SOUTHERN

AFRICAN

DEVELOPMENT

COMMUNITY

ROAD MARKINGS

SECTIONS

MAY 2012

CHAPTER 7

CHAPTER 7:
ROAD MARKINGS

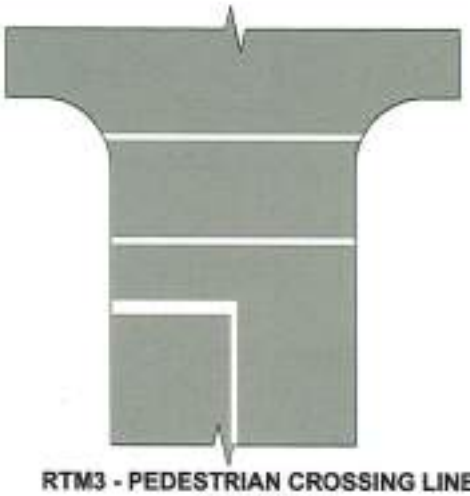
7.0 CONTENTS

This contents listing illustrates each officially approved road marking in the regulatory, warning and guidance classes with the marking number and name. A page reference is given within this chapter where details of the function and basic dimensioning of each road marking can be found. Where appropriate, a cross reference is given to Volume 4, Chapter 12, where full dimensional details and other data are given.

Section 7.2: REGULATORY - Transverse Road Markings

RTM1 - STOP LINE
Ref. Vol 1-7.2.1

RTM2 - YIELD LINE
Ref. Vol 1-7.2.2



RTM3 - PEDESTRIAN CROSSING LINES
Ref. Vol 1-7.2.3

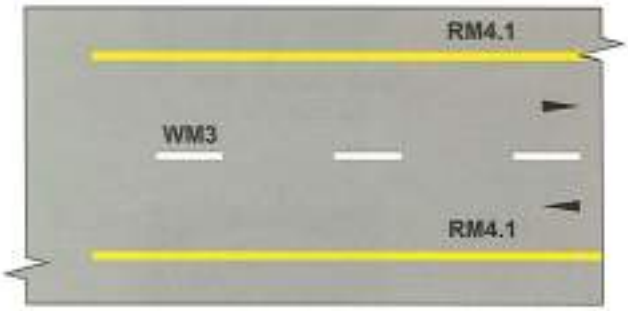
RTM4 - BLOCK PEDESTRIAN CROSSING MARKINGS
Ref. Vol 1-7.2.4

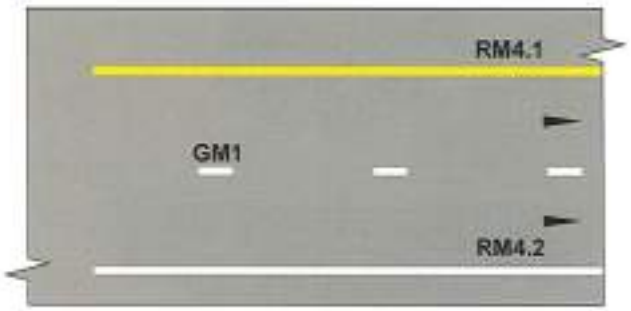
Section 7.3: REGULATORY MARKINGS

RM1 - NO OVERTAKING LINE
Ref. Vol 1-7.2.5

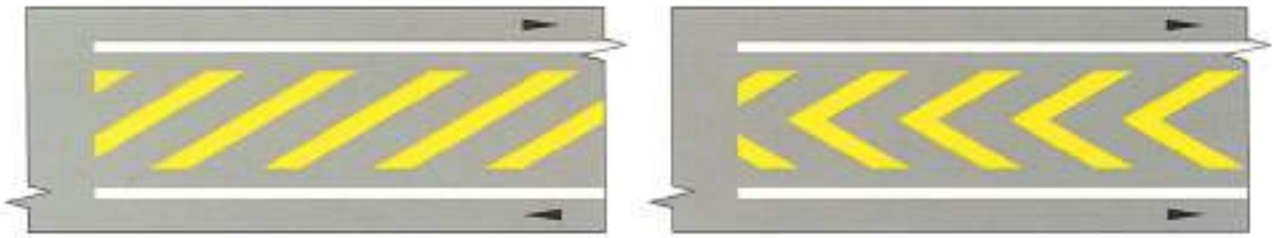
RM2 - NO CROSSING LINES
Ref. Vol 1-7.2.10

