERSECTIONS

3.18.01 GENERAL

Refer to Section 2.10 for the marking of cycle lanes on the sections of roads between intersections.

Cycle lanes are provided where road space is to be formally allocated to cyclists using the road.

Special attention should be paid to the marking of cycle lanes at intersections as this is where cyclists may come into direct conflict with motorised traffic.

Cycle lanes at intersections should be marked as shown in Figures 3.31 - 3.38.

Further guidance is given in Austroads Guide to Traffic Engineering Practice Part 14 and its NZ Supplement, available at:

http://www.transit.govt.nz/technical/manuals.jsp.

In case of conflict between the guides, the information in the NZ Supplement prevails.

3.18.02 EDGE LINES

Where used along the route, edge lines at intersections should be marked as defined in Section 3.03 and Table 3.1 with tapers appropriate to side road requirements. The tapers must not cross the cycle lane, but should stop at the line that forms the left hand edge of the cycle lane as shown in Figure 3.32.

Where motorised traffic has to diverge or cross a cycle lane (e.g. at side roads, where a left turning lane forms to the left of a cycle lane, or at major driveways that have the characteristics of a side road), continuity lines as defined in Section 3.07 should be marked instead of an edge line.

3.18.03 CYCLE LANE LINES

The cycle lane line separating general traffic from cyclists should be defined by a solid line as described in Section 2.10.03 (a), or by a continuity line where the criteria outlined in Section 3.18.02 are met.

(a) Side Roads:

Cycle lane lines (whether solid or continuity) should define a continuous travelling path for cycling as detailed in Figures 3.31, 3.32 and 3.36 to 3.38.

(b) Signalised Intersections:

Cycle lane lines (whether solid or continuity) should define a continuous travelling path for cycling up to the limit line. The cycle lane should continue on the departure side of the intersection where space allows. Refer to Figure 3. 36.

Where space allows, cycle lanes should continue to the intersection and terminate with an advanced stop line (refer section 3.18.09) or advanced stop box (refer section 3.18.08) ahead of the other traffic lane limit lines.

An exclusive cycle turn lane may be marked as detailed in Figure 3. 37 (c).

Deliberate space should be provided to allow for safe merging and turning manoeuvres between cyclists and motorists.

3.18.04 DIAGONAL BARS

Diagonal bars should NOT be marked in the cycle lane.

3.18.05 CYCLE LANE SYMBOL

Cycle lane symbols as defined in Section 2.10.04 should be marked at the re commencement of the cycle lane after each intersection, in advanced stop boxes, and in other locations as required.

3.18.06 COLOURED SURFACING

At particular locations where motorists need to be reminded of the likely presence of cyclists, or where cyclists are likely to feel under stress from potential conflicts with motor vehicles, cycle lanes should be given a distinctive pavement surface colour.

Suggested locations for such treatment are: near intersections; in advanced stop boxes, advanced stop lines and hook turn boxes; 10 m on the approach to busy intersections (excluding roundabouts); through sections of cycle lane marked with continuity lines; 3 -5 m on the departure lanes of roundabouts; and past side roads (beginning 5 -10 m before the intersection – see Figure 3.31a).

Coloured surfacing is NOT to be used on the cycle lane approaches to roundabouts as cycle lanes are to be terminated prior to roundabouts, and cyclists may need to take a general lane for their desired manoeuvre.

Colour: Green - Use AS 2700 S 1996 colour G13 Emerald or similar*.

*Ref: http://www.tmr.qld.gov.au/~/media/business-and-industry/technical-standards-and-publications/traffic-and-road-use-management-manual/august-2010-amendment-14/1_34.pdf

3.18.07 CYCLE LANES AT ROUNDABOUTS

Cycle lanes are NOT to be marked on the circulating lanes of roundabouts. Cycle lanes on approaches to roundabouts should be terminated 30 m from the limit lines, or at a connection to an off-road alternative path.

This is because forcing cyclists to the left of motor traffic results in circulating cyclists being less obvious to motorists attempting to enter the roundabout as they search for traffic to give way to. Also, circulating cyclists are more likely to come into conflict with exiting vehicles if cyclists are forced to the outside lane.

By omitting cycle lanes from the approaches to roundabouts cyclists are able to adopt lane positioning similar to that of motorists, which improves safety for all users. If cycle lanes are marked motorists may show disapproval of cyclists who do use the other traffic lanes.

For cyclists' safety, it is desirable to have roundabouts with single lane entry, circulation and exit. Where this is not possible, due to capacity constraints, vehicle speeds should be kept as low as possible by limiting approach visibility, and introducing geometric delay. Alternative intersection controls (especially traffic signals) should also be considered.

Where off-road alternatives are also provided it should not be assumed that cyclists will (or should) use these; thus all roundabouts should be designed with on road cyclists in mind.

Figure 3.33 shows a single-lane and a multi-lane roundabout where cycle lanes are terminated 30 m from the limit lines and cyclists are expected to progress through the roundabout within the traffic lanes.

Kerbside cycle lanes can be marked on the departure side of roundabouts.

3.18.08 ADVANCED STOP BOXES

Advanced stop boxes (ASBs) allow cyclists to queue at signalised intersections in front of motor vehicles. This makes cyclists more visible, and may allow them to change lanes. ASBs do not require the presence of approach cycle lanes at intersections.

ASBs should not extend across more than two adjacent lanes in either direction from a cycle lane, as shown in Figure 3.34. ASBs should not extend across more than two adjacent lanes if no approach cycle lane is provided.

ASBs can be provided for movements where no departure cycle lane is available. Where cyclists would typically proceed straight ahead from an exclusive left turning lane (which is in breach of the Road User Rule), it can be considered to remove the left turn arrows (i.e. legalising the behaviour) and providing an ASB ahead of the kerbside lane.

ASBs should not be in conflict with exclusive turning movement operation, i.e. an ASB for straight ahead cyclists should not be placed ahead of the kerbside lane if the signals operate an exclusive left turning phase.

Coloured surfacing (section 3.18.06) can be used to reinforce the existence of ASBs. Figure 3.34 gives the dimensions required; they should generally be the same width as the relevant general traffic lane and a minimum of 3 m in length. A cycle lane limit line should be 100 mm wide, and leave a 200 mm gap to pedestrian crosswalk lines, as shown in Figure 3.34.

