



# Delineation

Section 17 - Alignment signs & markers

The delineation guidelines have been developed to assist in designing and maintaining a quality delineation system.

The guidelines are to comprise 19 sections and an appendix. These are initially being released individually and in no specific order. The sections which are to be released are as follows:

<b>Part</b>	<b>Title</b>
Section 1	Introduction
Section 2	Delineation principles
Section 3	Pavement markings
Section 4	Longitudinal markings
Section 5	Enhanced longitudinal markings
Section 6	Transverse markings
Section 7	Transverse markings - Pedestrian facilities
Section 8	Diagonal and chevron markings
Section 9	Messages on pavements
Section 10	Pavement arrows
Section 11	Pavement markings at roundabouts
Section 12	Pavement markings for bicycle facilities
Section 13	Pavement markings for kerbside parking restrictions
Section 14	Maintenance of pavement markings
Section 15	Raised pavement markers
Section 16	Guide posts and delineation of safety barriers
Section 17	Alignment signs and markers
Section 18	Delineation systems
Section 19	Delineation management and audit
Appendix A	Locating and setting out of dividing (barrier) lines

To determine which sections are currently available go to:

[www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/delineation\\_dll.html](http://www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/delineation_dll.html)

The information contained in the various parts is intended to be used as a guide to good practice. Discretion and judgement should be exercised in the light of the many factors that may influence the choice of delineation devices in any situation. The guidelines make reference, where relevant, to current Australian Standards and are intended to supplement and otherwise assist in their interpretation and application.

---

# Delineation

## Section 17

# ALIGNMENT SIGNS AND MARKERS

Special Note:

As from 17 January 2011, the RTA is adopting the Austroads Guides (Guide to Traffic Management) and Australian Standards (AS 1742, 1743 & 2890) as its primary technical references.

An RTA Supplement has been developed for each Part of the Guide to Traffic Management and relevant Australian Standard. The Supplements document any **mandatory** RTA practice and any complementary guidelines which need to be considered.

The RTA Supplements **must** be referred to prior to using any reference material.

This RTA document is a complementary guideline. Therefore if any conflict arises, the RTA Supplements, the Austroads Guides and the Australian Standards are to prevail.

The RTA Supplements are located on the RTA website at [www.rta.nsw.gov.au](http://www.rta.nsw.gov.au)





**Roads and Traffic Authority**

[www.rta.nsw.gov.au](http://www.rta.nsw.gov.au)

**VERSION:** 1.0  
**ISSUED:** February 2010

**APPROVED BY:**

**SIGNED**

Phil Margison  
General Manager  
Traffic Management

**SIGNED**

Michael de Roos  
General Manager  
Safer Roads

**AUTHORISED FOR USE BY:**

**SIGNED**

Peter Collins  
Director  
Network Management

© 2009 Roads and Traffic Authority NSW

Extracts from these guidelines may be reproduced providing the subject is kept in context and the source is acknowledged.

Every effort has been made to supply complete and accurate information. However RTA, NSW assumes no responsibility for its use.

All trade name references herein are either trademarks or registered trademarks of their respective companies.

***For policy and technical enquiries regarding these guidelines please contact:***

Traffic Management Branch  
Email: [technical\\_directions\\_publication@rta.nsw.gov.au](mailto:technical_directions_publication@rta.nsw.gov.au)

***To access electronic copies of these and other guidelines go to:***

[www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/technicalmanuals\\_dli.html](http://www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/technicalmanuals_dli.html)

***For the latest amendments (if any) to these guidelines go to:***

[www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/delineation\\_dli.html](http://www.rta.nsw.gov.au/doingbusinesswithus/downloads/technicalmanuals/delineation_dli.html)

ISBN 978-1-921242-89-2 (Electronic only)  
RTA/Pub. 08.091

## Contents

<b>17.1</b>	<b>General principles .....</b>	<b>17-1</b>
<b>17.2</b>	<b>Types .....</b>	<b>17-1</b>
<b>17.3</b>	<b>Warrants for use .....</b>	<b>17-1</b>
17.3.1	Substandard horizontal curve.....	17-1
17.3.2	Sub-standard vertical curve.....	17-2
17.3.3	Other situations .....	17-2
<b>17.4</b>	<b>Curve and advisory speed signs .....</b>	<b>17-2</b>
17.4.1	Curve warning sign .....	17-2
17.4.2	Advisory speed sign .....	17-9
<b>17.5</b>	<b>Chevron alignment markers.....</b>	<b>17-11</b>
<b>17.6</b>	<b>Unidirectional hazard markers (UHMS) .....</b>	<b>17-13</b>
<b>17.7</b>	<b>Other hazard markers.....</b>	<b>17-14</b>
17.7.1	Obstruction markers (D4-5).....	17-16