RM3 - CHANNELIZING LINE
Ref. Vol 1-7.2.11

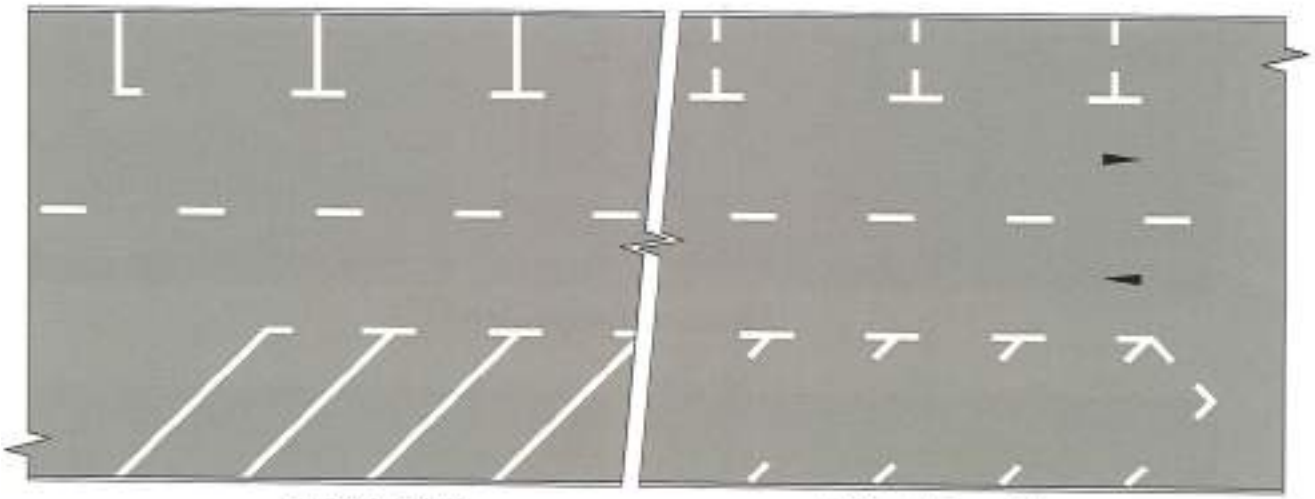




RM4.1 - LEFT EDGE LINE **RM4.2 - RIGHT EDGE LINE**
Ref. Vol 1-7.2.13

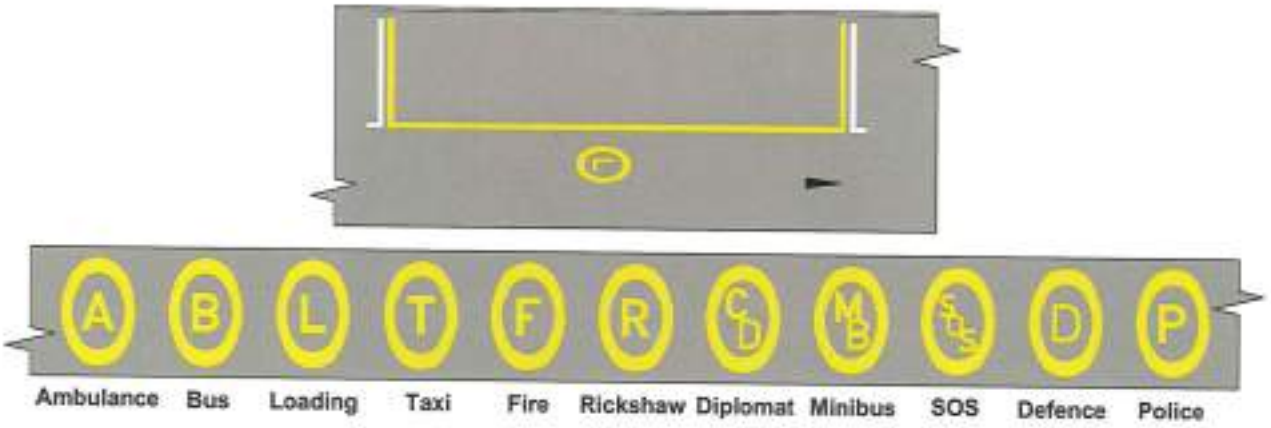


RM5 - PAINTED ISLANDS
Ref. Vol 1-7.2.15 Vol 4-12.2.3/11



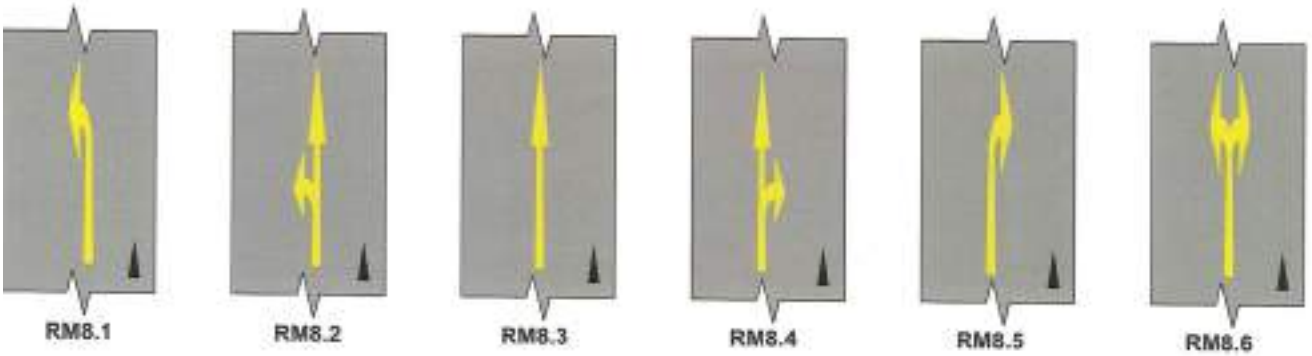
RM6 - PARKING BAYS

Ref. Vol 1-7.2.17



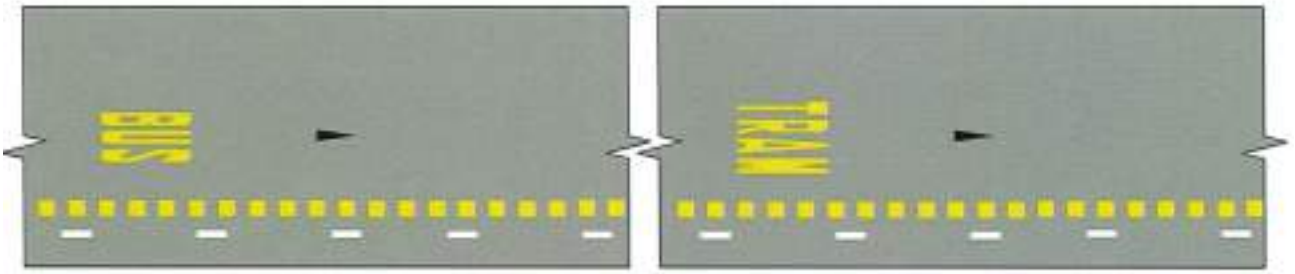
RM7 and RM7.1 - EXCLUSIVE PARKING BAY

Ref. Vol 1-7.2.18 Vol 4-12.1.3 and 12.4.7 to 12.4.13

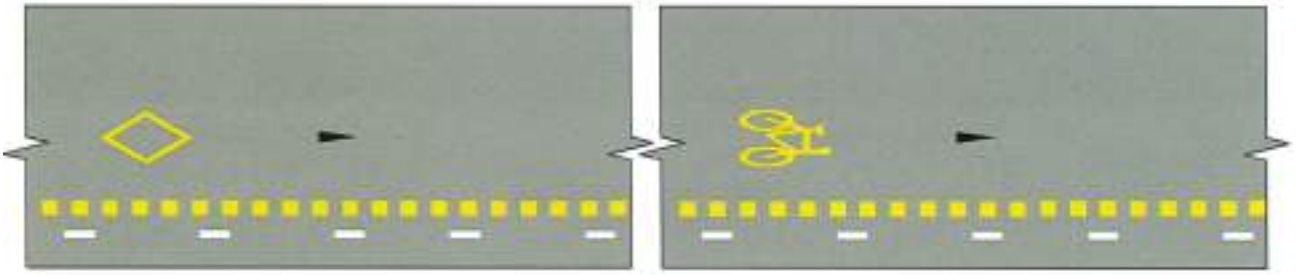


RM8 - MANDATORY DIRECTION ARROWS

Ref. Vol 1-7.2.20 Vol 4-12.3.2 to 12.3.4



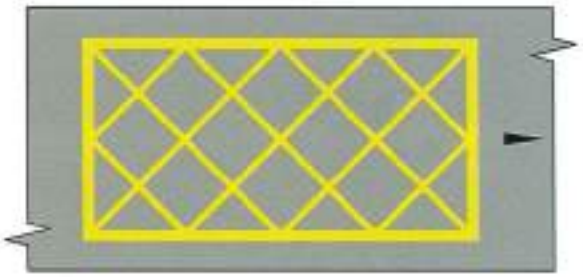
RM9 plus Word Marking RM17



RM9 plus Symbol Marking RM17

RM9 - EXCLUSIVE USE LANE LINE

Ref. Vol 1-7.2.21 and 7.2.31 Vol 4-12.1.3, 12.4.3, 12.4.6 and 12.5.1 to 12.5.7

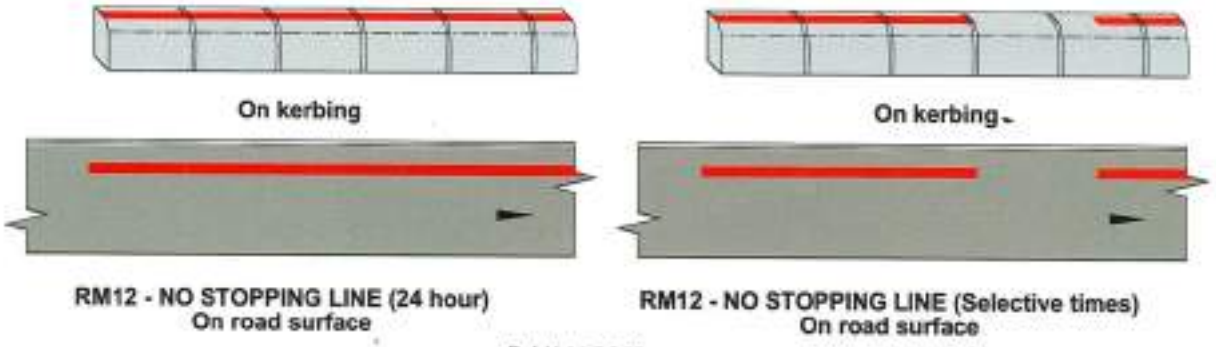


RM10 - BOX JUNCTION

Ref. Vol 1-7.2.23 Vol 4-12.2.12

RM11 – ZIG-ZAG ZONE LINES

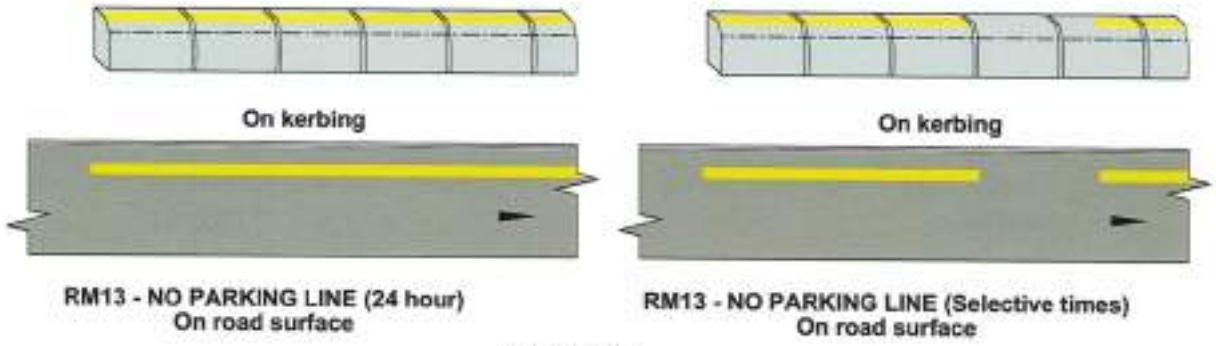
Ref. Vol 1-7.2.25 Vol 4-12.2.13



RM12 - NO STOPPING LINE (24 hour)
On road surface

RM12 - NO STOPPING LINE (Selective times)
On road surface

Ref. Vol 1-7.2.26



RM13 - NO PARKING LINE (24 hour)
On road surface

RM13 - NO PARKING LINE (Selective times)
On road surface

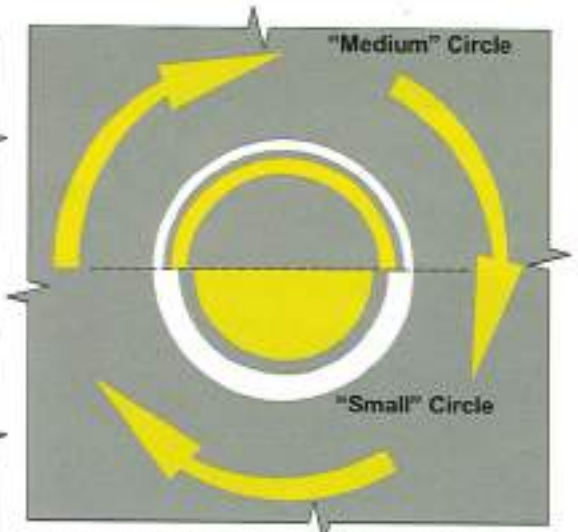
Ref. Vol 1-7.2.27

RM14 - NO MOTOR CYCLES MARKING

Ref. Vol 1-7.2.28 Vol 4-12.4.2

RM16 - DISABLED PERSONS PARKING BAY

Ref. Vol 1-7.2.30 Vol 4-12.1.2 and 12.4.5



RM15 - TRAFFIC CIRCLE MANDATORY DIRECTION ARROWS

Ref. Vol 1-7.2.29 Vol 4-12.3.5/6

RM17.1
Cycle Lane

RM17.2
Bus/Tram Lane

RM17.3
Disabled Person
Parking Bay

RM17.4
High Occupancy
Vehicle Lane

RM17 – EXCLUSIVE USE LANE/PARKING SYMBOLS

Ref. Vol 1-7.2.31 Vol 4-12.4.3/12.4.5/12.5.2

Section 7.3: WARNING MARKINGS

WM1 - RAILWAY CROSSING AHEAD

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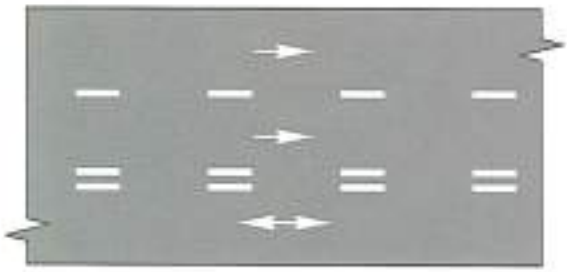
WM2 - CONTINUITY LINE

Ref. Vol 1-7.3.2

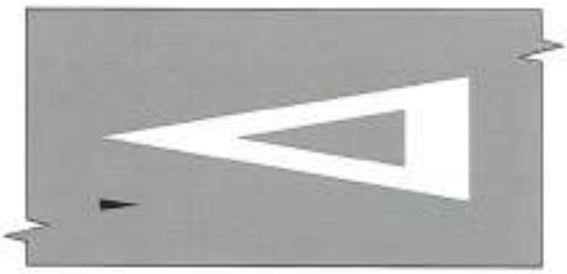
WM3 - DIVIDING LINE

Ref. Vol 1-7.3.3



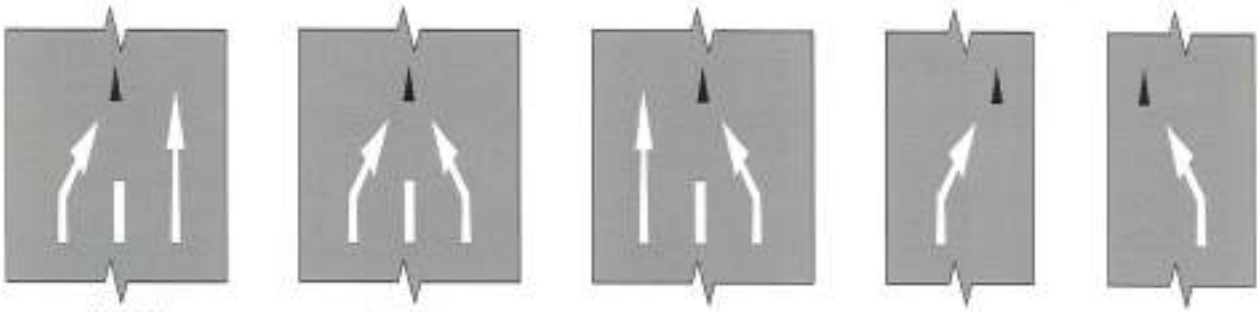
WM4 - REVERSIBLE LANE LINES

Ref. Vol 1-7.3.4



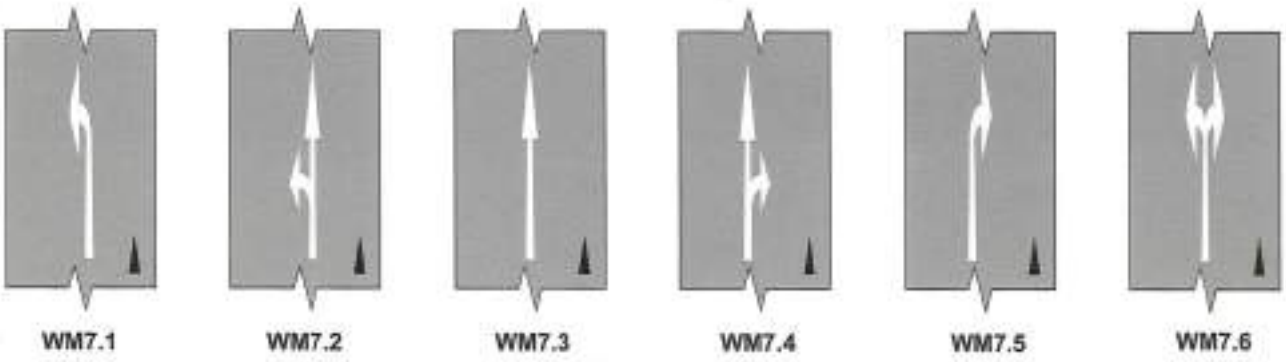
WM5 - YIELD CONTROL AHEAD

Ref. Vol 1-7.3.4 Vol 4-12.4.15



WM6 - LANE REDUCTION ARROWS

Ref. Vol 1-7.3.5 Vol 4-12.3.7/8



WM7.1 WM7.2 WM7.3 WM7.4 WM7.5 WM7.6

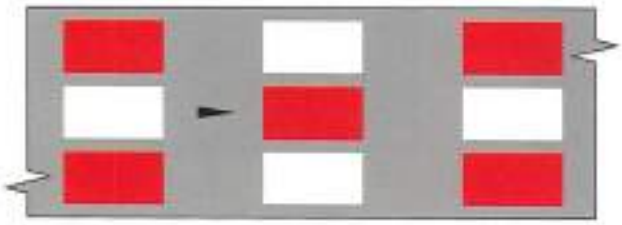
WM7 - MANDATORY DIRECTION ARROW AHEAD

Ref. Vol 1-7.3.7 Vol 4-12.3.2 to 12.3.4

WM8.1 WM8.2 WM8.3

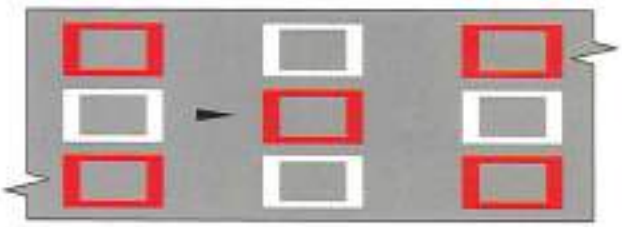
WM8 - NO OVERTAKING LINE OR NO CROSSING LINE AHEAD

Ref. Vol 1-7.3.8 Vol 4-12.3.8/9



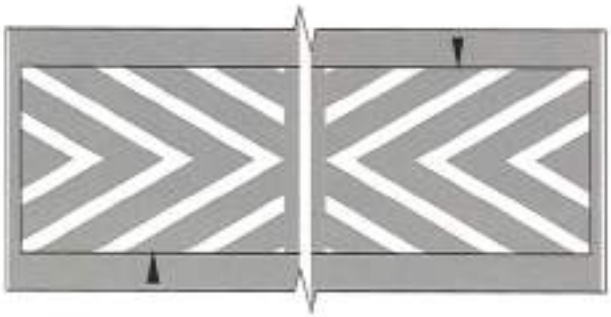
WM9.1 - ARRESTOR BED AHEAD

Ref. Vol 1-7.3.8 Vol 4-12.2.14



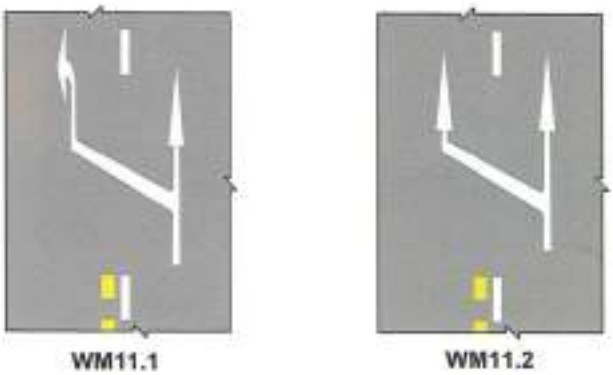
WM9.2 - ESCAPE ROAD AHEAD

Ref. Vol 1-7.3.8 Vol 4-12.2.15



WM10 - SPEED HUMP

Ref. Vol 1-7.3.9 Vol 4-12.2.16



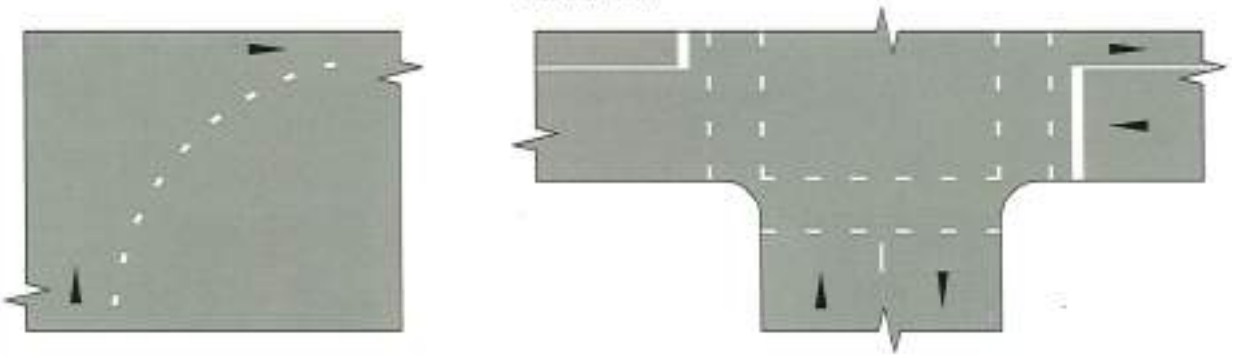
WM11.1 WM11.2

WM11 - END OF EXCLUSIVE USE LANE ARROWS

Ref. Vol 1-7.3.9 Vol 4-12.3.11/12

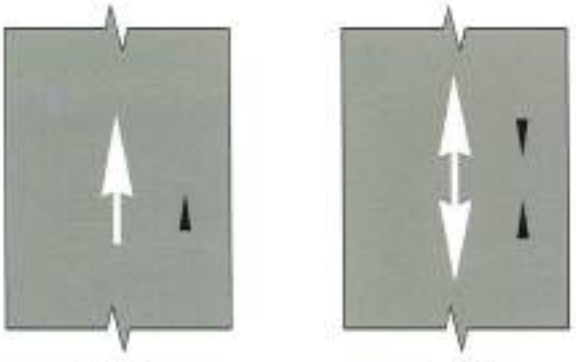
Section 7.5: GUIDANCE MARKINGS

GM1 - LANE LINE
Ref. Vol 1-7.4.1

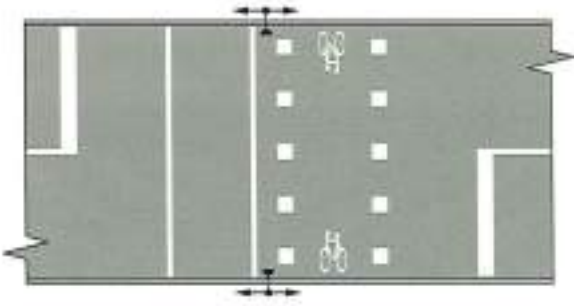


GM2 - GUIDE LINES
Ref. Vol 1-7.4.2

GM3 - BIFURCATION ARROWS
Ref. Vol 1-7.4.3 Vol 4-12.3.13/14



GM4 - INFORMATION ARROWS
Ref. Vol 1-7.4.3 Vol 4-12.3.15



GM5 - BICYCLE GUIDE LINES
Ref. Vol 1-7.4.4

GM6.1
Cycle Facility

GM6.2
Airport

GM6.3
Disabled Person Facility

GM6.4
High Occupancy Vehicle

GM6 - ROAD MARKINGS SYMBOLS

Ref. Vol 1-7.4.5 Vol 4-12.4.3 to 12.4.6

GM7 - WORD MARKINGS

Ref. Vol 1-7.4.6 Vol 4-12.5.1 to 12.5.9

GM8 - KERBFACE MARKINGS

Ref. Vol 1-7.4.6

CHAPTER 7: ROAD MARKINGS

7.1 INTRODUCTION

7.1.1 General

1 Developments in road traffic signing in Southern Africa have increasingly tended towards European practices. The details given on road markings in this manual conform closely to general European practice whilst also incorporating many of the *ad hoc* concepts already used in Southern African cities, provinces and countries.