The location of the limit line of ASBs in front of right turning lanes may need to be located away from pedestrian crosswalk lines to suit swept path requirements, or the box can be reduced in width (i.e. extend across part of the right turning lane only).

3.18.09 ADVANCED STOP LINES

Advanced stop lines (ASLs) continue the cycle lane further than adjacent traffic lanes at a signalised intersection, to position cyclists in front of motorists.

Advanced stop lines should be 2 m from the limit lines of other traffic lanes. A cycle lane limit line should be 100 mm wide, and leave a 200 mm gap to pedestrian crosswalk lines, as shown in Figure 3.36.

Advanced stop lines should always be provided where ASBs are not feasible, even at mid-block signals and adjacent to exclusive through lanes.

3.18.10 HOOK TURNS

At busy multi-lane signalised intersections, it may be difficult for some cyclists to move to the right turn lane and a hook turn facility can be provided to assist with the manoeuvre. This allows cyclists to make a right turn in two stages. The first stage involves moving to the far side of the intersection, keeping as far left as possible. The cyclist then waits there (in the hook turn box) until the side street gets a green light and then moves with side street traffic across the intersection.

Hook turn boxes should be placed clear of the trajectory of through cyclists. The location of a hook turn box must consider the phasing of the side street phase, e.g. it needs to be clear of left turning vehicles if these have an exclusive left turning phase.

The size of the hook turn box will depend on the space available and the number of cyclists that should be accommodated at any one time. It should provide an area of at least 3 m^2, with each of the edges being at least 1.5 m long.

A cycle symbol (section 2.10.04) and directional arrow should be marked within the hook turn box. The cycle symbol and the arrow should be aligned with the direction of travel from which the cyclists access the box, to

avoid cyclists travelling straight through from the adjacent approach confusing the box with an advanced stop box.

Examples of hook turns are shown in Figure 3.35. A standard stencil for the hook turn marking is provided in Figure 3.35a. Note that the arrow is 30% of the standard turn arrow size (refer to section 3.05) and the cycle symbol size is that for a 50 km/h road.

3.18.11 CYCLE LANE ARROW MARKINGS

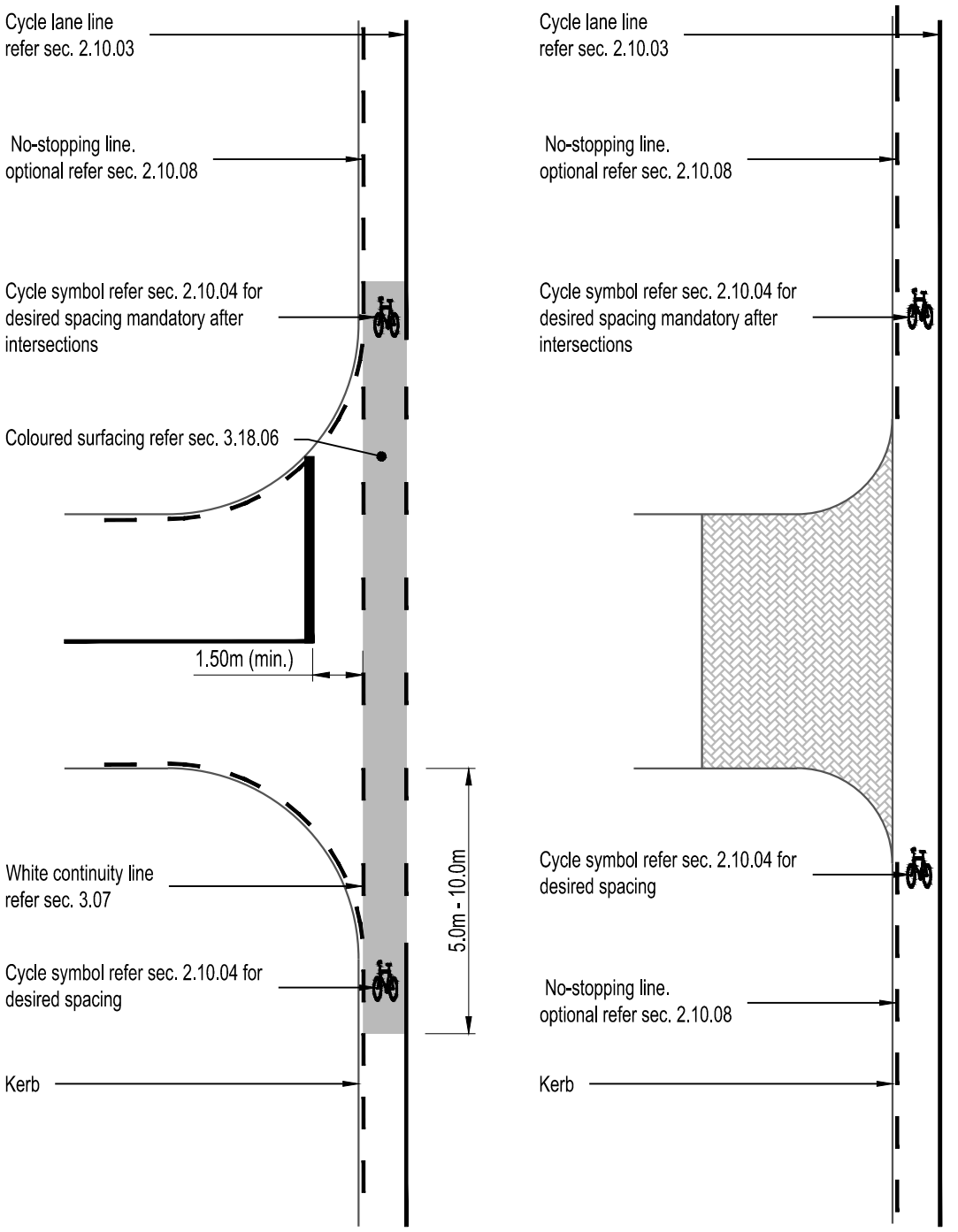
Where additional cycle lanes are provided to assist turning movements a scaled version of a lane arrow can be marked in the cycle lane along with a cycle symbol (refer section 2.10.04). The cycle lane arrow should be 30% of the size of general lane arrows (see Figure 3.5). See Figure 3.37 (c) for an example of this use.