This page intentionally left blank

## 17.1 General principles

Guide posts are used to delineate alignment over the road length except where delineation units are attached to safety barriers or other structures. Abrupt changes in horizontal alignment require additional delineation treatments to assist drivers in approaching and negotiating the road successfully. These additional forms of delineation are particularly important at night.

## 17.2 Types

Delineation devices used to convey such information are:

- (a) Curve and advisory speed signs, W1-3 and W8-2 signs
- (b) Chevron alignment markers (CAMs), D4-6 sign
- (c) Unidirectional hazard markers (UHMs), D4-1-1 sign

These devices help drivers to control vehicle speed and maintain proper placement of the vehicle on the roadway.

Curve and advisory speed signs, alone or in combination with chevron alignment markers, are used to provide advance warning of abrupt changes in horizontal road alignment.

Unidirectional hazard markers are used to indicate change in direction of travel due to an obstruction.

NOTE: In certain circumstances fluorescent yellow-green sheeting may be used to increase the conspicuity of certain signs. If it is intended to use fluorescent material, approval must first be obtained from the General Manager Safer Roads

## 17.3 Warrants for use

### 17.3.1 Substandard horizontal curve

Guidelines for the use of devices at horizontal curves are given in the following sections. As a general guideline, these devices are only used to treat sub-standard horizontal curves. Horizontal curves are regarded as

substandard if the advisory speed (see Section 17.4.2.1) of the curve is at least 10km/h less than the sign-posted speed on the immediate preceding section of the road. This means that the maximum advisory speed displayed must be 15km/h less than the sign-posted speed limit.

On some local roads, the road environment, terrain, geometry, traffic volume, and composition may reduce drivers' expectations of the level of delineation. Therefore, these devices may not be required on all roads meeting the warrants, including residential streets in urban areas and very low volume rural roads.

### **17.3.2 Sub-standard vertical curve**

Vertical curves may be sub-standard with regards to:

- (a) Stopping or overtaking sight distance
- (b) Excess vertical acceleration at dips and humps which may cause a hazardous situation or discomfort to the vehicle occupants

### **17.3.3 Other situations**

At curves which do not meet the criteria in Section 17.3.2, it is usually only necessary to provide the delineation devices specified in Section 3 (Pavement marking), Section 15 (Raised pavement markers) and Section 16 (Guide posts & delineation of safety barriers). The devices given in this section are to be used only to delineate sub-standard curves. The only exception is when the existence or direction of a curve may not be clear to approaching drivers, for example, where a curve is located just beyond a crest. In this case, an advisory speed sign would not be used.

The choice of specific delineation devices at a given site should be guided by proper engineering considerations.

## **17.4 Curve and advisory speed signs**

### **17.4.1 Curve warning sign**

#### **17.4.1.1 Horizontal curves**

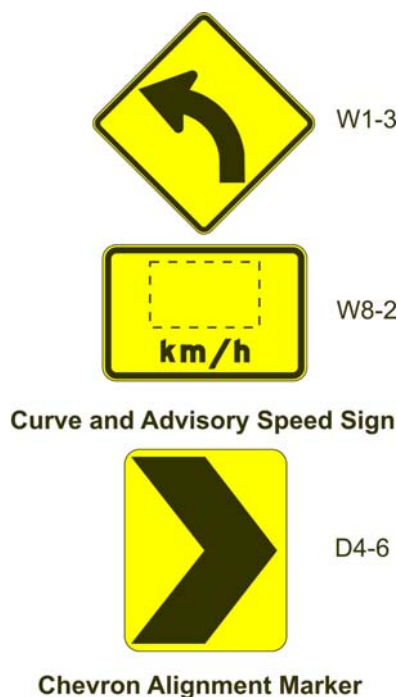
Curve warning and advisory speed signs for use at horizontal curves are listed in Table 17.1 and shown in Figure 17.1. Figure 17.2 provides a guide