2 Road markings may be defined as markings embedded in, or applied, or attached, to the road surface, kerbing, or to objects within or adjacent to the roadway for the purpose of regulating, warning or guiding traffic and to delineate the limits of the roadway and all, or portions, of the travelled way. The term ROAD MARKINGS therefore includes roadstuds, and other lateral delineation devices such as guardrail delineators and traffic cones. Road markings may be used to supplement road signs and traffic signals, or they may be used on their own.

3 The *modus operandi* in developing the system of road markings has been:

(a) to make clear the functional purpose of each type of marking; and
(b) to optimise the effectiveness of road markings, recognising that the application of markings and the maintenance of them is an on-going budgetary problem for road authorities.

4 Road markings have the limitation that they may be obliterated under adverse weather conditions. Their conspicuity is impaired, often significantly, when wet or dirty and their durability depends to a great extent on their exposure to traffic wear. Road markings perform a very necessary function by conveying requirements and information to drivers which might not be possible with road signs. They may often be visible when signs are obscured and are able to provide message continuity to a driver of a moving vehicle which is difficult and costly to achieve by signing.

5 The following sections of this chapter detail the individual types of road markings. These types of markings comprise the "tools" which a road designer may utilise. It is highly recommended that, particularly when undertaking road junction design, the road marking requirements be considered at the planning stage. The use of these road markings "tools" is in fact part of the design process. Typical details of applications and combinations of various road markings are covered in Volume 2.

6 Erasing road markings remains a difficult process. Although research is being undertaken to find improved methods, erasing of markings should be limited wherever possible. Since the removal of incorrect or badly positioned road markings is so difficult to do well it is very important that designers are conscious of the need to plan with care and attention to detail so that only necessary markings are applied. This is particularly important in urban areas where a lack of adequate planning can result in markings being applied to large areas of the road surface. Without the necessary care, this problem may become so extensive as to create a skidding risk, particularly for motorcyclists, and in any event will be expensive to eradicate or maintain (see also Subsections 7.1.12 and 7.1.15).

7.1.2 Objectives

1 The continuing increase in traffic volumes on our roads makes the extensive and correct use of road markings essential. By so doing the full and efficient use of often limited road space may be achieved. The widespread use of lane markings is desirable to enhance lane discipline, which in turn adds significantly to improved traffic flows and road safety. In urban areas particular advantages accrue from the use of adequate and ac- curate road markings at junctions.

2 Objectives to be aimed for in providing road markings therefore are:

(a) road safety;
(b) conformity of practice;
(c) good traffic management leading to optimum road capacity;
(d) provision of the correct marking first time.

7.1.3 Classification of Road Markings

1 Road markings may comprise any of the following types, either separately or in combination:

(a) transverse markings (approximately at right angles to the roadway centre line);
(b) longitudinal markings;
(c) arrows;
(d) painted islands;
(e) symbols;
(f) words, letters and/or numerals;
(g) parking markings;
(h) roadstuds;
(i) other delineation devices.

2 Since many of these types of marking can have more than one functional purpose, road markings are classified as follows:

(a) regulatory markings;
(b) warning markings;
(c) guidance markings;
(d) roadstuds;
(e) other delineation devices.

3 It is essential that road authority officials and road designers correctly understand the significance of markings they wish to utilise.

7.1.4 General Design Principles

1 Road markings are provided not only to satisfy traffic engineering requirements but should also be economically and environmentally suitable. Road markings should therefore embody the following properties:

(a) good visibility by day and night;
(b) good skid resistance;
(c) durability;

(d) clarity of message;
(e) where appropriate, symbolic markings should be elongated in the direction of movement of traffic (an elongation of at least 3 to 1 compared to a similar symbolused on a sign face is recommended);
(f) elongated markings should be sized in relation to the operating speed of traffic;
(g) short drying or application times to keep traffic disruption to a minimum;
(h) low environmental impact **(products shall not contain substances banned under national or international law).**

2 The visibility of road markings depends on the observation angle, the length of the marking and the contrast in the levels of light reflected by the marking and by the surrounding surfaces. This LUMINANCE CONTRAST is considered to result under conditions of identical illumination of the contrasting surfaces. Illumination of road markings may occur by virtue of the generally diffuse, or scattered, light provided by daylight or by overhead street lighting, or by the more direct light provided by vehicle headlamps. The luminance of a marking is dependent on the amount of pigment, the presence of glass beads (which reduces the luminance) and the method or manner of application. To be visible, markings must contrast adequately with the surface to which they are applied.

3 Night-time illumination by vehicle headlamps results in low levels of marking illumination, certainly at medium to long range. At such low levels the contrast sensibility and colour perception properties of the eye are significantly reduced. This results in colours merging into the background and perception of detail is severely diminished. To improve contrast it is generally recommended that road markings which have night-time significance be made retroreflective by the use of glass beads *(ballotini),* applied either in a mixed form or after application of a paint. The need to provide retroreflective road markings on road surfaces illuminated by overhead street lighting will be determined by the grade of street lighting to be used. Under lower grades of street lighting the use of retroreflective street markings may still be warranted (see Subsection 7.1.8).

4 It has been demonstrated by experiment that due to the optical circumstances of night-time driving the best roadway delineation can be achieved by placing the delineation devices as low as possible i.e. on the road surface, and as laterally close to the vehicle path as possible.

5 The following general rules are useful to help one understand why a wide variety of lines have been developed. This variety indicates that the system is becoming complex, which places a duty on designers to apply the various types of marking with care. In general:

(a) broken longitudinal lines are permissive in character;
(b) continuous solid longitudinal lines are restrictive in character;
(c) double continuous solid lines indicate maximum levels of restriction;
(d) the width of line used is an indication of the degree of emphasis attached to the marking.

6 The effectiveness of road markings will deteriorate rapidly if their application is not adequately specified and controlled. When road markings have poor durability the road authority is forced to re-mark more frequently which results in poor cost-efficiency. If road markings are not durable or well maintained the accident potential for sections of roadway may be significantly increased, with further adverse economic effects (see Subsection 7.1.15).

7 Since the presence of water on the road surface rapidly makes road markings ineffective, critical attention must be given to rapid drainage of surface water from the roadway.

7.1.5 Dimensioning and Setting Out

1 The minimum width of any line marking shall be 100 mm.

2 In general the diagrams given in this chapter do not include dimensions. The principal dimensions are, however, given in the descriptive text for each marking. Detailed dimensions are given diagrammatically in Volume 4. 1t should be noted that minimum dimensions are stated for most road markings. Many of these minimum dimensions are also prescribed by legislation. However, there is no impediment to using wider line dimensions. Many existing practices already use wider than minimum values for particular emphasis. Care should be exercised in this regard, however. There are a very limited number of possible line markings and many markings with different functions have a similar appearance. The need to maintain a visual indication of such functional differences must be recognised.

3 All broken line markings are described by a LINE-TO-GAP RATIO and recommended dimensions of line and gap lengths are given in each appropriate Subsection. Longitudinal broken line markings are designed for convenience to be set out in MODULES.A module may comprise one or several line-plus-gap combinations.

4 The STANDARD MODULE dimension for **rural roads is 12m** and for **urban roads is 9 m**. When undertaking geometric design, it is recommended that taper lengths, painted island lengths etc. be dimensioned in multiples of the appropriate module length. This will generally improve the ease of setting out of all changes in direction and/or line type, broken line markings and roadstuds when the latter are required.

5 The appearance of a standard module may be modified by an alteration in the line-to-gap ratio. This type of treatment may be used particularly with a LANE LINE marking GM1, or a CONTINUITY LINE marking WM2. The line length remains a standard length and the gap length is altered. This has the effect of increasing or decreasing the number of line-plus-gap combinations within a standard module. This technique is illustrated in Figure 7.1 and specific details of the different module dimensions are given in the relevant subsections. The standard module is therefore an intermediate form of the road marking which may be modified to produce a REDUCED density form or an EXTRA density form. When a multi-lane road is marked or re-marked with parallel broken lines such as DIVIDING LINE marking WM3, LANE LINE marking GM1, and/or CONTINUITY LINE marking WM2, it is normal practice to line up parallel modules at regular cross-section intervals. The line markings may be lined up at the front or back of the module cross-section, or the markings may be centred on the module cross-

section as illustrated in Figure 7.2. Adoption of one of these approaches will also assist the regular positioning of roadstuds when these are specified.

6 On multi-lane roadways which have a curving alignment it is recommended that modules be set out on the centre or DIVIDING LINE. The effect of the curvature will increase the circle perimeter outside the centre line and reduce it on the inside of the centre line. Setting out will be simplified in such circumstances if the outer modules are extended and the inner modules shortened so that markings line up on cross-sections. This will assist matching of modules into and out of curves and onto straights.

7 Although detailed dimensions of all arrow, symbol, letter and numeral markings are given in Volume 4, generally recommended lengths of such markings related to operating speeds of traffic are given in Table 7.1. More detailed comments on the appropriate lengths of specific markings are given in the relevant subsections, and in Volume 2, Table 2.3.

7.1.6 Location

1 In order that the effects of dirt and surface water may be minimised longitudinal road markings should not be located closer than 150 mm from the edge of roadway surface. If roadstuds are required between a line and the edge of road surface the line should be located 250 mm from the road edge.

2 When roadstuds are to be applied next to a longitudinal continuous solid line marking the roadstuds should preferably be placed 50 mm from the line on the side outside the travelled way. This spacing may be reduced to 25 mm in exceptional cases.

3 When parallel longitudinal lines are marked close to each other they should be spaced a minimum of 50 mm apart. If roadstuds are to be applied between such lines the lines should then be spaced at least 150 mm apart.

4 In general STOP LINE marking RTM1 and YIELD LINE marking RTM2 should be located in relation to the edge of the main road or according to the junction geometry if the junction is channelised. **These lines should NOT arbitrarily be located in line with the road reserve boundary.** Unless the junction is controlled by a traffic signal or a 3- or 4-way stop control adequate Shoulder Sight Distance must be available to drivers of vehicles when they are stopped in the prescribed manner at a STOP or YIELD marking. This Shoulder Sight Distance must allow for drivers of stationary vehicles to see enough of the main road in order to move off, to cover a distance comprising the total of the distance of the STOP or YIELD marking from the edge of the intersecting roadway, plus the width of that roadway, plus the length of their vehicle. Such a manoeuvre must be able to be completed in the time it takes a vehicle, which has just come into view on the main road as the driver on the controlled road moved off, to reach the junction (see Subsections 7.2.1 and 7.2.2 and Section 2.2 including Figures 2.7 and 2.8).

7.1.7 Materials

1 Road markings may be applied in a paint, plastic or bonded sheet form. The texture and preparation of the road surface to which markings are to be applied determine, to a great extent, the effectiveness of the application, and therefore the life of the markings.

2 Road marking paints may be applied in a range of thicknesses of the order of 0,2 mm to 0,5 mm and are designed to be quick drying. Thin-application paints with limited durability are appropriate only to lightly trafficked roads or roads likely to be subjected to maintenance within the longer life of more appropriate thicker-application markings used on busier roads. The skid resistance of painted markings may be low and specifications should ensure that this aspect is adequately covered and that compliance with specifications is achieved {see Subsection 7.1.8).

TABLE 7.1 RECOMMENDED SYMBOL LENGTHS TABLE7.1

Operating Speed {km/h)	Typical applications	Arrows, Symbols, Letters (m)
30-40	City Centre	1,25 or 2,5
50-60	Urban	2,5 or4,0
70-90	Urban Arterial/Rural Expressway	4,0 or 5,0
100-120	Rural Roads and Freeways	5,0
Special Applications	High Speed/High Accident Incidence Sites	7,5

NOTES:

(1) The marking lengths given are for general applications. There are variations to these recommendations which are covered in the individual road marking subsections.

(2) Lengths of arrows vary greatly depending on their type. For full details see Volume 4, Chapter 12, Section 3.

3 Thick-application materials in the form of thermoplastics or cold-applied plastics have greater skid resistance properties. Thermo-plastic materials, although expensive, can be cost effective, particularly if used for transverse lines, pre-cut symbols, larger marked areas and for markings on sections of road subject to very high traffic flows. Thermo-plastic material may be spray applied (1 mm to 1,5 mm thickness) or screed-applied (up to 3 mm thickness). Cold-applied plastics are even more expensive and their durability can be cost effective under conditions of extreme wear.

4 Bonded sheet or pre-formed bonded tapes are generally too expensive to be cost effective for large scale use. Permanent and temporary grades of bonded tape are available. The permanent grade can be cost effective for transverse markings, pre-cut symbols and larger marked areas and possibly for all markings on sections of road subject to very high traffic flows. Application of the temporary grade in controlled quantities at road-works, as removable temporary markings, can be recommended due to the difficulty experienced in the removal of paint markings. Such temporary markings may have to be adjusted in position regularly. The result of over- painting and re-painting at road-works sites can be extremely confusing and therefore potentially hazardous to drivers. Until such time as a more effective method of removing road markings is available which does not leave a residual effect which, under certain lighting conditions, gives the appearance of road markings, the use of black or grey bonded tapes to eliminate unwanted markings is recommended.

5 Care must be exercised to ensure that the temporary grade only is used for road markings which may be required for short periods of time and which may need to be relocated from time to time to accommodate changing traffic patterns, particularly at road-works (see Subsection 7.1.12).

7.1.8 Specification

1 The specification of **applied road markings** and the testing of such markings for compliance to specification is not well developed. The testing procedures require expensive equipment and highly skilled operators and very few suitable items of equipment are available in Southern Africa. **Details given in this section are therefore for the guidance only of any authority wishing to carry out testing, and are given to encourage the development of effective testing procedures and specifications.** The various values given are not prescriptive and are subject to alteration as a result of research and experience, and by the eventual publishing of appropriate standards for applied road markings.

2 In South Africa SABS Specifications CKS 192-1971, CKS 501-1981 and SANS 731-1987 refer for Drop-on Type Reflectorised Road-marking Paint, High-build Non-Skid Road-marking Paint and Road-marking Paint respectively, and deal with the quality of paint manufacture and offer limited testing advice. They do not cover a number of important properties of road marking paints, nor do they cover other road marking materials, nor any application specifications.

3 The annual cost to road authorities of re-marking roads within their jurisdiction can be considerable. In order to ensure that, in the interests of road safety, markings remain of an acceptable standard the effectiveness of such expenditure should be carefully monitored. In order to achieve an adequate and cost effective quality of road marking it is recommended that road authorities entering into contracts specify their requirements for the road markings as applied to the relevant road surface or surfaces, in addition to specifying the materials as manufactured. The specification can cover the durability required from materials by specifying an acceptable deterioration in quality over a period of time. By specifying in such a manner authorities should be able to establish parameters for the maintenance of road markings in an efficient manner. Such a specification can be made independent of the actual road marking materials and tenders can be reviewed in terms of the initial cost AND the time span performance likely from different materials.