3.18.12 CYCLE LANES AT SIGNALISED INTERSECTIONS

Figures 3.36 and 3.37 show appropriate transitions of cycle provision between midblock and intersection locations. The aim is to achieve continuous provisions for cycling. Any tapers should ideally be 1:20, with a maximum of 1:10.

Kerbside cycle lanes must NOT be used where an exclusive left turn lane exists.

To discourage motorists from driving in kerbside cycle lanes at intersections, the combined width of the cycle lane and adjacent general traffic lane should not be greater than 4.8 m. Otherwise, motorists commonly form two separate queues.

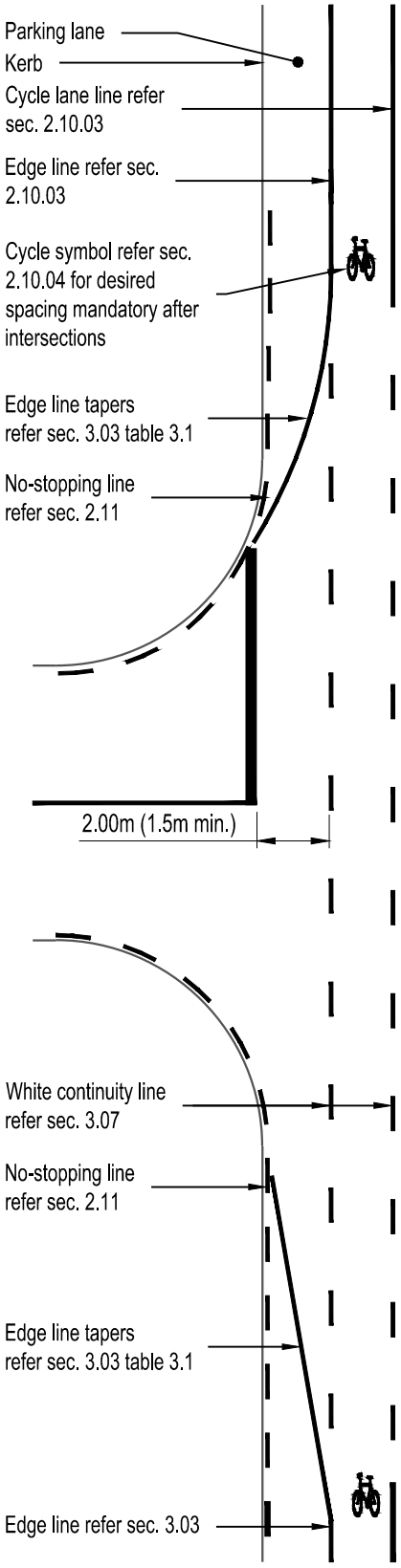


A) COLLECTOR ROAD OR LOCAL SIDE ROAD

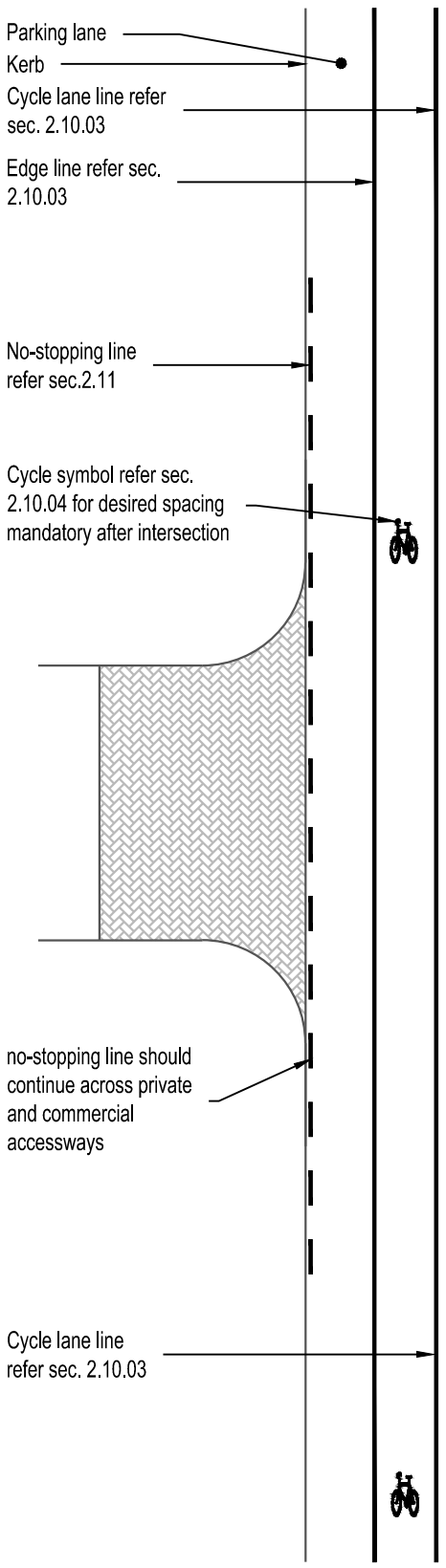
B) SIDE ROADS WITH LOW TURNING VOLUMES AND TRAFFIC RESTRAINTS OR ACCESSWAYS