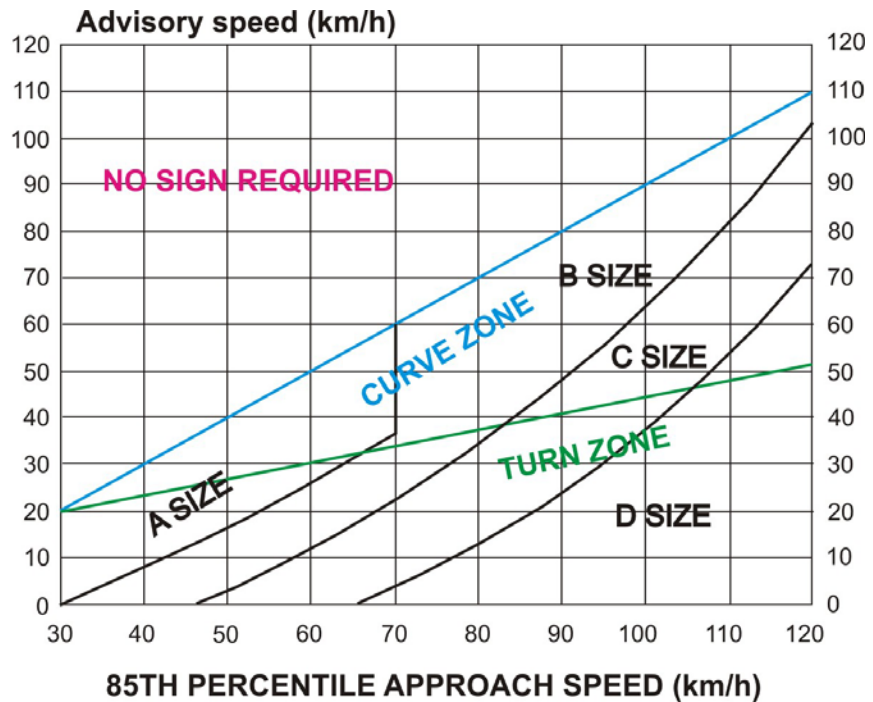
for the use of curve and turn warning signs. Advice on the use of the individual turn and curve signs, together with reverse turn and curve, winding road and hairpin bend signs is given below. These signs can be used in conjunction with advisory speed signs on sealed roads (see Section 17.4.2) with speed values determined in accordance with ASI742.2.

SIGN	SIGN NUMBER	SIZE, mm
Turn	W1-1	A 600 X 600
Reverse Turn	W1-2	B 750 X 750
Curve	W1-3	C 900 X 900
Reverse Curve	W1-4	D 1200 X 1200
Winding Road	W1-5	
Hairpin Bend	W1-7	
Tilting Truck [X] km/h	W1-8	1500 X 3000
Advisory Speed	W8-2	A 600 X 400
NEXT [X] km	W8-17-1	B 750 X 500 C 900 X 600 D 1200 X 800
Winding Road Ends 3km	G9-17	1100 X 400

**Table 17.1:** Curve Warning and Advisory Speed Signs for use at Substandard Horizontal Curves



**Figure 17.1:** Alignment signs and markers



**Figure 17.2:** Guide for the use of curve warning sign

(a) Turn (W1-1)

The Turn sign should be used in advance of a substandard curve in accordance with Figure 17.2.

The Advisory Speed sign (W8-2) should be used in conjunction with this sign as indicated in Figure 17.1.

(b) Reverse turn (W1-2)

The Reverse Turn sign should be used where two curves in opposite directions each warrant the use of Turn signs (W1-1) and are separated by a tangent length of less than 120 m. The sign may also be used where only one of the two curves warrants a Curve sign (W1-3) and it is impracticable to sign each curve separately.

The Advisory Speed sign (W8-2) should be used in conjunction with this sign and, if used, shall indicate the advisory speed of the curve with the lower speed value.

(c) Curve (W1-3)

The Curve sign should be used in advance of a substandard curve in accordance with Figure 17.2. The Advisory Speed sign (W8-2) should be used in conjunction with this sign as indicated in Figure 17.1.

It is also permissible to use this sign where, although the conditions specified in Section 17.3.1 do not apply, the road geometry is such that the curve may not be readily perceived, e.g. where a crest precedes a horizontal curve.

(d) Reverse curve (W1-4)

The Reverse Curve sign should be used where two curves in opposite directions, one or both of which is substandard, are separated by a tangent length of less than 120 m.