4 Factors which should be included in a specification of an applied road marking material are:

(a) colour;
(b) luminance factor;
(c) coefficient of retroreflection;
(d) skid resistance (particularly for urban areas).

The required durability for these properties can be specified by indicating the minimum time period which should elapse before the acceptable "used" values are reached (see paragraph 7.1.8.5).

5 The values given in Table 7.2 for new materials may be used to assess original work. The values given for used materials may be used to establish rates of deterioration in terms of factors (a), (b) and/or (c). According to the working environment a used marking may reach the lower limits acceptable for one of the factors before the others. A decision to re-mark may be taken based on the deterioration in terms of only one factor. By building up a database of information road authorities should ultimately be able to assess which factor is most critical and under what circumstances.

6 The degree to which the acceptable values are attained for new or "first-time" applications of sprayed, brushed or screeded road marking materials is most likely to depend on:

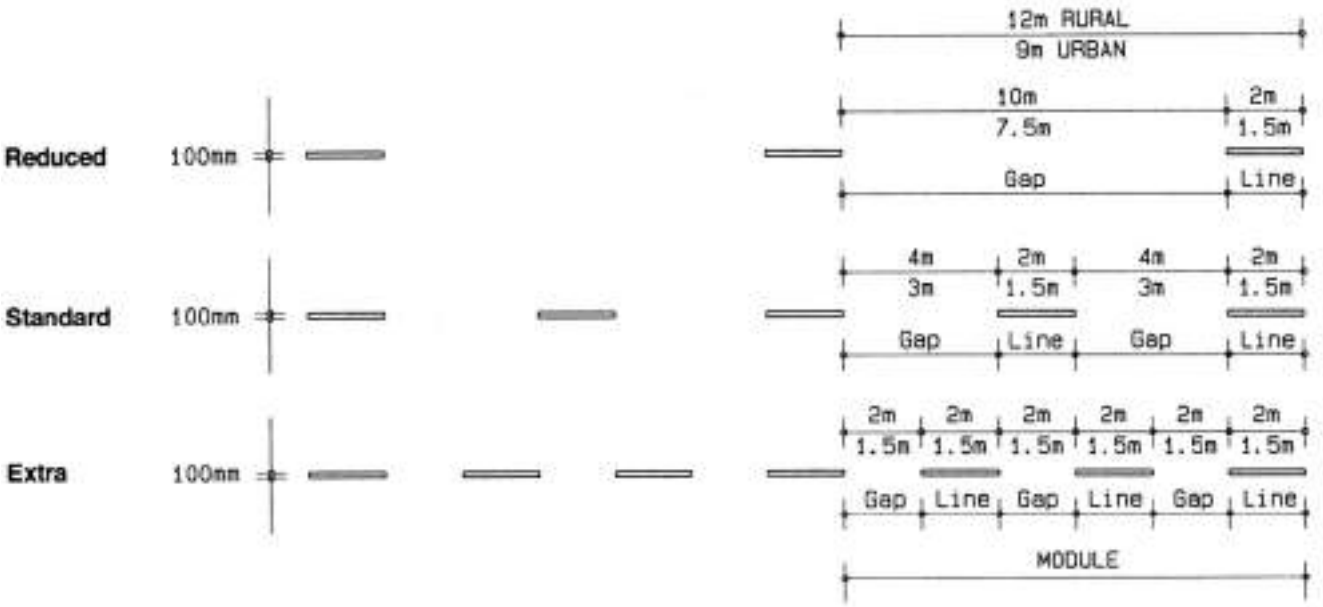
(a) the time which the new surface has had to "cure";
(b) the application rate used for the road marking materials.

It is common practice when painting road markings to cater for the surface curing time by using two applications at closely spaced intervals. This factor must be considered when writing contract specifications and when assessing tenders.

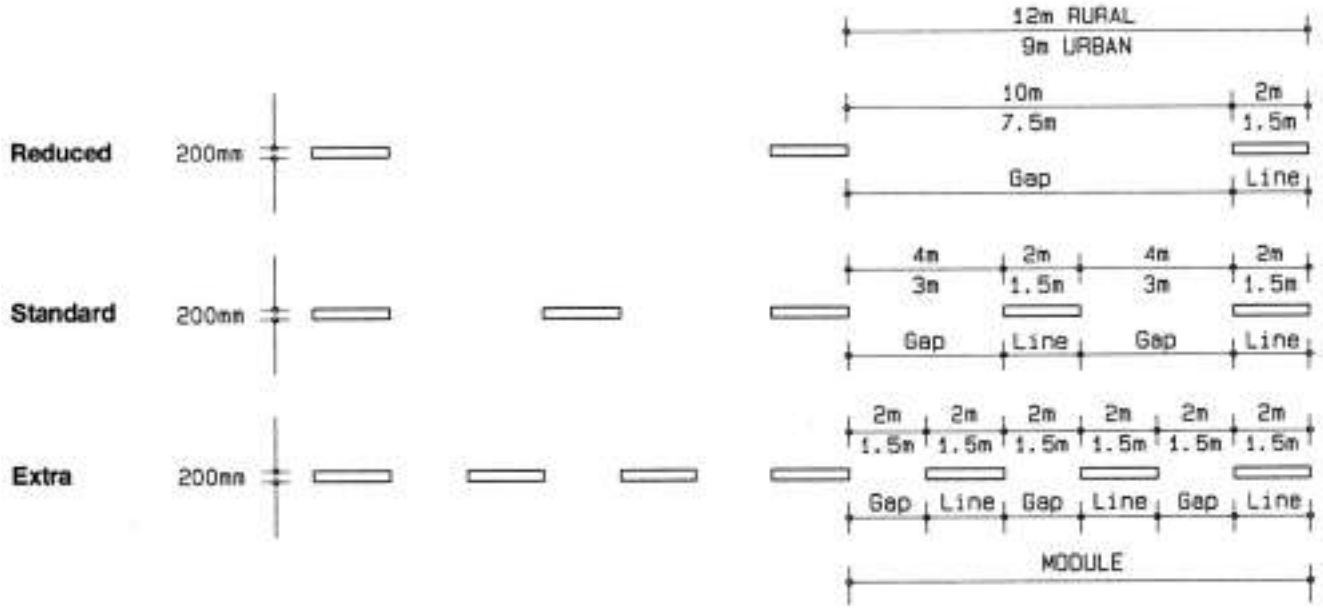
7.1.9 Warrants

1 Precise warrants for the use of road markings in a general sense are not well developed. A limited number of specific road markings have a warrant available, details of which are given in the relevant subsections.

2 Warrants for signal controlled and yield controlled mid-block pedestrian crossings, which in turn warrant the use of the relevant road markings are covered in Chapter 6, Subsection 6.8.11 where a range of warrant charts are also provided in Figures 6.16 to 6.27.



Detail 7.1.1 Lane Line markings GM1



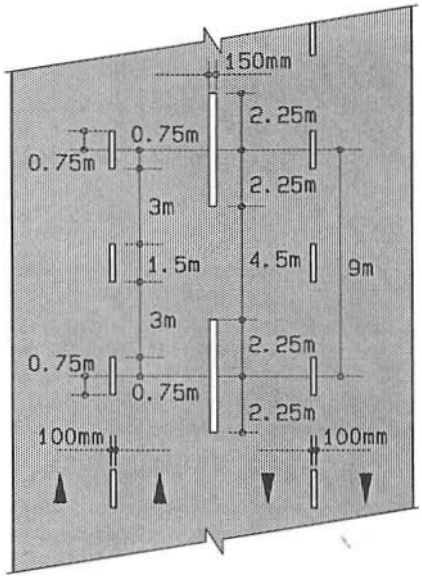
Detail 7.1.2 Continuity Line markings WM2

NOTES:

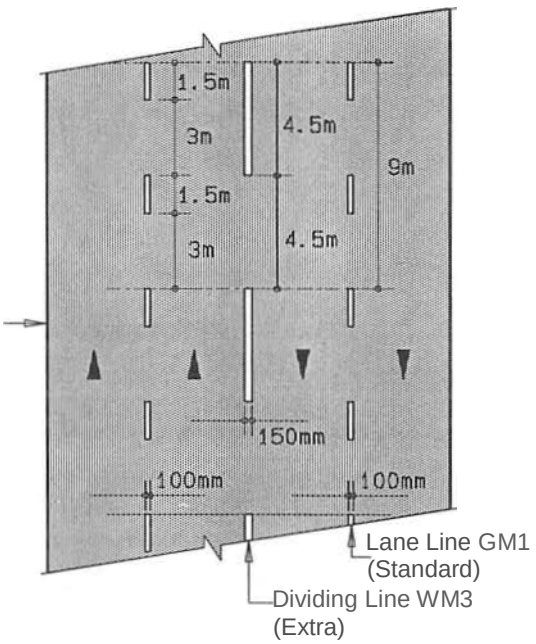
(1) See Figure 7.2 for alternative methods of lining up markings across a roadway when setting out.

(2) Refer to Subsection 7.1.9 and to Subsection 7.4.1 – LANE LINE marking and Subsection 7.3.2 - CONTINUITY LINE marking for guidance on the selection of standard, reduced or extra modules.

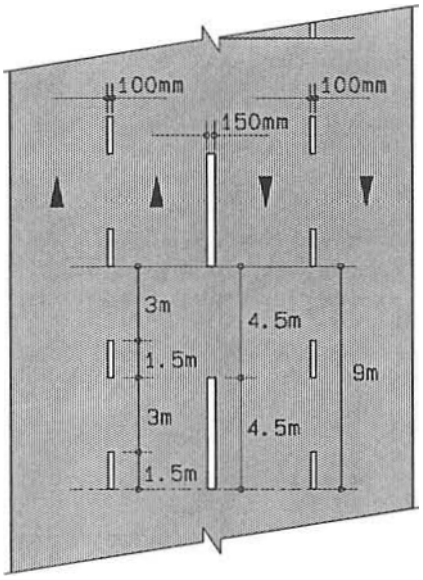
Fig. 7.1 Standard, Reduced and Extra Modules for Broken Line Markings



Detail 7.2.1 Modules Lined Up Across the Road on the Centre of the Marking



Detail 7.2.2 Modules Lined Up Across the Road on the Marking



Detail 7.2.3 Modules Lined Up Across the Road on the Back of the Marking

NOTES:

(1) Details illustrate urban STANDARD MODULES for LANE LINE marking GM1 and EXTRA MODULES for DIVIDING LINE marking WM3 (see Subsections 7.4.1 and 7.3.3 respectively).

(2) Details are also relevant to REDUCED or EXTRA LANE LINE marking MODULES.

Fig. 7.2 Lateral Alignment of Modules for Broken Line Markings

TABLE7.2 ACCEPTABLE VALUES FOR FACTORS APPROPRIATE TO THE SPECIFICATION OF ROAD MARKINGS TABLE 7.2

Factor	New Materials			Used Materials		
	White	Yellow	Red	White	Yellow	Red
Colour x[1]	0,305 0,335 0,325 0,295	0,494 0,470 0,493 0,522	0,660 0,610 0,638 0,690	0,305 0,350 0,340 0,295	0,481 0,444 0,494 0,054	0,655 0,579 0,606 0,690
Colour y[1]	0,315 0,345 0,355 0,325	0,505 0,480 0,457 0,477	0,340 0,340 0,312 0,310	0,315 0,360 0,370 0,325	0,518 0,476 0,426 0,454	0,345 0,341 0,314 0,310
Luminance Factor	0,6	0,4	±0,08	0,45	0,3	±0,06
Coefficient of Retroreflection (minicandelas/lux/m^2)	150	100	±30	100	70	±20
Skid Resistance BNP[2]	50			50		

NOTES:

(1) The co-ordinates given refer to the Chromaticity Chart in Figure 1.20. The co-ordinates measured for the colour should fall within the area defined by the co-ordinates given.

(2) "BPN" stands for a value determined by the British Portable Pendulum Number measurement method applicable to all colours of markings.

3 Warrants for the use of various road markings are likely to be different for rural applications and urban applications. In the absence of a wider range of developed warrants for road markings the following factors, which are largely subjective and may be more relevant in a rural situation than an urban situation, should be considered:

(a) a LEFT EDGE LINE marking RM4.1 is warranted on the left side of the travelled way of any rural or urban roadway which has been provided with a surfaced emergency shoulder (the marking may also be warranted on the left side of roadways which do not have surfaced emergency shoulders but which are subject to edge damage due to vehicles wandering off the surfaced roadway);

(b) a RIGHT EDGE LINE marking RM4.2 is warranted on the right side of all freeway carriageways carrying traffic travelling in one direction only (Class A1 freeway), whether the median is provided with a barrier or not (such an edge line is also warranted on non-freeway dual carriageway roadways which have a median which is not defined by barrier or un-mountable kerbs);

(c) GUIDE LINE markings GM2 are warranted when more than one turning lane is provided for the left or right turning movements at a junction even if one of the two lanes is a shared through and turning lane (this marking may also be warranted to guide pedestrians to the safest crossing point at channelised or wide road junctions -this latter marking application may also be warranted in an urban situation to make the existence and location of a junction more obvious to approaching drivers);

(d) a CONTINUITY LINE marking WM2 is warranted when a dedicated or exclusive turning lane is provided at a rural or urban junction; such a marking is also warranted on the left side of a roadway to define the through portion of the roadway at wide junctions when the provision of a LEFT EDGE LINE marking RM4.1 through the junction is not appropriate and/or the combination of horizontal and/or vertical curvature together with an uphill approach on the intersecting roadway makes definition of the alignment of the left edge of the roadway unclear;

(e) a range of markings are warranted at the junctions of one-way and two-way roadways in urban areas to reinforce the correct direction of travel;

(f) the use of PARKING BAY markings RM6 is warranted in any situation where a driver is charged for the use of the parking, or where, from experience, the behaviour of drivers has indicated a need to control their parking activities;

(g) in addition, if the following are provided, the use of the appropriate road marking is warranted as indicated:

(i) a STOP sign R1 to R1.5 - a STOP LINE marking RTM1;

(ii) a YIELD sign R2, YIELD TO PEDESTRIANS sign R2.1 or a YIELD AT TRAFFIC CIRCLE sign R2.2- YIELD LINE marking RTM2;

(iii) traffic signals - STOP LINE marking RTM1 and normally PEDESTRIAN CROSSING LINES marking RTM3;

(iv) an EXCLUSIVE PARKING BAY marking RM7 - the appropriate designatory letter within the standard oval marking RM7.1;

(v) BUS LANE RESERVATION sign R302, BICYCLE LANE RESERVATION sign R304, HIGH OCCUPANCY VEHICLE RESERVATION sign R336 or TRAM LANE RESERVATION sign R339 - EXCLUSIVE USE LANE LINE marking RM9;

(vi) EXCLUSIVE USE LANE LINE marking RM9 - symbol markings BICYCLE GM6.1 and HIGH OCCUPANCY VEHICLE GM6.4, and WORD MARKINGS GM7;

(vii) in advance of a pedestrian crossing - PEDESTRIAN CROSSING AHEAD lines RM11;

(viii) in advance of a railway crossing (see Volume 2, Chapter 7) - RAILWAY CROSSING AHEAD marking WM1;

(ix) in advance of a lane drop - LANE REDUCTION ARROW marking WM6;

(x) in advance of a NO OVERTAKING LINE marking RM1 or NO CROSSING LINE marking RM2- NO OVERTAKING LINE AHEAD marking WM8;

(xi) in advance of an arrestor-bed - ARRESTOR BED AHEAD marking WM9;

(xii) on a speed hump - SPEED HUMP marking WM10 and NO OVERTAKING LINE marking RM1;

(xiii) the addition of a lane either as a climbing lane, an overtaking opportunity lane or as a turning lane - BIFURCATION ARROWS marking GM3 and LANE LINE marking GM1.