MARKINGS FOR CYCLE LANES AT INTERSECTIONS ON ROADS WITHOUT EDGELINES

FIGURE 3.31

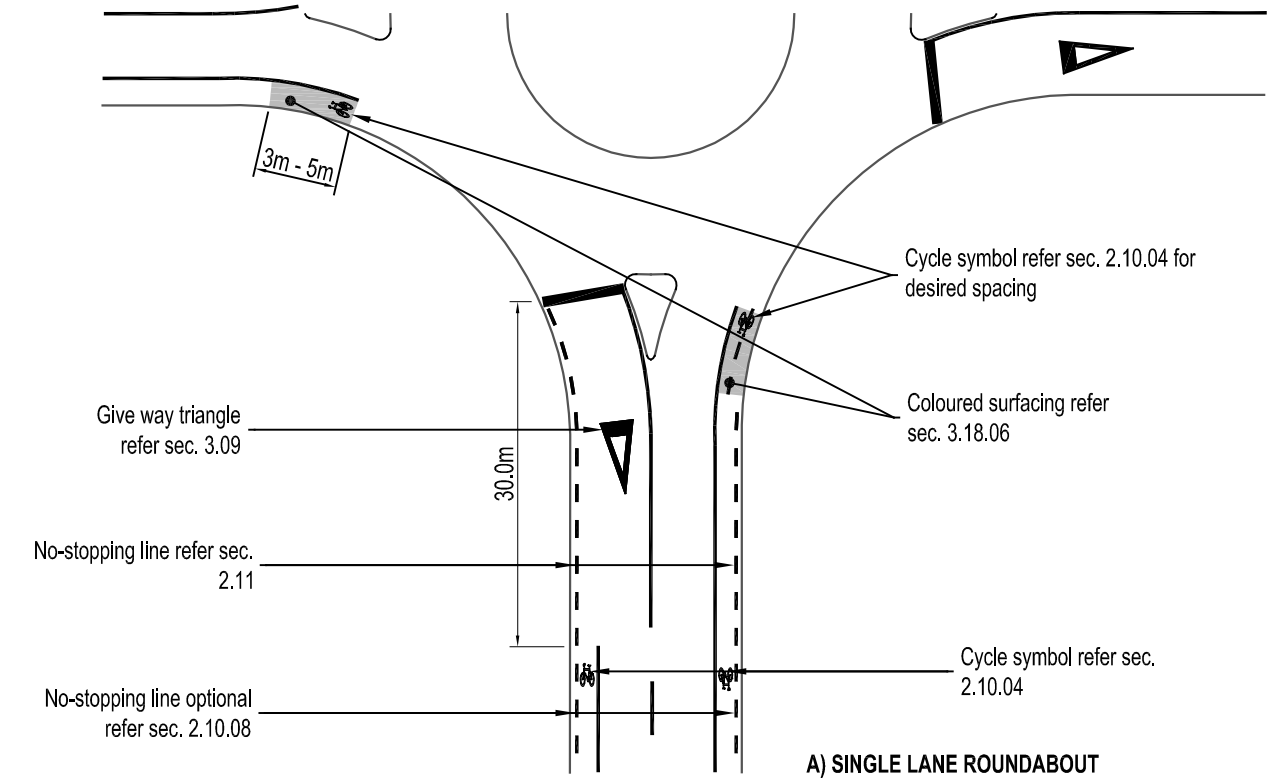


A) ARTERIAL OR COLLECTOR SIDE ROAD OR LOCAL ROAD



B) ACCESSWAY OR TRAFFIC RESTRAINT ON LOW VOLUME LOCAL ROAD

MARKINGS FOR CYCLE LANES AT INTERSECTIONS ON ROADS WITH EDGELINES FIGURE 3.32



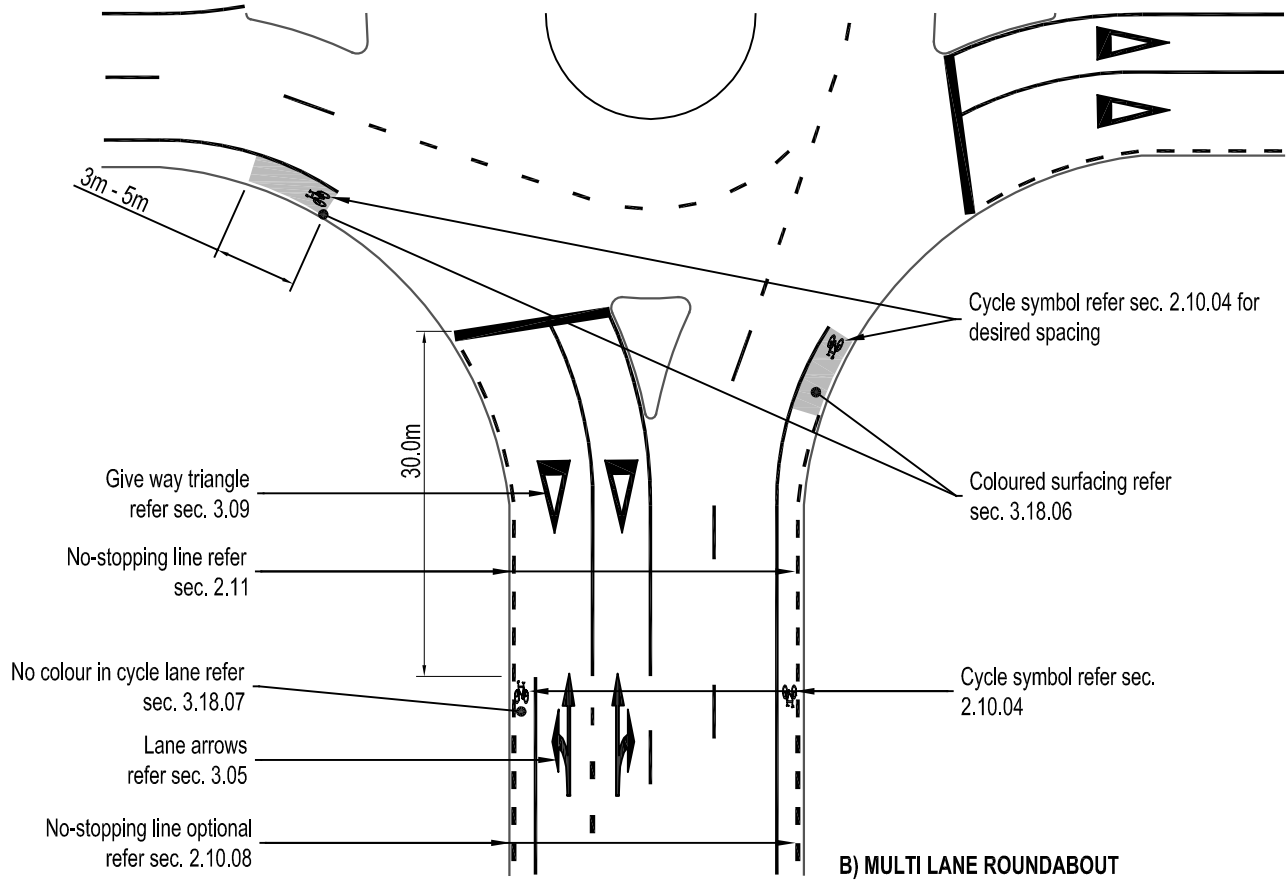
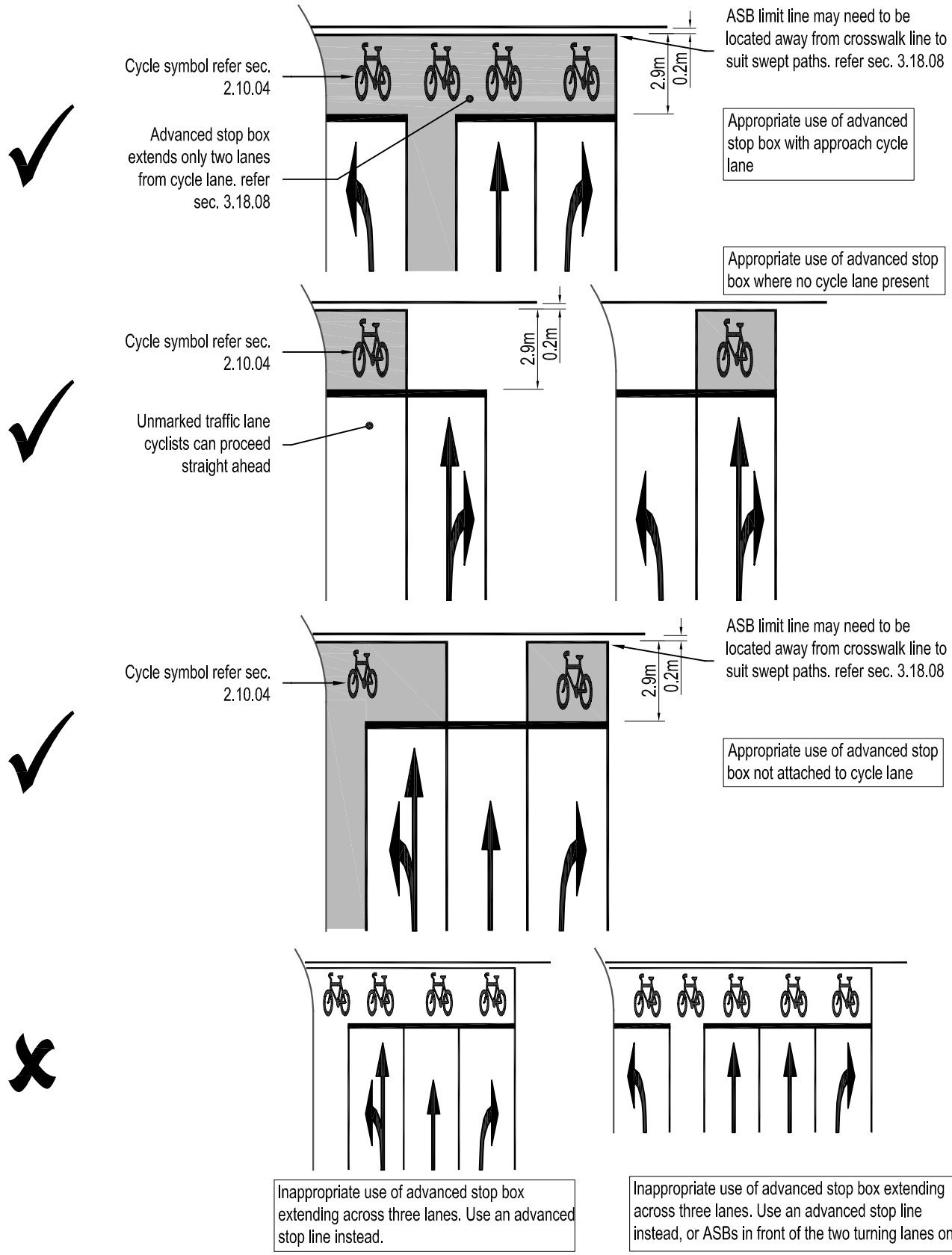
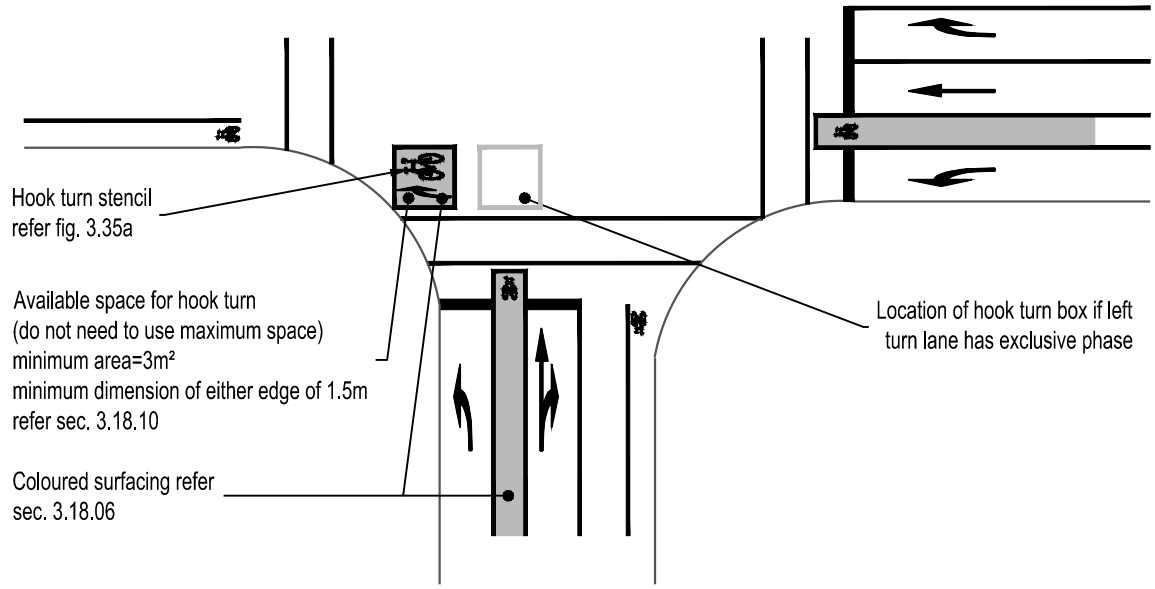