The Advisory Speed sign (W8-2) should be used in conjunction with this sign in accordance with Figure 17.1, and the advisory speed used should be that applicable to the curve with the lower speed value.

It is also permissible to use this sign where, although the conditions specified in Section 17.3.1 do not apply, the road geometry is such that the curve may not be readily perceived, e.g. where a crest precedes a horizontal curve.

(e) Winding road (W1-5)

The Winding Road sign should be used where there is a series of closely spaced curves some or all of which warrant the use of Turn (W1-1) or Curve (W1-3) signs.

Where the length of winding road is greater than 1 km, a NEXT [X] km supplementary plate (W8-17-1) should be used in conjunction with this sign.

Where the section of winding road extends over a number of kilometres this sign may be repeated with appropriate changes to the supplementary distance plates.

A Turn sign (W1-1) or a Curve sign (W1-3) together with an Advisory Speed sign (W8-2) (when this is required by the provisions of Section 17.3.1) should normally be used after sign W1-5 to indicate the direction and speed value of the first substandard curve (see also Section 17.4.2).

The exception to this rule is where, in a distance of 1 km or less, there are a series of three or more closely spaced curves of similar speed value and the alignment of the first curve is adequately delineated, in which case the Advisory Speed sign (W8-2) may be used with the W1-5 sign and additional Turn or Curve signs need not be used.

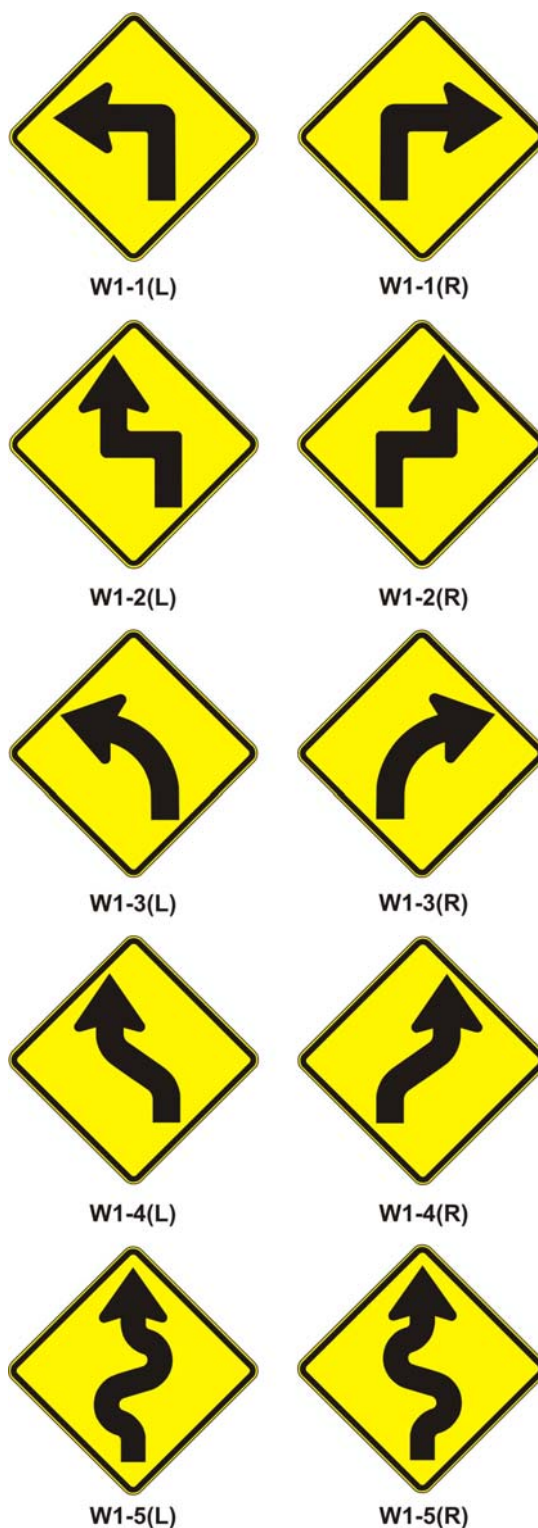
(f) Hairpin Bend (W1-7)

The Hairpin Bend sign should be used where a Turn sign (W1-1) is warranted but the change of direction is so considerable that it amounts to a reversal of direction.

The Advisory Speed sign (W8-2) should be used in conjunction with this sign in accordance with the provisions of Figure 17.1.