4 As described in Subsection 7.1.5 and illustrated in Figure 7.1 a number of broken line markings may be applied as STANDARD, REDUCED or EXTRA MODULES. The decision to alter from one type of module to another, or to choose one type of module instead of another may be warranted by factors such as :

(a) the need to economise where visual impact is not critical;
(b) the need for increased visual impact from a road marking due to horizontal or vertical curvature, high traffic volumes or a change in the roadway cross-section or lane configuration;
(c) the need to emphasise the difference between functionally different but visually similar types of road markings;
(d) the use of a progressive increase in density of marking approaching a point of divergence, convergence, or potential conflict of traffic.

7.1.10 Roadway Width Changes

1 When the alignment and/or width of a roadway is altered due to an increase or decrease in the number of lanes, or the introduction or removal of a dividing island, or at a constriction, it is commonly necessary to re-align some or all of the longitudinal road markings. Such a change in alignment is achieved by shifting the line at a constant rate until it reaches the required new position. This rate of shift is commonly referred to as the TAPER RATE. The circumstances described may occur as part of permanent or temporary geometric treatments.

2 For purposes of road marking a taper rate of 1 in 50 (or 1 metre shift for every 50 metres longitudinal distance) is considered "flat" (or slow), whereas a taper rate of 1 in 10 is considered "sharp" (or fast). Subject to the road space available the ends of a tapering section may be softened, both visually and geometrically, by the introduction of circular or parabolic curves. Such treatment is more appropriate when using a "sharp" taper rate but may also be appropriate with "flat" taper rates on high speed approaches.

3 The TAPER RATE to be used is dependent upon:

(a) the operating speed of traffic;

TABLE 7.3 NOMINAL TAPER RATES FOR LONGITUDINAL LINES TABLE 7.3

Operating speed (km/h)	Taper Rate for Line Shift Without Kerbed Island (1 in ...)		Taper Rate for Line Shift Preceding Kerbed Island (1 in ...)		
			Width of kerbed island		
			0,6 m - 1,25 m	1,75 m - 2,5 m	3m or more
30	20	Rural Urban	50 25	20 10	10
50	25	Rural Urban	50 30	20	15
60	35	Rural Urban	50 35	25	20
80	45	Rural Urban	50 45	35	30
120	50		50	40	35

(b) whether only road markings are offset (in particular the DIVIDING LINE between opposing flows of traffic);
(c) whether a channelizing or median island (or barrier) is introduced in conjunction with the shift in alignment.

4 Table 7.3 indicates a range of appropriate TAPER RATES. When a change in alignment occurs simultaneously with the introduction of an island (or barrier) the flatter or slower taper rate quoted should be used. When introduced into the traffic flow a narrow island or obstruction may be potentially more hazardous than a wider one. The table therefore recommends flatter taper rates for narrower obstructions. Designers must also be aware of the requirements of the Code of Procedure or design requirements of the Authority under whose jurisdiction the roadway falls.

5 The taper rates given should be considered as nominal rates. The setting out of road markings will be simplified if the length of tapering sections is fixed at a rounded dimension. This length should preferably represent a full number of rural or urban STANDARD MODULES as this will simplify the matching of any parallel longitudinal broken line markings to the changes in alignment. For example a 1,70 m shift at a rate of 1 in 50 requires a taper length of 85 m. It is recommended that the taper length be adjusted to 84 m for rural conditions (7 x 12m modules) and 81 m for urban conditions (9 x 9 m modules). This approach will therefore result in actual taper rates of 1 in 49.4 and 1in 47.6 respectively (see also paragraph 7.1.5.4.).

6 Changes in alignment and tapers may occur between lanes carrying traffic in opposite directions or lanes carrying traffic in the same direction. A wide range of line types may be involved in the detailed treatment of such sections of road. The intended function each line type is covered in the remaining sections of this chapter. Details of the applications of various line types involving tapers are illustrated in Volume 2.

7.1.11 Junction Channelisation

1 The majority of detail relating to the use of road markings for junction channelisation is given in Volume 2.

2 Designers wishing to utilise various types of marking should read the relevant text in this chapter so that they are familiar with the intended functions of such markings.

3 A particular aspect relevant to the road marking of junctions. which designers should note, is the functional difference between line markings used for the separation of vehicles travelling in the same direction and line markings used for the separation of vehicles travelling in opposite directions.

7.1.12 Temporary Road Markings

1 Any type of road marking may be used temporarily during a period when road construction is in progress or traffic is deviated from its normal route for whatever reason. It must be remembered, however, that there is no visual difference to drivers between permanently placed road markings and temporarily placed ones. Great care must be exercised so that there is no confusion when it is required to use temporary road markings. Whenever possible a clearly visual discontinuity should be created between a remaining, but no longer relevant, permanent longitudinal marking and a temporary longitudinal marking intended to re- place the original marking and to perform a similar function. Conversely, the intended continuation of a permanent longitudinal marking into a temporary longitudinal marking should be visually reinforced by whatever means is practical under the circumstances. In preparing such treatments designers should pay particular attention to their effectiveness at night. The use of wider markings, roadstuds or delineator hazard markers may be considered.

2 Due to the difficulty in erasing road markings it is strongly recommended that wherever possible temporary markings be applied using one of the following techniques:

(a) by using a lightly applied non-emulsion paint such as PVA which will quickly wear under traffic operations (the use of PVA paint is preferable for short- term work which still requires a limited amount of marking, or in situations where regular remarking to accommodate the rapid wear is acceptable);
(b) by using temporary, pre-formed, adhesive-backed tapes (this material, although costly, has the advantage that it can be put down and lifted a number of times with limited wastage and can be cost effective when used carefully; a black version of this tape is available which is useful to temporarily blank-out existing markings, particularly at temporary changes of direction when lane, edge or barrier lines would otherwise continue across the line of the deviation or detour, and would otherwise have to be erased; care should be taken to see that only the temporary grade of tape is used in such circumstances);
(c) by using temporary roadstuds at close spacings to simulate a road marking line (roadstuds used in this manner must be easily removable).

7.1.13 Freeway Road Markings

The road marking of freeways is covered generally under the subsections dealing with specific road markings. Due to the almost universally high speeds pertaining to freeways it is normal to specify line widths which are greater than the minimum values and to generally make details such as painted islands as bold as possible.

2 Certain aspects of the road marking of freeways require particular care in detailing and specification. These are:

(a) edge lines (see Subsection 7.2.8);
(b) off-ramp ore painted islands (see Subsection 7.2.9 and Volume 2, Chapter 2);
(c) on-ramp gore markings (see paragraph 7.1.13.3 and Volume 2, Chapter 2);
(d) median edge lines (see Subsection 7.2.8);
(e) "No Entry" markings including roadstuds, at junctions of off-ramps with crossing roads (see Subsection 7.5.2 and Volume 2, Chapter 2);
(f) lane reduction arrows (see Subsection 7.3.6 and Volume 2, Chapter 2);
(g) at the beginning and end of freeways (see Volume 2, Chapter 2);
(h) at the termination of climbing lanes (see Volume 2, Chapter 2).

3 On-ramp gore markings may vary according to the type of on-ramp being marked. A loop ramp turning through 180° to 360° may benefit from the use of a painted island marking in the joining gore with the main freeway carriageway or collector-distributor road. A tangential type of on-ramp does not normally require a painted island in the gore area.

7.1.14 Pedestrian and Cyclist Road Markings

1 Road markings indicating exclusive pedestrian and/or cyclist portions of the roadway and the positions where pedestrians and/or cyclists cross the path of vehicular traffic are covered in the various subsections of this chapter and in Volume 2, Chapters 2 and 3.

2 Designers using these road markings should remember that they also apply to pedestrians and cyclists and to be effective must be clearly visible to them. This comment applies to the use of PEDESTRIAN CROSS- ING AHEAD "zigzag" marking RM11, and GUIDE LINE marking GM2 in particular.

7.1.15 Maintenance

1 The maintenance of road markings is an expensive operation and has been commented on in earlier sub-sections. When re-marking is undertaken it should be done carefully and accurately to avoid creating a ragged appearance to the marking. A high standard of maintenance of road markings, including roadstuds, is essential if they are to fulfil their purpose.

2 The following aspects should be considered by road authorities when developing a systematic approach to road marking maintenance:

(a) before re-marking, particularly after a road or street has been reconstructed or re-surfaced, the functional need for all existing markings should be assessed;

(b) if a marking has been deemed necessary it is in the interests of public safety that it be well maintained;

(c) the most cost effective form of maintenance need not necessarily be the re-marking of markings at ever-shorter intervals of time due to the labour cost component; other options should be assessed on an economical basis;

(d) mechanical street cleaning and the washing of devices such as guardrails (and their delineators) is used in several parts of the world to extend replacement maintenance periods and should be assessed from time to time as it may become cost effective in the Southern African context in terms of time and materials.

3 If, for whatever reason, a marking has been applied to the road surface which is no longer required the removal of such a marking must be carried out skilfully. The traditional methods of erasing an unwanted road marking are:

(a) to paint it over with flat black or grey paint;

(b) to burn the marking off the road surface;

(c) to grind the marking off the road surface

(d) to remove the marking with a very high pressure water jet.

These methods can all, on occasion, fail to achieve the desired objective in that they leave marks, which, under certain light conditions may appear as clearly as the original road marking. Research on this issue continues on a world-wide basis, however, a technique worth considering is to try to disguise the shape of the markings being removed by making the area of over-painting, burning or grinding an irregular rather than regular shape which does not conform exactly to the pattern being erased.

7.1.16 Road Marking Diagrams

1 As stated in paragraph 7.1.1.5 the individual road markings detailed in this chapter are the "tools" which may be used to design an often complex road marking plan. The subsections dealing with each road marking include a diagram of the actual marking. In many cases the diagram details basic examples of only one or two modules, or patterns, of what is in effect a continuous marking which may, when applied, stretch for kilometres. In addition to the diagrams a limited number of figures are provided in order to illustrate basic applications.

2 In order that the orientation of each diagram and figure can be made clear an indication is given in all relevant instances of the direction of travel of traffic in relation to the marking or markings. This indication is given by the following triangular device:

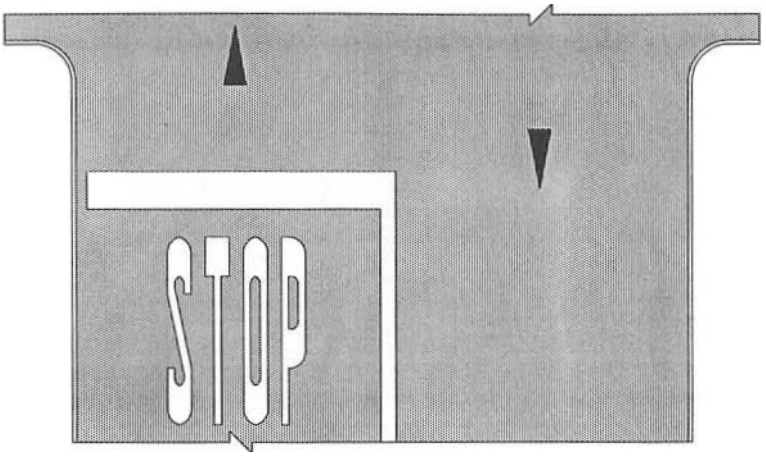
pointing in the direction of travel

This triangle appears in black on the grey background of the diagram and should not be misinterpreted as an arrow on the road surface.

STOP LINE

COLOUR:

White



For dimensions ref. Vol. 4 page 12.1.2 to 12.1.7

RTM1

7.2.1 Stop Line

1 A STOP LINE regulatory marking RTM1 imposes a mandatory requirement upon drivers of vehicles, when combined with a STOP sign R1, a RED traffic signal indication, or the signal of a traffic officer, ***that they shall stop their vehicle immediately behind such line,*** AND such line shall have the significance assigned to STOP sign R1. In any other circumstance STOP LINE markings shall have the significance assigned there to by STOP sign R1. (STOP sign R1 includes any and all derivations of sign R1 -see Subsection 2.2.1 and Chapter 6.)

2 This has the effect, that in the event that a STOP sign R1 **at a road junction** has fallen down or is temporarily missing, or if a traffic signal is temporarily out of order, the STOP LINE marking RTM1 shall have the full significance of the sign R1, or the traffic signal RED indication, as if they were still in position or functioning.

3 STOP LINE markings RTM1 shall only be used in conjunction with STOP sign R1 and TRAFFIC SIGNALS. STOP LINE markings shall not be used where regular but short term point duty is performed by a traffic officer or a scholar patrol or at non-signal controlled pedestrian crossings. STOP LINE markings shall not be used in conjunction with GUIDE LINE marking GM2, within a junction which is controlled by traffic signals, since the control required over turning traffic is YIELD control (see Subsection 7.2.2, paragraph 7.2.2.2). When a random temporary road-block is operated by a traffic officer temporary STOP LINE markings RTM1 shall be placed on the road surface for the duration of the road-block and shall be completely removed immediately the temporary control ceases (see Subsection 7.2.2, 7.2.3 and 7.2.4).

4 A STOP LINE shall comprise a continuous solid white line with a minimum width of 300 mm in urban areas and 500 mm in rural or other areas. STOP LINES, which have been warranted, shall extend across the full width of that portion of all surfaced road junction approaches used by traffic travelling towards the junction, with the exception as noted in paragraph 7.2.1.5. In the case of two-way roadways stop lines shall extend from the edge of the roadway to the NO OVERTAKING LINE marking RM1, or the NO CROSSING LINE marking RM2, whichever indicates the dividing line between opposing traffic movements as specified in paragraph 7.2.1.6. In the case of one-way roadways stop lines shall extend from the left kerb line to the right kerb line. For the purposes of these requirements the junction between the road surface and a drainage channel may be taken to represent the kerb line.

5 A STOP LINE marking RTM1 shall be combined with a YIELD LINE marking RTM2 to permit left turning filter movements at junctions under control of STOP/YIELD sign R1.2.

6 When a STOP LINE is marked across a portion of a two-way roadway the DIVIDING LINE marking WM3, shall be replaced by a minimum length of NO OVERTAKING LINE marking RM1, or NO CROSSING LINE marking RM2, whichever is appropriate in terms of the functions of these markings (see Table 7.5).