FIGURE 3.33 **MARKINGS FOR CYCLE LANES AT ROUNDABOUTS**

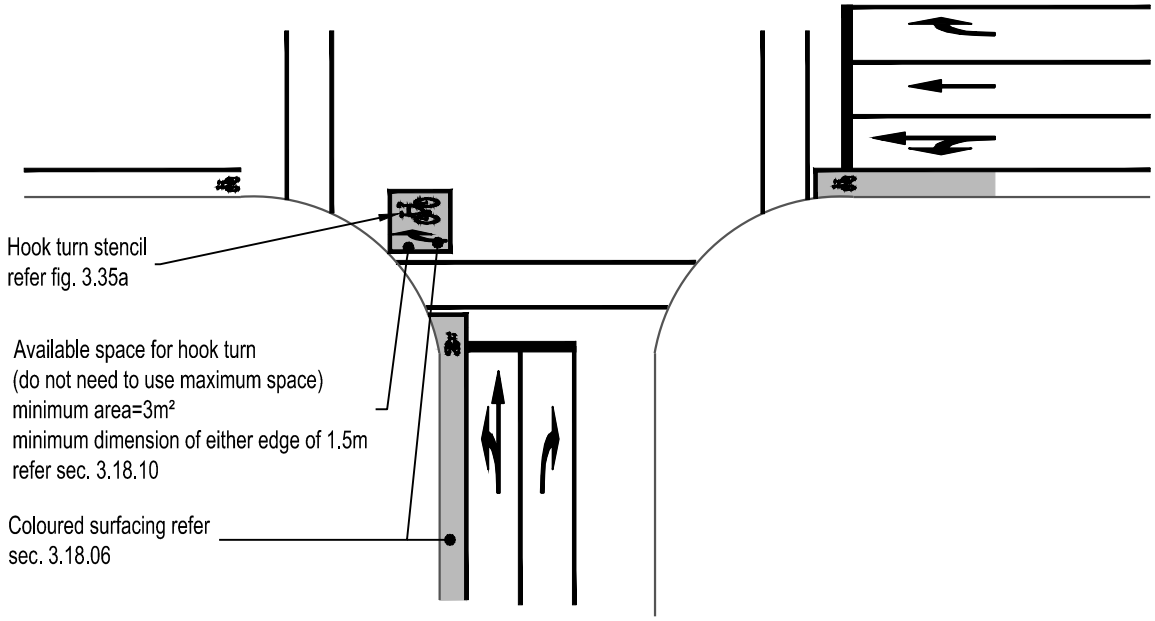
CYCLE LANES AT INTERSECTIONS



MARKINGS FOR ADVANCED STOP BOXES AT SIGNALISED INTERSECTIONS FIGURE 3.34

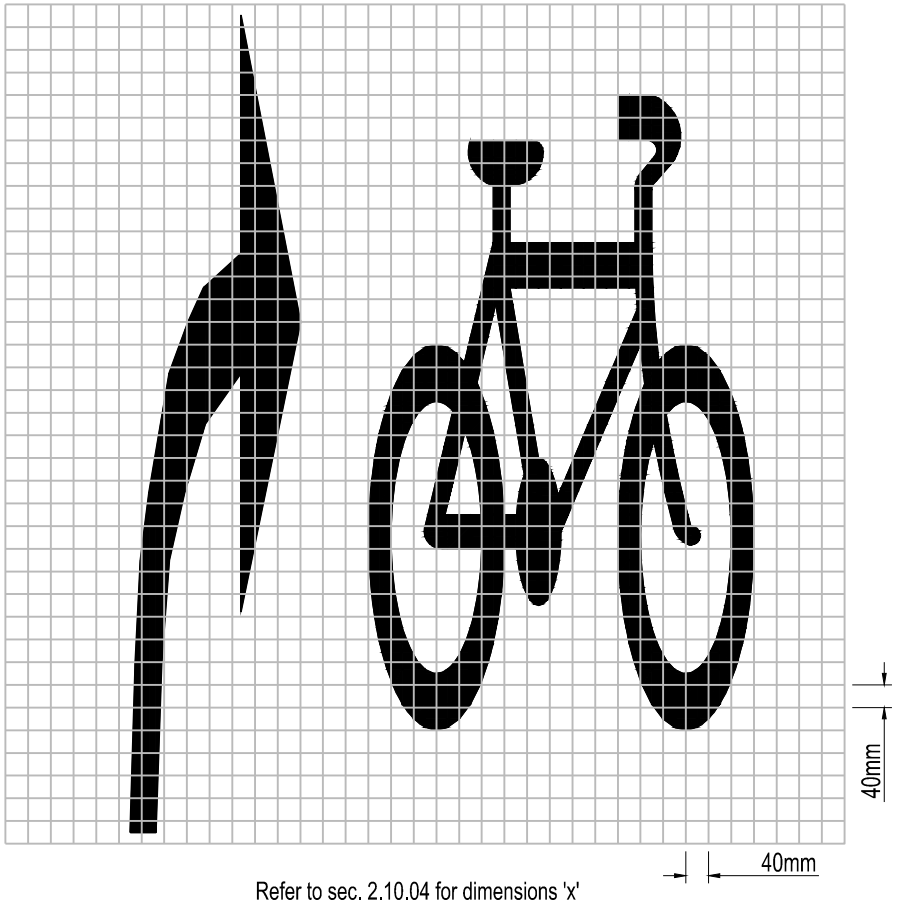


A) IN FRONT OF AN EXCLUSIVE LEFT TURN LANE

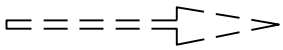


B) IN FRONT OF A KERBSIDE CYCLE LANE

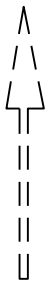
FIGURE 3.35 MARKINGS FOR HOOK TURN BOXES AT SIGNALISED INTERSECTIONS



Refer to sec. 2.10.04 for dimensions 'x'