(g) Tilting truck (symbol)....km/h (W1-8)

The Tilting Truck [X] km/h sign should be used where there is a history of trucks toppling even where all other required curve warning and delineation devices are provided. It is normally associated with, and placed in advance of a curve or turn warning sign. Speed numerals shall only be shown if they can be reliably assessed.



**Figure 17.3:** Curve warning signs

**NOTE:** Pending the results of ongoing research into safe truck speeds on turns, if the advisory speed is to be shown it should be based on the best available evidence of truck performance and safety on turns of similar radius and cross-fall.

### 17.4.1.2 Vertical curves

Details of signs used at substandard vertical curves are given in Table 17.2 below.

SIGN	SIGN NUMBER	SIZE, mm
CREST	W5-11	A 600 x 600
DIP	W5-9	B 750 x 750
Road Hump	W5-10	C 900 x 900
Advisory Speed	W8-2	A 600 x 400 B 750 x 500 C 900 x 600

**Table 17.2:** Curve Warning Signs for use at Substandard Vertical Curves

(a) Crest (W5-11)

The CREST sign should be used at vertical curves on roads where a no-overtaking zone is warranted, but it is not practicable to mark a barrier line, or where the stopping sight distance is substandard.

(b) Dip (W5-9)

The DIP sign should be used to warn of any sharp depression in the road profile (see Section 18).

An Advisory Speed sign (W8-2) may be used with this sign to indicate the comfortable speed.

(c) Road Hump

The Road Hump sign (W5-10) should be used where there is a sharp rise in the road profile (see Section 18).

An Advisory Speed sign (W8-2) may be used with this sign at road humps where the comfortable crossing speed can be assessed with reasonable accuracy.

At vertical curves the Advisory Speed sign shall be erected on the same post as, and below, the warning sign with which it is associated.

In no case shall such a sign be erected until the nominated speed has been determined by accepted traffic engineering procedures (see Section 17.4.2.1).

## **17.4.2 Advisory speed sign**

### **17.4.2.1 General**

- (a) The advisory speed is the maximum speed at which a curve may be comfortably negotiated under good road and weather conditions. Where the advisory speed is greater than the legal speed limit it is not to be signposted with advisory speed but the appropriate curve warning sign may be displayed.
- (b) Advisory speed should be determined by methods given in ASI742.2.
- (c) Advisory speed signs, expressed in km/h, have increments of 10 and end in 5 (e.g. 45, 55, 65 etc). Therefore the maximum advisory speed is 15km/h less than the posted speed limit.
- (d) Advisory speed signs are recommended on sealed roads only. Unsealed roads change behaviour with wear and weather conditions and the advisory speed may not remain constant.

### **17.4.2.2 Use of Advisory Speed sign (W8-2)**

- (a) The Advisory Speed sign (W8-2) shall be used only in conjunction with a curve warning sign to indicate the desirable speed in good weather, traffic and road conditions for comfortable travel through the hazard, referred to on the warning sign (see Section 17.4.1). Its use with the Winding Road sign (W1-5) is subject to the conditions specified in Section 17.4.1.1(e).
- (b) The Advisory Speed sign shall be erected on the same post as, and below, the warning sign with which it is associated. The size code A, B, C or D, shall be the same as for the warning sign with which it is mounted.
- (c) In no case shall such a sign be erected until the nominated speed has been determined by accepted traffic engineering procedures (Section 17.4.2.1).

### 17.4.3 Application in field

The following conditions and recommendations apply to the erection of advisory speed signs and their accompanying warning signs:

- (a) Where two closely spaced curves forming a reverse curve have a separate tangent length generally less than 120 m and one or both are sub-standard in accordance with Section 17.3.1, then on each approach either the single sign Reverse Turn (W1-2) or Reverse Curve (W1-4) sign together with Advisory Speed sign (W8-2) should be displayed. The advisory speed shown shall be that of the slower curve (with the 15km/h difference. See Section 17.4.2.1). The Reverse Curve sign may be required at greater curve separations for higher speed curves, if separate signing of the second curve within the first curve is inappropriate in the particular case.
- (b) At some reverse curves a single Turn (W1-1) or Curve (W1-3) sign together with an Advisory Speed sign (W8-2) will be sufficient for both curves, provided that it can be safely assumed that the speed of a vehicle when emerging from the first curve will be less than the advisory speed of the second curve, and that the alignment of the second curve is adequately delineated for drivers when leaving the first curve.
- (c) Where there is a series of more than two closely spaced curves, some or all of which are substandard in accordance with Section 17.3.1 the Winding Road symbol sign (W1-5) should be used at the beginning of the series. Normally, an additional Turn (W1-1) or Curve (W1-3) sign should be used to indicate the direction of the first substandard curve in the series and the Advisory Speed sign (W8-2) indicating the speed of that curve, should be used with this sign. However, if the series extends for a distance of 1km or less, and the curves are of similar speed value and the alignment of the first curve is adequately delineated, the additional single Curve or Turn sign need not necessarily be used. In this case the Advisory Speed sign, indicating the speed of the slowest curve, should be placed below the Winding Road symbol sign (W1-5).
- (d) Where there is a curve close to a single-lane bridge, major intersection or through a shopping centre, advisory speeds should not be displayed if in so doing drivers may be induced to travel through that adjacent situation at a speed, which could be excessive



and dangerous. Likewise, at a passive control level crossing, signs indicating a speed higher than the safe approach speed (having regard to the sight distance to approaching trains) shall not be used

## 17.5 Chevron alignment markers

Chevron alignment markers (D4-6) (CAMs), single black chevron on yellow background (shown in Figure 17.1), should be used to augment the delineation of sub-standard curves only if an engineering assessment indicates that the guide posts, curve and advisory speed warning sign alone are insufficient to meet driver information needs. They should be reserved exclusively for curve delineation, and should not be used for any other purpose such as for delineating roundabouts, pedestrian refuges, wombat crossings, bullnose of guard rails etc. Details of CAM signs are given in Table 17.3.

SIGN	SIGN NUMBER	SIZE, mm
Chevron Alignment Marker	D4-6	A 600 x 750
		B 750 x 900
		C 900 x 1100

**Table 17.3:** Chevron Alignment Markers Signs

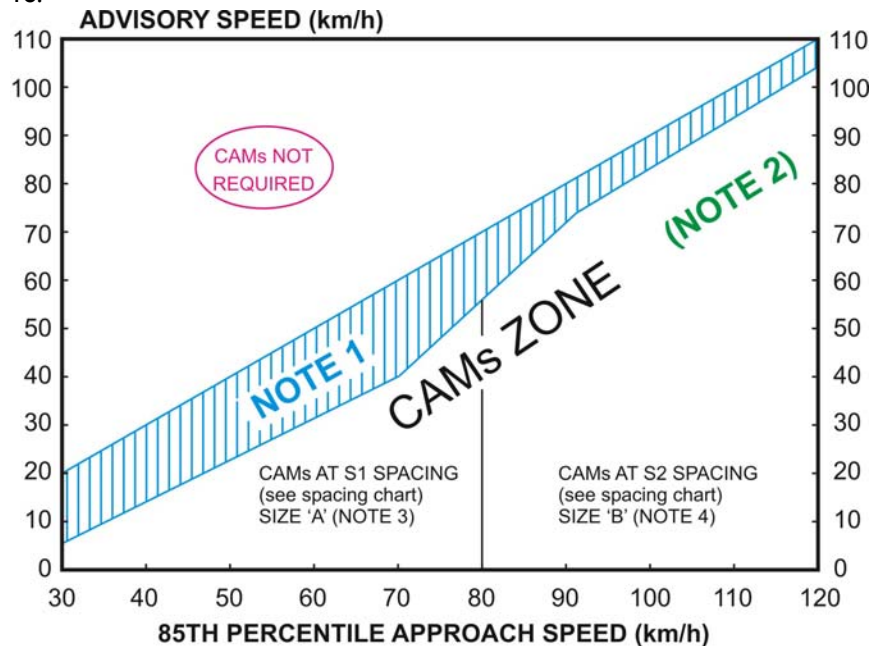
The following guidelines should be followed for installation of CAMs.

- (a) Use of CAMs should be considered only if criteria given in Figure 17.4 are fully met.
- (b) Chevron alignment markers should be used in conjunction with appropriate curve warning signs (Section 17.4).
- (c) They should be used to augment conventional delineation treatments (pavement markings and guide posts) and not as a substitute for them.
- (d) The spacing of the CAMs should be in accordance with Figure 17.5. A minimum of four markers should be installed. The first CAM should be located in accordance with AS1742.2 Figure 4.7 and a minimum of 2 markers should be visible at the approach (distance equivalent to five seconds of travel time) to the curve. Please refer

to the minimum preview distances given in the Table 2.2 in Section 2.