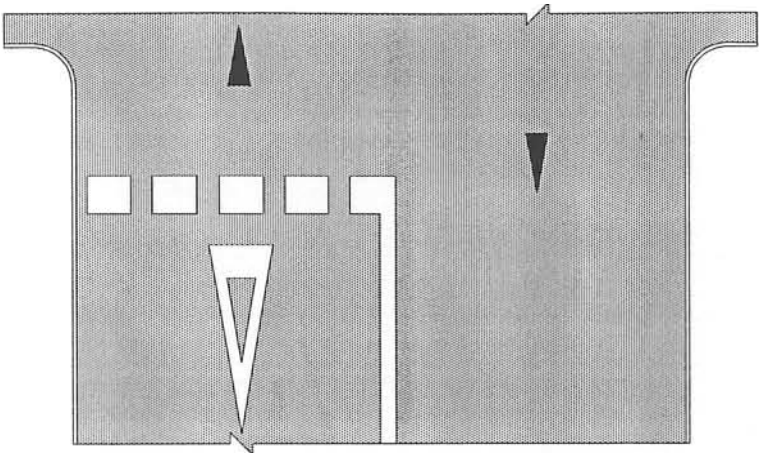
7 When used in conjunction with PEDESTRIAN CROSSING LINES marking RTM3, a STOP LINE should be spaced at least 1m, and at signalised mid-block crossings preferably 3 m, in advance of the PEDESTRIAN CROSSING LINE. When pedestrian crossing lines are not marked, the stop line should be located so as to give the best line of sight to crossing road users consistent with the turning requirements of vehicles entering the roadway on which the stop line is marked. The STOP LINE should be located not more than 15m or less than 1,2 m from the line representing the continuation of the edge of the intersecting roadway (see Figure 2.8, Section 2.2).

8 Typical examples of the application of STOP LINE markings are given in Volume 2, Chapters 2 and 3.

9 It is recommended that the word "STOP" in the standard WORD markings GM7 be marked on the road surface approximately 1 m in advance of the STOP LINE marking RTM1 when used in conjunction with a STOP sign R1. The marking of the word "STOP", with or without INFORMATION ARROW marking GM4.1, in advance of a stop line may be used as an optional additional marking when sight distance to the STOP sign R1, is unavoidably poor (see Subsection 7.4.4).

YIELD LINE

For dimensions ref. Vol.4 page 12.1.2 to 12.1.7



COLOUR:

White

RTM2

7.2.2 Yield Line

1 A YIELD LINE regulatory marking RTM2 imposes a mandatory requirement upon drivers of vehicles ***that they shall yield right-of-way at the point marked by the line:***

(a) to all traffic on the public road which is joined by the road on which they are travelling,

(b) to all rail traffic on the railway line which is crossed by the road on which they are travelling;

(c) to pedestrians and/or cyclists crossing the roadway, or waiting to cross the roadway at a crossing marked with PEDESTRIAN CROSSING LINES marking RTM3 and/or BLOCK PEDESTRIAN CROSSING marking RTM4;

AND such marking shall have the significance assigned to YIELD sign R2 (YIELD sign R2 includes any and all derivations of sign R2).

2 This has the effect that, in the event that a YIELD sign R2 at a road junction or pedestrian crossing has fallen down, or is temporarily missing, the YIELD LINE marking RTM2 shall have the full significance of YIELD sign R2. A YIELD LINE marking RTM2, when marked across a turning lane demarcated by GUIDE LINE marking GM2, within a junction which is controlled by traffic signals, shall have the full significance of YIELD sign R2 without the use of such sign.

3 YIELD LINE markings RTM2 shall only be used in conjunction with YIELD sign R2, YIELD TO PEDESTRIAN sign R2.1, or YIELD AT TRAFFIC CIRCLE sign *R22,* or as indicated in paragraph 7.2.2.2. YIELD LINE markings shall be used at any location, which is not controlled normally by a traffic signal, where regular but short term point duty is performed by a traffic officer or a scholar patrol (see Subsections 7.2.1, 7.2.3 and 7.2.4).

4 A YIELD LINE shall comprise a broken white line with a minimum width of 300 mm in urban areas and 500 mm in rural or other areas. YIELD LINES, which have been warranted, shall extend across the full width of that portion of all surfaced road junction approaches used by traffic travelling towards the junction, with the exception noted in paragraph 7.2.2.7. A line-to-gap ratio of 2 to 1 should be used with the recommended lengths of 600 mm line and 300 mm gap. These should be extended o 1000 mm and 500 mm in rural areas when the yield controlled portion of the intersecting roadway exceeds 5 m in width.

5 When a YIELD LINE is marked across a portion of a two-way roadway the DIVIDING LINE marking WM3 shall be replaced by a length of NO OVERTAKING LINE marking RM1, or NO CROSSING LINE marking RM2, which-ever is appropriate in terms of the functions of these markings. The minimum lengths of such markings shall be as given in Table 7.5. At a marked pedestrian crossing YIELD LINE marking RTM2 may be used in conjunction with PEDESTRIAN CROSSING AHEAD LINE markings RM11. For details of this and other pedestrian crossing markings see Subsection 72.15.

6 When used in conjunction with PEDESTRIAN CROSSING LINES marking RTM3, and/or BLOCK PEDESTRIAN CROSSING marking RTM4, a YIELD LINE should be spaced at least 3 m and preferably 6 m in advance of the PEDESTRIAN CROSSING LINE or BLOCK PEDESTRIAN CROSSING marking.

7 A YIELD LINE marking RTM2 shall be combined with a STOP LINE marking RTM1 to permit left turning filter movements at junctions under control of STOP/YIELD sign R1.2.

8 When used at a road junction a YIELD LINE should be located not less than 1,2 m from the line representing the continuation of the edge of intersecting roadway. When used on a turning roadway (slip road) care should be taken to locate the YIELD LINE so that drivers have an adequate line of sight to converging traffic on the cross road in order that they may yield right-of-way at the line (see Figure 2.7, Section 2.2).

9 A YIELD LINE, in conjunction with a YIELD sign R2, may be used to control traffic on the approach to a railway crossing which is infrequently used, provided that a good line of sight to the railway line is available.

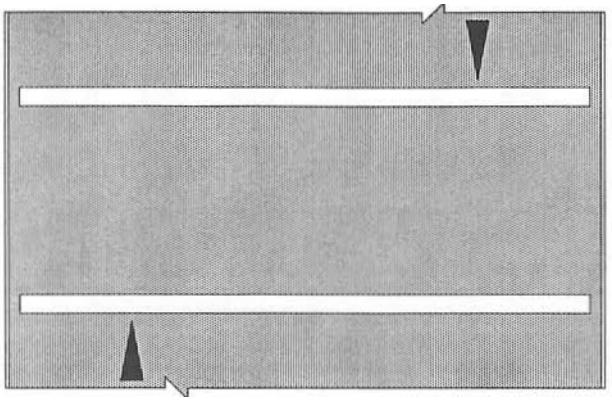
10 Typical examples of YIELD LINE markings are given in Volume 2, Chapters 2, 3 and 7.

11 It is recommended that the YIELD CONTROL AHEAD marking WM5 be marked on the road surface approximately 1 min advance of the YIELD LINE marking RTM2. YIELD CONTROL AHEAD marking WM5, with or without INFORMATION ARROW marking GM4.1, may be used as an optional additional marking when sight distance to the YIELD sign R2 is limited (see Subsections 7.3.5 and 7.4.4 and Volume 2).

PEDESTRIAN CROSSING LINES

COLOUR:

White



For dimensions ret. Vol. 4 page 12.1.2 to 12.1.7

RTM3

7.2.3 Pedestrian Crossing Lines

1 A PEDESTRIAN CROSSING LINES regulatory marking RTM3 imposes a mandatory requirement that drivers of vehicles ***shall yield right-of-way, by slowing down or stopping if need be to so yield, to a pedestrian who is crossing the roadway or a portion of roadway, or to a pedestrian waiting to cross the roadway,*** AND regulatory marking RTM3 imposes a mandatory requirement that pedestrians ***shall only cross the roadway within the crossing defined by the markings and the edges of the roadway and/or median or other traffic island (if such are provided)***

PROVIDED that:

(a) if such PEDESTRIAN CROSSING LINES marking RTM3 is used in conjunction with a road sign or traffic signal, or STOP LINE marking RTM1 or YIELD LINE marking RTM2 ***the significance of these road traffic signs shall take precedence;***

(b) pedestrians are crossing the roadway or portion of roadway in accordance with the prescribed indications of a traffic signal when such is provided.

2 PEDESTRIAN CROSSING LINES markings shall always comprise two continuous white lines. These lines shall be a minimum of 100 mm wide and shall be placed at least 2,4 m apart. A separation of 3 m is preferred, and where large volumes of pedestrians are present the distance separating the lines should be increased. The lines should extend across the full width of a roadway or portion of roadway and should normally be parallel to each other and at 90° to the direction of traffic movement. However, crossings may be skewed if this is in the best interests of pedestrians and the safe movement of traffic.

3 PEDESTRIAN CROSSING LINES shall be preceded by a STOP LINE marking RTM1 when used at a traffic signal controlled crossing, or a YIELD LINE marking RTM2 when used at a road sign controlled crossing. Marking RTM3 shall not be marked on top of, or as an extension to such lines, but as separate markings. It is not recommended that PEDESTRIAN CROSSING LINES be marked on the approaches to uncontrolled or partially controlled junctions. If it is required to provide guidance to pedestrians when their numbers do not warrant the installation of a formal crossing it is recommended that GUIDE LINE markings GM2 be provided in a similar manner to PEDESTRIAN CROSSING LINES. This type of informal crossing is intended to assist pedestrians identify the section of public road over which they may most safely cross.

4 Warrants for the installation of various types of mid-block pedestrian crossing are given in Section 6.8. The pedestrian crossing marking used will depend on the type of control warranted. As a general rule PEDESTRIAN CROSSING LINES marking RTM3 should be provided at all approaches to a junction controlled by traffic signals.
However they may be omitted if:

(a) for some reason it is considered unsafe for pedestrians to cross a particular approach; in such circumstances the normal crossing position should be covered by a NO PEDESTRIANS sign R218 and the safe route through the junction made clear to pedestrians if necessary by means of pedestrian guidance signs;

(b) the pedestrian crossing volumes in a particular direction average less than 50 per hour during daylight.

5 It is recommended that PEDESTRIAN CROSSING LINES marking RTM3 is only used in conjunction with a traffic signal either at a junction or in a mid-block location. Pedestrian crossings controlled by YIELD TO PEDESTRIAN sign R2.1, which may operate with or without part-time control by a traffic officer or a scholar patrol shall use the BLOCK PEDESTRIAN CROSSING marking RTM4 because of the greater visual impact of this marking. In the event that the type of control at a mid-block pedestrian crossing is altered from road sign to traffic signal, or *vice versa,* it is acceptable to use both markings. In such situations, the "block" markings should be separated from the line markings to obtain a better visual effect (see Subsections 7*2.4* and 72.15).

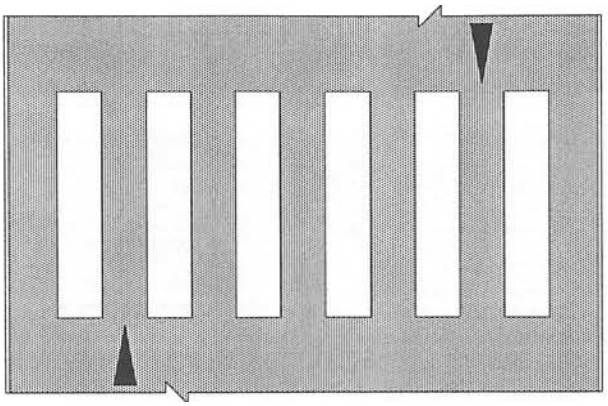
6 Where PEDESTRIAN CROSSING LINES are marked in an un-signalised mid-block location, they should be preceded by a PEDESTRIAN CROSSING warning sign W306 on each approach in accordance with the provisions of Subsection 3.4.6. If marked at a signalised mid-block location warning signs W301 and W306 may be used.

BLOCK PEDESTRIAN CROSSING MARKINGS

For dimensions ref. Vo/.4 page 12.1.2 to 12.1.1

COLOUR:

White



RTM4

7.2.4 Block Pedestrian Crossing Markings

1 A BLOCK PEDESTRIAN CROSSING regulatory marking RTM4 imposes a mandatory requirement that drivers of vehicles ***shall yield right-of-way, by slowing down or stopping if need be to so yield, to a pedestrian who is crossing the roadway or a portion of roadway, or to a pedestrian waiting to cross the roadway,*** AND regulatory marking RTM4 imposes a mandatory requirement that pedestrians *shall only cross* ***the roadway within the crossing defined by the markings and the edges of the roadway and/or median or other traffic island (if such are provided).***

PROVIDED that:

(a) if such BLOCK PEDESTRIAN CROSSING marking RTM4 is used in conjunction with a road sign or traffic signal, or STOP LINE marking RTM1 or YIELD LINE marking RTM2 ***the significance of these road traffic signs shall take precedence;***

(b) pedestrians are crossing the roadway or portion of roadway in accordance with the prescribed indications of a traffic signal when such is provided.

2 BLOCK PEDESTRIAN CROSSING markings shall comprise a number of rectangular white painted markings of minimum length 2,4 m and minimum width 600 mm, spaced 600 mm apart which shall extend across the full width of the roadway or portion of roadway. A length of marking of 3 m is preferred, and this dimension may be further increased if large volumes of pedestrians are present, to enable reasonable compliance with the provisions of paragraph 7.2.4.1. The necessary width may be determined by making the length of marking equal to 0,6 m for every 125 pedestrians/hour based on the four peak hours. A maximum length of 5 m is recommended.

3 BLOCK PEDESTRIAN CROSSING marking RTM4 shall be preceded by a STOP LINE marking RTM1 if used at a traffic signal controlled crossing, or a YIELD LINE marking RTM2 when used at a road sign control- led crossing (see Subsection 7.2.3, paragraph 7.2.3.3).

4 It is recommended that BLOCK PEDESTRIAN CROSSING markings be used at any pedestrian crossing controlled by YIELD TO PEDESTRIAN sign R2.1. Such crossings should normally be mid-block pedestrian crossings which may operate with or without part- time control by a traffic officer or a scholar patrol. In the event that the type of control at a mid-block pedestrian crossing is altered from road sign to traffic signal, or *vice versa* it is acceptable to use both BLOCK PEDESTRIAN CROSSING markings and PEDESTRIAN CROSSING LINES markings to avoid the need to erase the "block" markings. The line markings should be separated from the "block" marking to achieve a better visual impact. BLOCK PEDESTRIAN CROSSING markings may be used elsewhere if necessary to enhance the visibility of a pedestrian crossing point at traffic signal controlled road junctions or mid- block crossings (see Subsections 2.2.3, 7.2.2, 7.2.3 and 7.2.15 and Volume 2).

5 Warrants for the installation of various types of mid-block pedestrian crossings are given in Section 6.8. The pedestrian crossing marking used will depend on the type of control warranted.

6 BLOCK PEDESTRIAN CROSSINGS may be used in rural areas but their common application is in busy urban areas where, at schools, stadia, arcades, malls, cinemas and other centres of attraction, it is necessary to assign priority to pedestrians crossing the roadway.

7 Where BLOCK PEDESTRIAN CROSSING markings are marked in a mid-block location they should be preceded by a PEDESTRIAN CROSSING warning sign W306 on each approach in accordance with the provisions of Subsection 3.4.6.