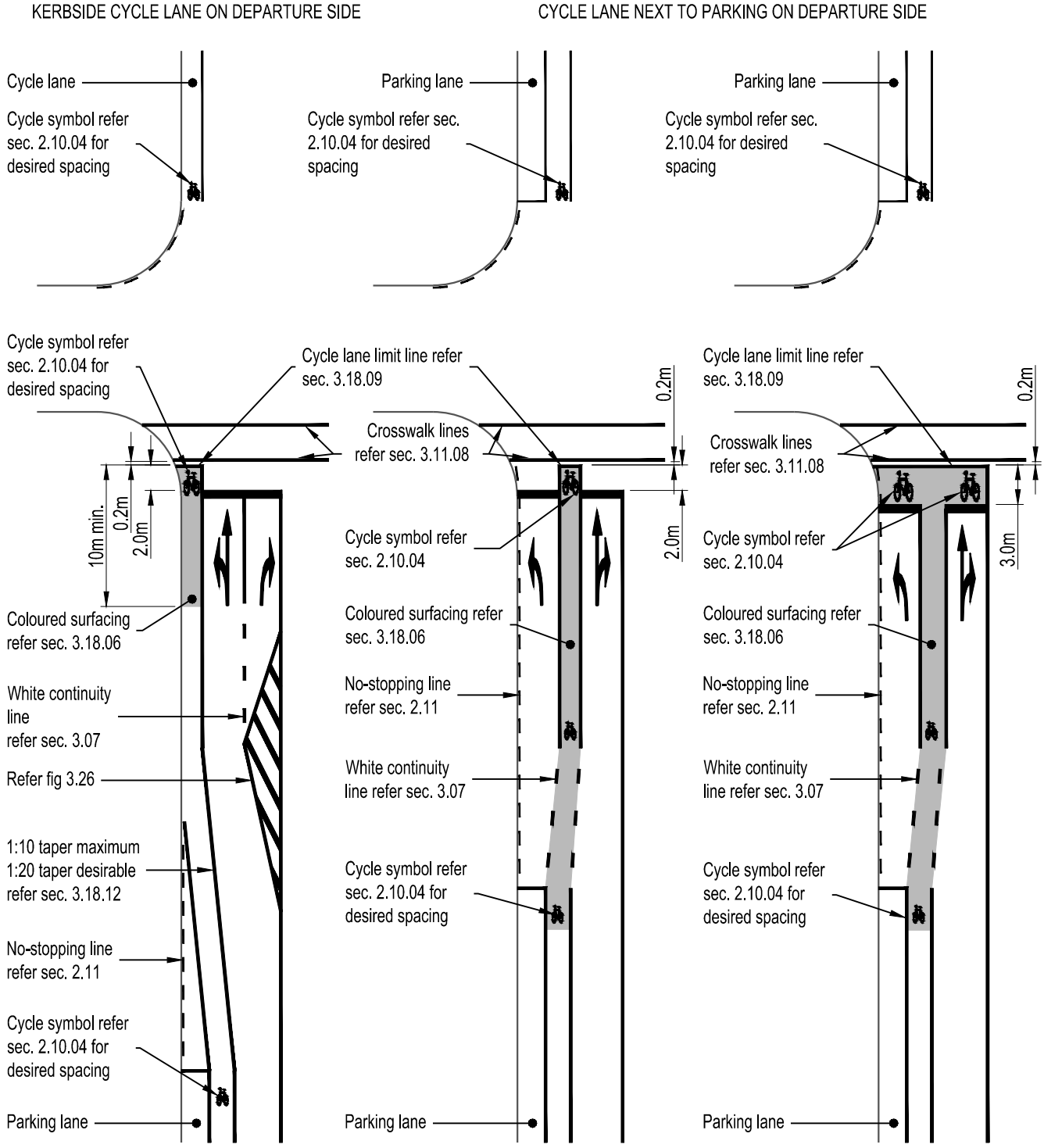


Direction of cyclists leaving hook turn box



Direction of cyclists approaching hook turn box

HOOK TURN STENCIL FIGURE 3.35a



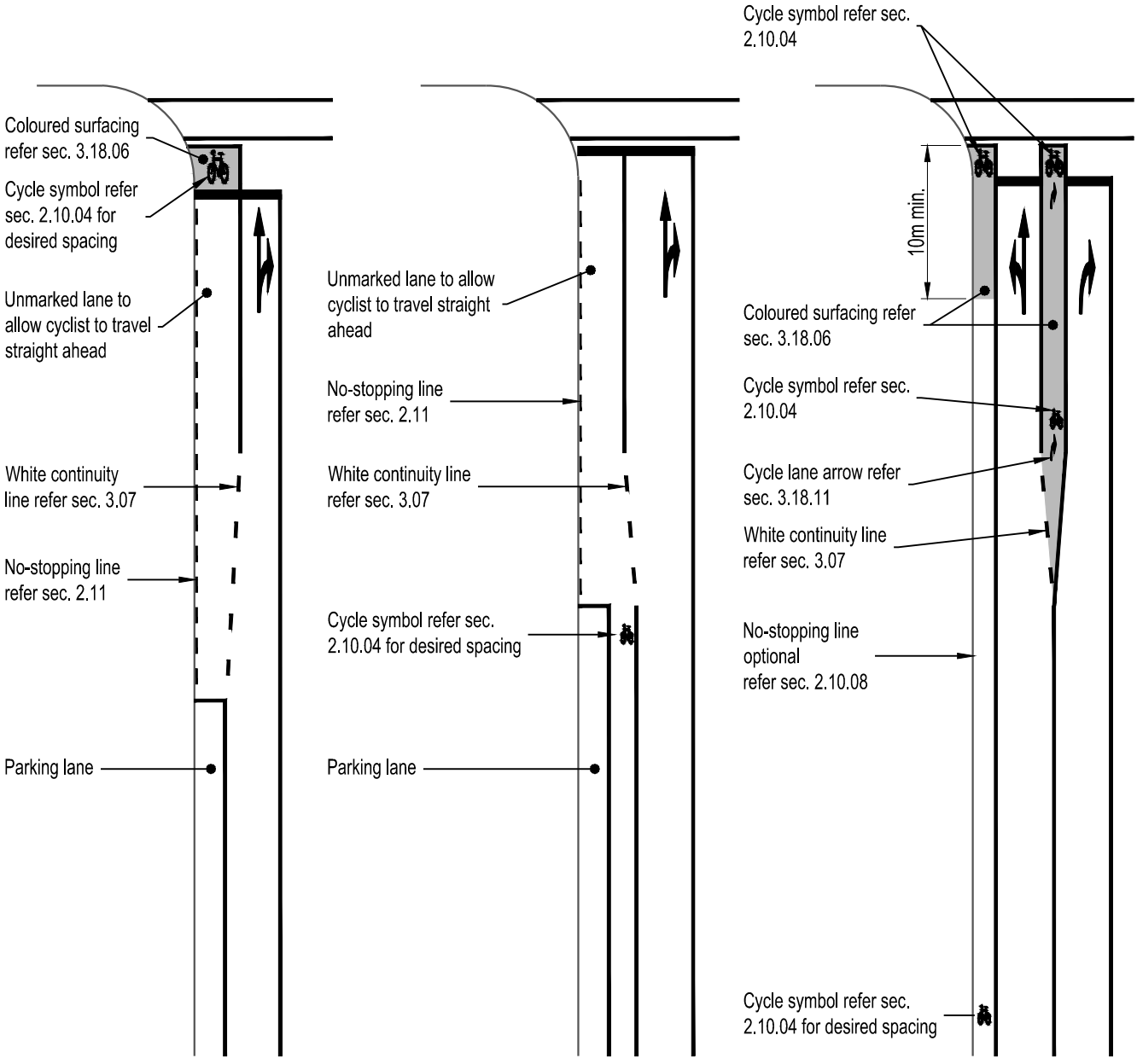
A) CYCLE LANE NEXT TO PARKING CHANGING TO KERBSIDE AT INTERSECTION WITH ADVANCED STOP LINE