- (e) The size of the markers should be in accordance with the provisions of Figure 17.4.
- (f) The markers should be installed at a height so that they are visible under headlight illumination at night. The height of CAMs, measured from the pavement surface to the underside of the chevron plate, should be approximately 1.5 m. When circumstances (e.g. a crest) at the curve entry are such as to warrant a higher mounting, the increased height is to be progressively reduced to about 1.5 m at the departure tangent.
- (g) The markers should be placed as close to the outside of the curve as practicable but at least 600 mm clear of the road shoulder, line of guide posts or face of guard fence.

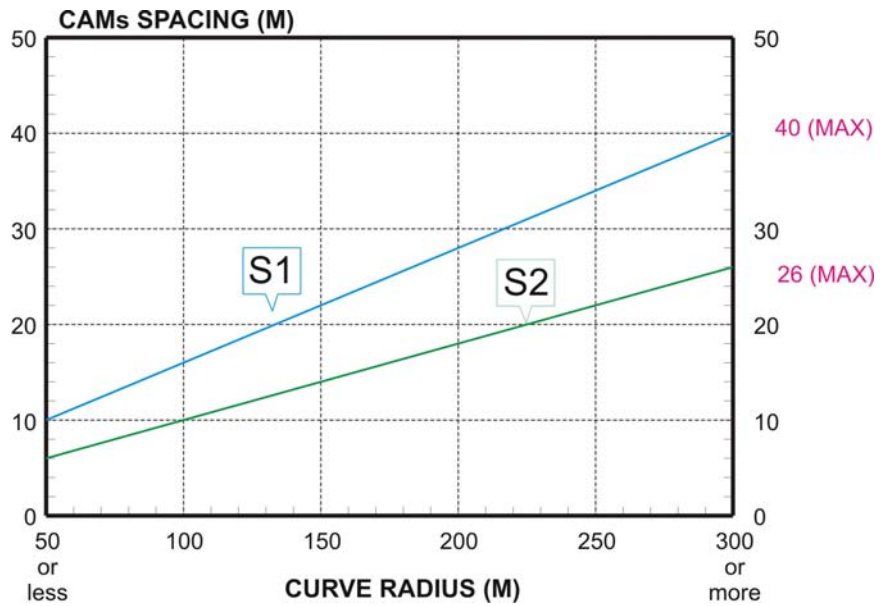
Application of CAMs to delineate a sub-standard curve is illustrated in Section 18.



**NOTES**

1. Curves in this region of the graph will not normally require CAMs, unless the existence or direction of the curve may not be clear to approaching drivers, e.g. where a curve occurs just beyond the crest or the curve section is subject to frequent fog and adverse weather conditions.
2. Use of CAMs shall be considered in this region, provided a proper engineering assessment indicates that the conventional delineation treatments alone, are insufficient in meeting driver information needs.
3. B size CAMs may be used where there are two or more lanes in one direction.
4. C size CAMs shall always be used on freeways and high standards divided carriageways. Use of C size CAMs may also be considered on those sections of highways where speed deficiency is 35km/h or more.

**Figure 17.4:** Guide for use of chevron alignment markers



**Figure 17.5:** Guide for determining spacing of chevron alignment markers

## 17.6 Unidirectional hazard markers (UHMs)

The only hazard marker used for the purpose of delineation is the unidirectional hazard marker (UHM), comprising a signboard, rectangular in shape, with white chevrons on a black background. UHMs are used where information for both the presence of an obstruction and a directional indication are required. Details of UHM signs are given in Table 17.4.