8 Non-signalised pedestrian crossings should not be marked:

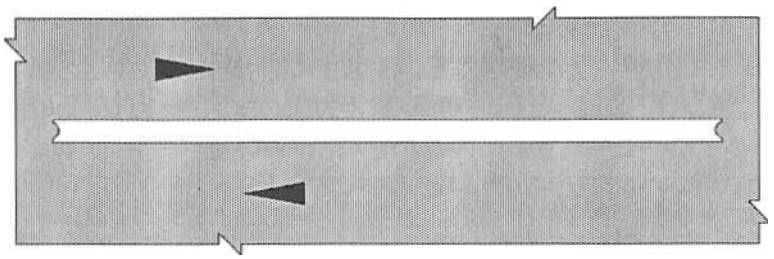
(a) on any section of roadway with inadequate vertical or horizontal sight distance;

(b) close to a junction controlled by traffic signals.

NO OVERTAKING LINE

COLOUR:

White



For dimensions ref. Vol. 4 page 12.1.2 to. 12.1.7

RM1

7.2.5 No Overtaking Line

1 A NO OVERTAKING LINE regulatory marking RM1 imposes a mandatory requirement that drivers of vehicles, when such marking is used to the left of, or in place of, a DIVIDING LINE marking WM3 to demarcate those portions of a roadway used by traffic travelling in opposite directions, ***shall:***

(a) not drive a vehicle In such a manner that it Is on the right side of such marking; and

(b) not drive a vehicle in such a manner that it or any part of such vehicle crosses the NO OVERTAKING LINES marking;

UNLESS the vehicle is driven:

(i) to gain direct access to any land on the opposite side of the NO OVERTAKING LINE;

(ii) to gain direct access from any land to that portion of the roadway on the opposite side of the NO OVERTAKING LINE;

(iii) to pass a stationary obstruction in the roadway;

PROVIDED that, in all instances it is safe to do so.

2 The NO OVERTAKING LINE marking performs the function of the marking previously known as a BARRIER LINE. Terminology has been amended to differentiate more clearly between the functions of single and double barrier lines used with or without a DIVIDING LINE markingWM3. An additional NO CROSSING LINE marking RM2 is therefore provided. The NO OVERTAKING LINE and NO CROSSING LINE markings remain, in function, as barrier lines (see Subsection 7.2.6).

3 The significance attached to NOOVERTAKING LINES is such that these lines shall only be used between portions of roadway carrying vehicles travelling in opposite directions. If it is required to achieve a no overtaking function within a portion of roadway carrying only vehicles which are travelling in the same direction a version of the CHANNELISING LINE marking RM3 shall be used. Although the application of a CHANNELISING LINE marking may commonly call for a wider line than is used for a NO OVERTAKING LINE marking this need not be the case. These markings can therefore appear identical and on occasion they may have an identical significance. The major functional difference therefore lies in the application of the NO OVERTAKING LINE to two-way traffic and the CHANNELISING LINE to one-way traffic.

4 NO OVERTAKING LINES shall be provided at vertical and horizontal curves, and elsewhere, on two-way roadways where overtaking is to be prohibited because of dangerously restricted sight distances or other hazardous conditions.

5 NO OVERTAKING LINES should be marked where the Barrier Sight Distance between a point 1,05 m high (equivalent to eye height) and a point 1,30 m high (equivalent to vehicle height) on vertical or horizontal curves is less than the value given in Table 7.4.The Barrier Sight Distance allows sufficient time for two vehicles approaching each other in a head-on situation to stop if they should be left with no other option for avoiding action. This distance therefore approximates to twice the Stopping Sight Distance.

6 NO OVERTAKING LINE markings shall comprise a single continuous solid white line with a minimum width of 100 mm. The effective continuity of a NOOVERTAKING LINE is subject to a number of factors covered in the following paragraphs.

7 The length of a NO OVERTAKING LINE depends on whether its principle use is for traffic control purposes (commonly urban), or for reasons of limited sight distance (commonly rural).When used to control overtaking manoeuvres under conditions of limited sight distance a NO OVERTAKING LINE may be used ac- cording to one of the systems given in Figure 7.3 in which case the length will depend on an engineering assessment (see Table 7.4, paragraph 7.2.5.10 and Figures 7.4 and 7.5).

8 The minimum length of a NO OVERTAKING LINE may vary according to the circumstances in which it is being used. Prescribed and recommended values are given in Table 7.5.

9 In undertaking an engineering assessment consideration should be given to:

(a) operating speed;
(b) Barrier and Decision Sight Distances;
(c) the distance between the end of one section and

the start of a new section of NO OVERTAKING LINE which should not be less than 120 m;

(d) multi-lane approaches;
(e) the existence of property accesses;
(f) traffic volumes;
(g) compliance with the DIVIDING LINE marking WM3 warrant given in Subsection 7.3.3.

10 In both rural and urban areas NO OVERTAKING LINES may be marked as part of the geometric treatment of road junctions. The treatment may vary according to many factors. Examples are given in Volume 2.

11 In order to warn traffic that a DIVIDING LINE is about to be combined with or replaced by a NO OVERTAKING LINE, NO OVERTAKING LINE AHEAD arrow markings WM8, should be marked on the DIVIDING LINE (see Subsection 7.3.8).

TABLE 7.4 WARRANTS FOR NO OVERTAKING LINE **TABLE 7.4**

Design Speed (km/h)	Minimum Barrier Sight Distance (m)
50	150
60	180
80	250
100	300
120	400

NOTES:

(1) Methods of determining the available Barrier Sight Distance are illustrated in Figures 7.4 and 7.5.

TABLE 7.5 MINIMUM NO OVERTAKING LINE LENGTH **TABLE 7.5**

Condition	Length (m)	
	Prescribed Min.<1>	Recommended Min.
Urban junction	9	18
Urban junction - traffic signal or uncontrolled approach	9	18 or 27(3)
Urban junction - STOP or YIELD controlled approach	9	18
Rural junction	12	24
Rural junction - uncontrolled approach	12	24 to 60(4)
Rural junction - STOP or YIELD controlled approach	12	24
Rolling terrain/curving roadway	N/A	150
Mountainous terrain	N/A	60

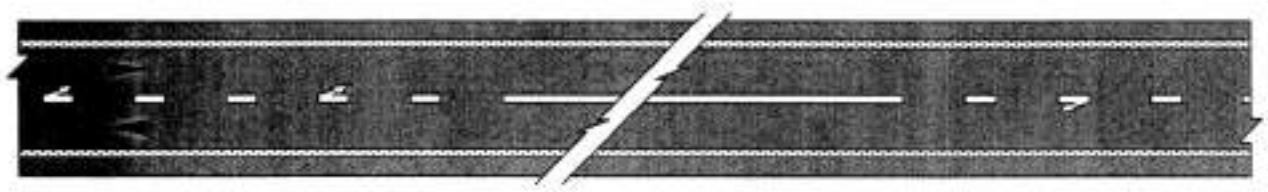
NOTES:

(1) The prescribed values apply ONLY PROVIDED a NO OVERTAKING LINE has been warranted and there is sufficient surfaced roadway to which the marking may be applied.

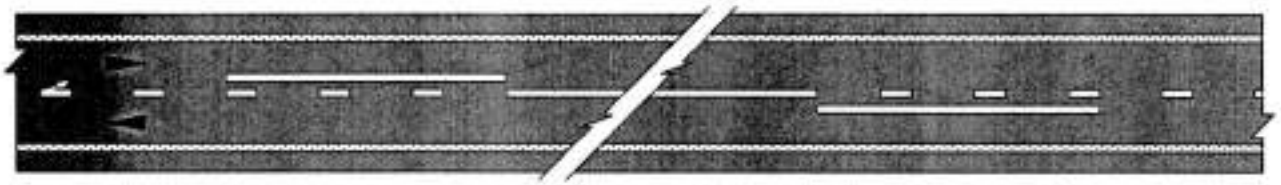
(2) All lengths are a whole number of the relevant markings MODULE lengths.

(3) A length of 27 m is preferred for multi-lane approaches. Greater lengths may be used.

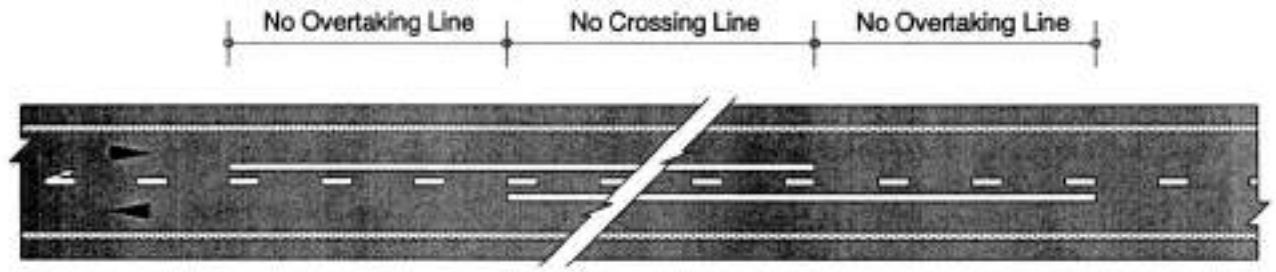
(4) MINIMUM length should be increased with increased operating speed. Greater lengths may be used.



Detail 7.3.1 Single Line System



Detail 7.3.2 Hybrid System



Detail 7.3.3 Three Line System

NOTES:

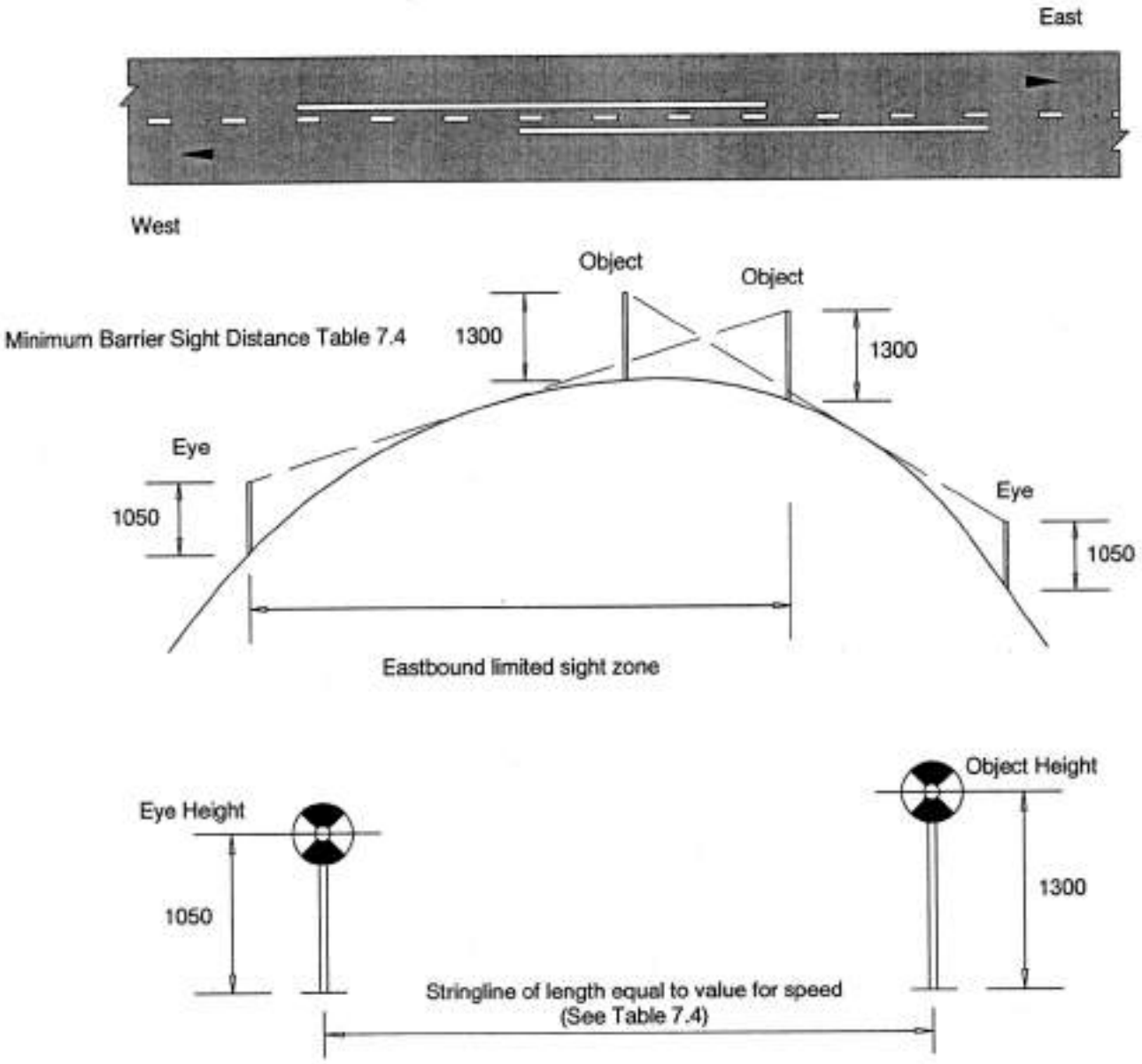
(1) The marking arrangements shown above indicate "centre line" treatments for two-way roadways. To avoid risks of confusion (particularly in a legal context) the terms "centre line" and "barrier line" are no longer used. The line separating opposing streams of two-way traffic may comprise a DIVIDING LINE marking WM3 (permitting overtaking), a NO OVERTAKING LINE marking RM1 (prohibiting overtaking but permitting crossing), or a NO CROSSING LINE marking RM2 (prohibiting overtaking and crossing),or some combination of these lines.

(2) Details 7.3.1 and 7.3.2 show systems of line marking between opposing streams of traffic which involve the replacement of DIVIDING LINE WM3 by NO OVERTAKING LINE RM1.

(3) Detail 7.3.3 shows a system where, in effect, two NO OVERTAKING LINES RM1 added to DIVIDING LINE WM3, create a NO CROSSING LINE RM2.With such a system it is necessary to discontinue the marking if it is required to give access in a local situation to a property or side road.

(4) Markings WM3, RM1 or RM2 may be used with or without LEFT EDGE LINE marking RM4.1, or on a multi-lane road they may be used with LANE LINE marking GM1.

Fig. 7.3 Line Combinations Incorporating No Overtaking Lines



NOTES:

(1) It should be noted that the need for NO OVERTAKING LINES, applied to both directions of travel, will result in sections of NO CROSSING LINE (see Figure 7.3).

(2) The assessment should be carried out for vertical and horizontal curvature at the same time. The recommended minimum distance between successive lengths of NO OVERTAKING LINE or NO CROSSING LINE is 120 m. This separation is relevant whether the consecutive lengths of NO OVERTAKING LINE are in the same direction or in opposite directions. The adequacy of this distance should be checked by an engineering assessment involving all factors relevant to a specific site.

(3) The detail in Figure7.5 illustrates the effect of Minimum Barrier Sight Distance applied to a horizontal curve. It is recommended that this assessment be based on a line of sight not encroaching beyond the shoulder breakpoint. This makes allowance for occasional encroachment of vegetation beyond the normal clear cut- line.