B) CYCLE LANE NEXT TO PARKING CHANGING TO CENTRAL LANE AT INTERSECTION

C) CYCLE LANE NEXT TO PARKING CHANGING TO CENTRAL LANE AT INTERSECTION

MARKINGS FOR CYCLE LANES AT APPROACHES TO SIGNALISED INTERSECTIONS

FIGURE 3.36



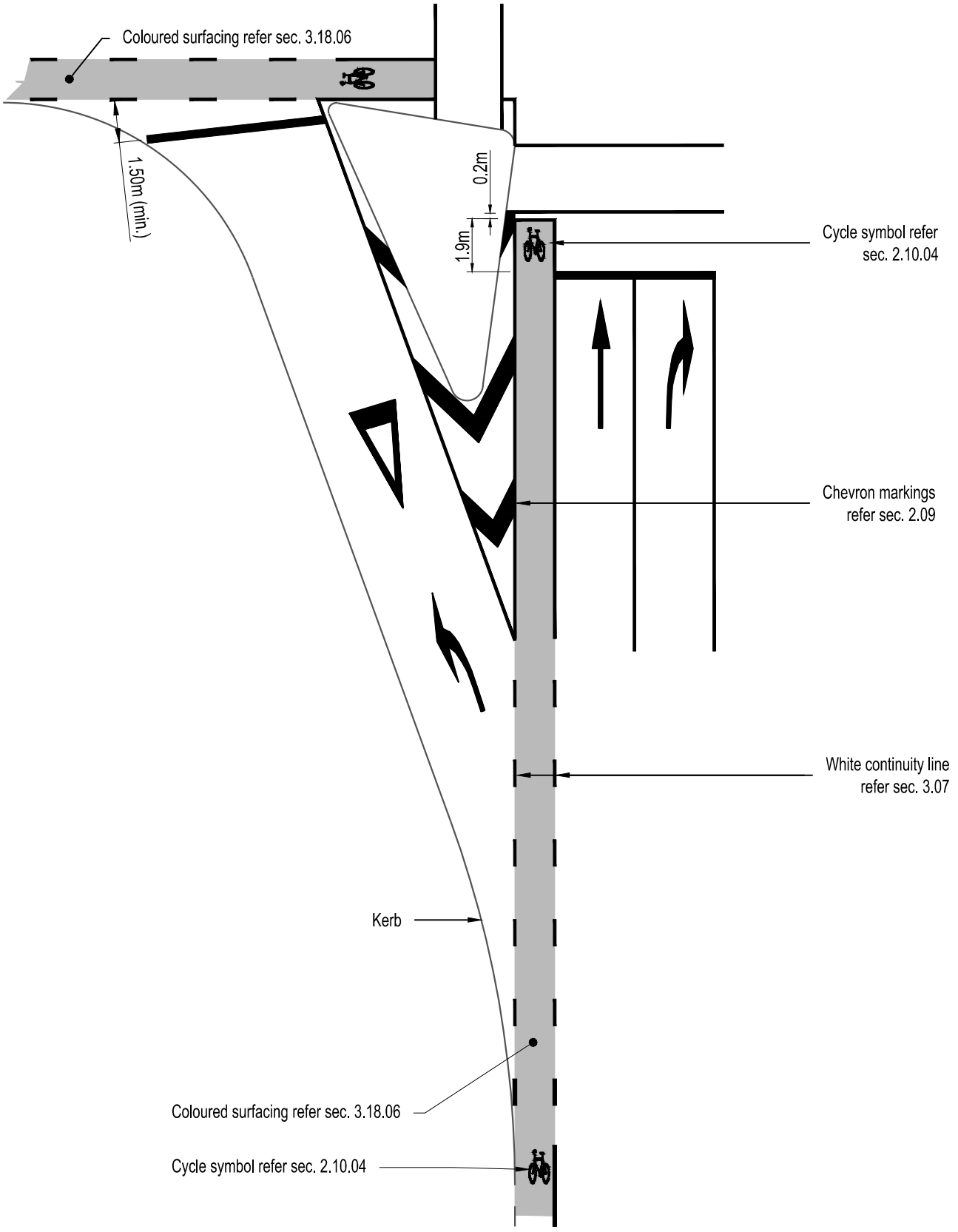
A) NO CYCLE LANE BUT ADVANCED STOP BOX PROVIDED IN FRONT OF UNMARKED KERBSIDE LANE

B) CYCLE LANE TERMINATES INTO UNMARKED NARROW KERBSIDE LANE

C) ADDITIONAL CYCLE LANE AT INTERSECTION TO ASSIST TURNING CYCLISTS

MARKINGS FOR CYCLE LANES AT APPROACHES TO SIGNALISED INTERSECTIONS

FIGURE 3.37



MARKINGS FOR CYCLE LANES AT SLIP LANE APPROACHES TO SIGNALISED INTERSECTIONS

FIGURE 3.38