**Figure 17.6:** D4-I-1

Sign	Sign number	Size, mm
Unidirectional hazard marker	D4-1-1	A 1600 x 400 B 3200 x 800
	D4-1-3	1800 x 300

**Table 17.4:** Unidirectional Hazard Marker Signs

Unidirectional hazard markers indicate a change in the direction of travel because of an obstruction. This type of marker should not be used to delineate curves. Examples of unidirectional hazard marker's use are:

- (a) On the central island of a roundabout to face the entering traffic (see Section 18)
- (b) On any other situation where an exposed obstruction requires definition and where all traffic must pass to one side

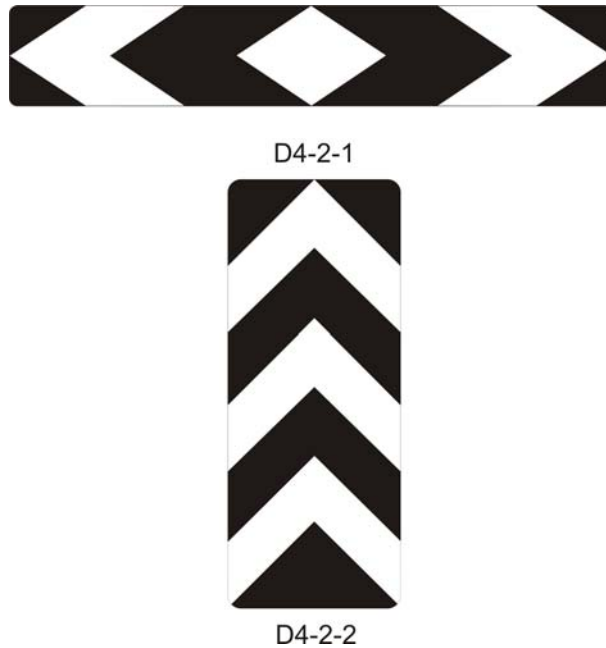
Normally the exposed obstructions should be at least 2.4 m wide to warrant the use of the UHM.

## 17.7 Other hazard markers

Details of other hazard markers, specifically bi-directional hazard markers, width markers, and obstruction markers, are given in Table 17.5 and discussed below.

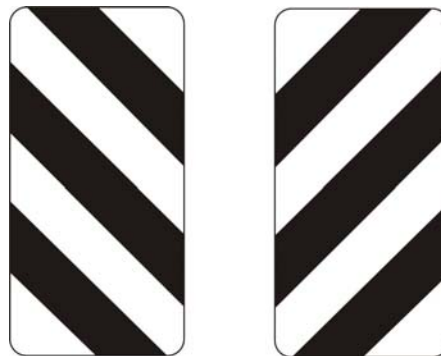
Sign	Sign number	Size, mm
Bidirectional hazard marker	D4-2-1	1800 x 300
	D4-2-2	400 x 1000
Width marker	D4-3(L)	A 225 x 450
	D4-3(R)	B 450 x 900
Obstruction marker	D4-5	1800 x 450

**Table 17.5:** Bi-directional Hazard Markers, Width Markers and Obstruction Marker Signs



**Figure 17.7:** Bi-directional hazard markers (D4 – 2 – 1 and D4 – 2 – 2)

The Bidirectional Hazard markers should be used to delineate the nose of an island or other obstruction where traffic may pass the obstruction to either side.



**Figure 17.8:** Width marker (D4 – 3)

Width markers should normally be erected in pairs, one either side of the formation at points where the formation narrows over structures such as culverts, bridge piers or end posts.

They should be used where the clearance from the normal pavement width to the vertical obstruction is:

- (a) 600 mm, or less, for a pavement 7.4 m wide

- (b) 1 m, or less, for a pavement 6.2 m wide
- (c) 1.2 m, or less, for a pavement 5.6 m wide

Width markers should generally be erected on the line of a vertical obstruction. Where there are wide kerbs or footways on the structure the markers should be erected so that they indicate the width of the pavement.

At railway level crossings Width markers are used in conjunction with the signs RAILWAY (G9-32) and CROSSING (G9-33).

Width markers may also be erected singularly on utility poles, central bridge piers or other vertical obstructions which are so close to the carriageway as to be a hazard. Dimensional proportions of the markers may be varied to fit the particular obstruction.

### 17.7.1 Obstruction markers (D4-5)

Obstruction markers may be used to delineate obstructions within or above the road. Typical uses of these markers are:

- (a) to highlight road closures, either mid-block or at the end of a cul-de-sac
- (b) to delineate vertical clearance above the road where height restrictions exist, i.e. overhead structures requiring the display of a LOW CLEARANCE [X].m (R6-11) sign



**Figure 17.9:** Obstruction markers (D4 – 5)

[Inside rear cover  
– provided for double sided printing purposes only]

---

**For further enquiries**

**[www.rta.nsw.gov.au](http://www.rta.nsw.gov.au)**

**13 22 13**

---

Roads and Traffic Authority

March 2008  
RTA/Pub. 08.091