Fig. 7.4 No Overtaking Lines for Vertical Curves

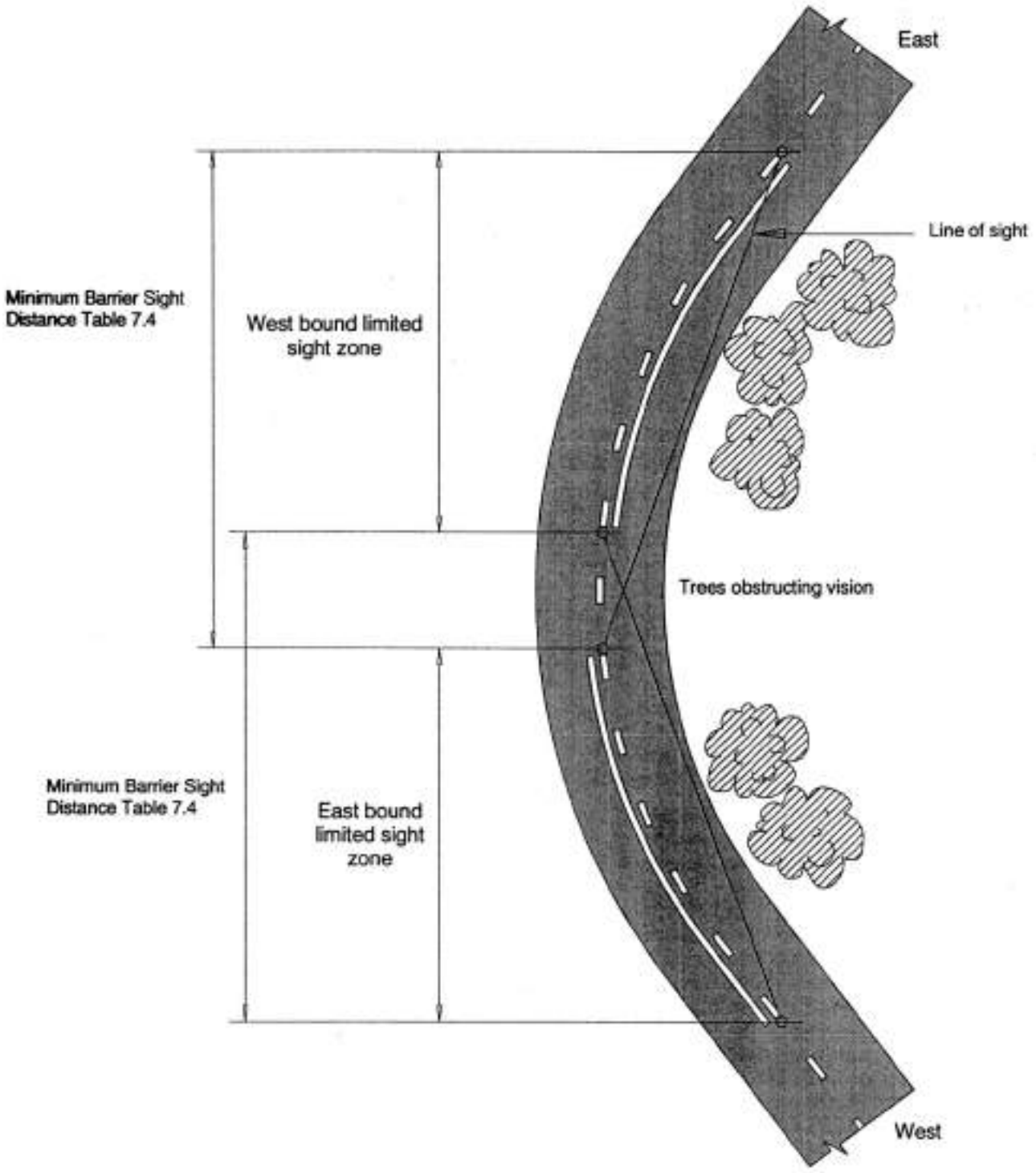


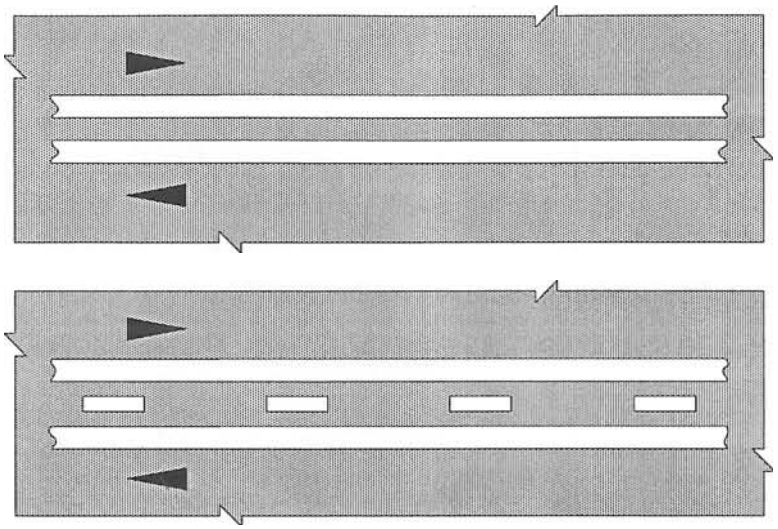
Fig. 7.5 No Overtaking Lines for Horizontal Curves

NO CROSSING LINES

For dimensions ref. Vol. 4 page 12.1.2 to 12.1.7

COLOUR:

White



RM2

7.2.6 No Crossing Lines

1 A NO CROSSING LINES regulatory marking RM2 imposes a mandatory requirement that drivers of vehicles ***shall*:**

(a) not drive a vehicle in such a manner that it is on the right side of such markings; and

(b) not drive a vehicle in such a manner that it or any part of such vehicle crosses the NO CROSSING LINES markings;

UNLESS the vehicle is driven to pass any stationary obstruction in the roadway and it is safe to do so.

2 NO CROSSING LINES markings shall always comprise two continuous solid white lines. The minimum width of each line shall be 100 mm. The separation of the two lines may vary from a minimum of 50 mm without roadstuds in urban areas, to a maximum of approximately 400 mm to accommodate a central DIVIDING LINE marking WM3 and two longitudinal rows of RED roadstuds (see Section 7.5). The minimum separation between NO CROSSING LINES and a central DIVIDING LINE marking should be 50 mm if road- studs are not to be used. The minimum lengths of a NO CROSSING LINES marking shall conform to those prescribed for NO OVERTAKING LINE marking RM1 as indicated in Table 7.5 in Subsection 7.2.5. It is recommended that greater than minimum lengths be specified in the majority of instances.

3 NO CROSSING LINES shall be used in the same manner as NO OVERTAKING LINE marking RM1 when it is expressly intended to prohibit turning movements across the line markings in addition to the actions prohibited by a NO OVERTAKING LINE marking.

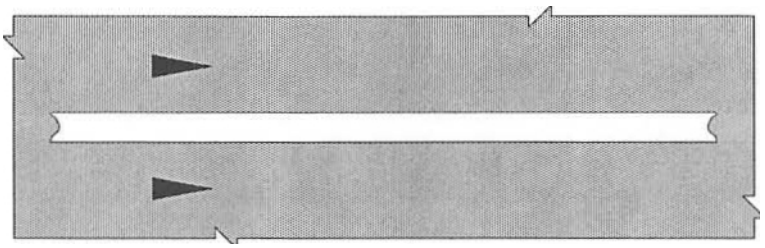
4 In urban areas, as development occurs, it may become necessary to restrict right-turn access movements to and from a property in the interests of safety and optimum traffic flow. When the provision of a raised island or central barrier is not possible NO CROSSING LINES may be used in such circumstances. The application of this form of control is particularly relevant in relatively close proximity to traffic signal controlled junctions where right turn access movement can be particularly hazardous under moderate to heavy traffic conditions.

5 In rural areas NO CROSSING LINES will more commonly be used on long lengths of roadways carrying two-lane two-way traffic. Should it become necessary to permit access to or from any property abutting such a roadway the NO CROSSING LINES marking should be replaced by a NO OVERTAKING LINE marking, the minimum length of which should conform to the provisions of Table 7.5.

COLOUR:

White

For dimensions ref. Vo/4 page 12.1.2 to 12.1.7



RM3

7.2.7 Channelising Line

1 A CHANNELISING LINE regulatory marking RM3 imposes a mandatory requirement that drivers of vehicles ***shall not drive a vehicle in such a manner that It, or any part of it, crosses such a marking.*** A CHANNELISING LINE shall only be used between streams of vehicles travelling in the same direction. With the exception of this factor a CHANNELISING LINE has the same significance as a NO CROSSING LINE marking RM2.In effect a CHANNELISING LINE also functions as a NO OVERTAKING LINE for vehicles travelling in the same direction on a multi-lane roadway (see paragraph 7.2.5.3).

2 A CHANNELISING LINE shall comprise a continuous solid white line with a minimum width of 200mm **except** when used on one side of a LANE LINE marking GM1 when a minimum width of 150 mm may be used, and when used as a "Stacking Line" when a minimum width of 100 mm may be used. This has the effect that at intersections "Stacking Lines" adopt the same width as the preceding lane line or continuity line. The minimum lengths of CHANNELISING LINES shall conform to those prescribed for NO OVERTAKING LINE marking RM1 as indicated in Table 7.5 in Subsection 7.2.5. A width of 300 mm and a minimum length of 60 m are recommended for roads with operating speeds of over 80 km/h.

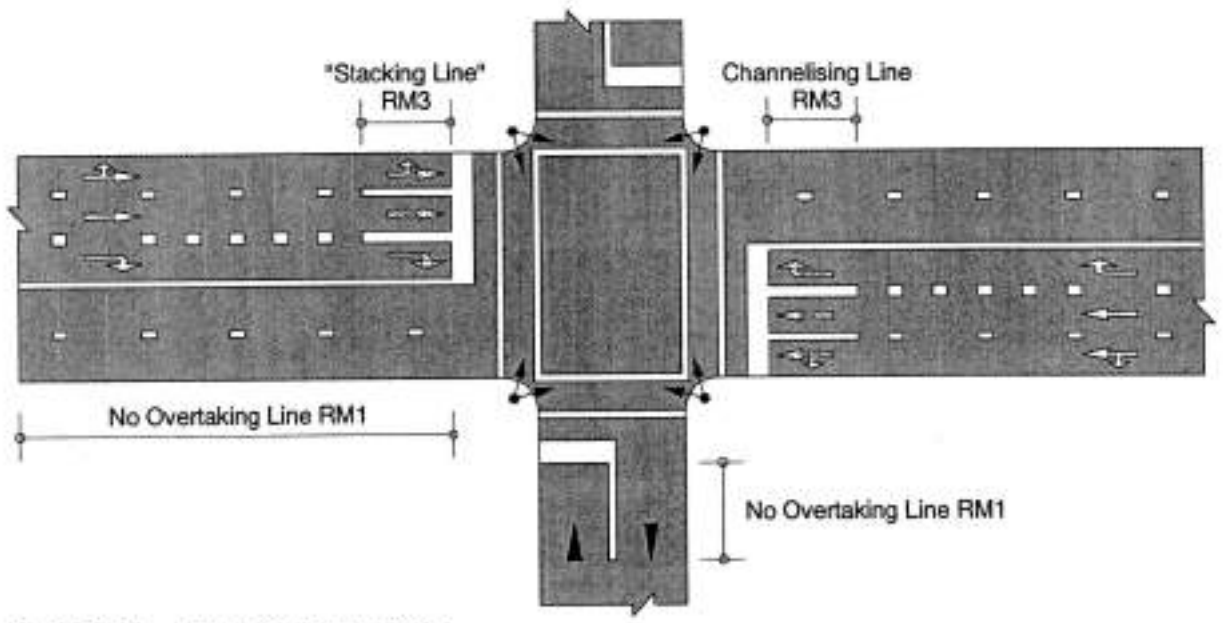
3 A "Stacking Line" marking is a CHANNELISING LINE used at junctions on multi-lane roads between lanes carrying through traffic. "Stacking Lines" should be located immediately in advance of the prolongation of the near side edge of an intersecting side road. "Stacking Lines" replace LANE LINE marking GM1 and have the intended function of stabilizing traffic flow through a junction by prohibiting lane changing or overtaking in the immediate vicinity of the junction. A "Stacking Line" may be used either in combination with a transverse STOP LINE marking RTM1 or a YIELD LINE marking RTM2, or without such markings.

4 When a CHANNELISING LINE marking has been used in advance of a split in direction of traffic flows it will commonly form the left boundary line of a channelising PAINTED ISLAND. When such an island precedes a kerbed or un-kerbed island or space to the right of a turning roadway the CHANNELISING LINE may be reduced to 100 mm minimum to form a continuing RIGHT EDGE LINE marking RM4.2.This line may then define the right edge and alignment of the turning roadway, slip road or freeway off- or on-ramp.

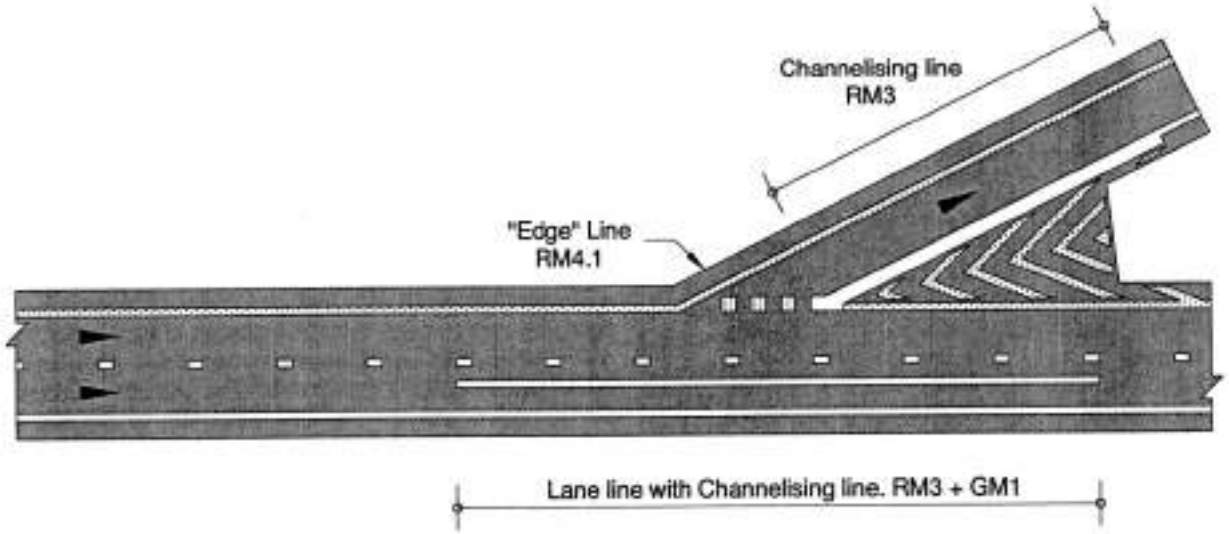
5 CHANNELISING LINES should be considered in situations where it is necessary to control one-way traffic movement on a portion of roadway at more complex at-grade junctions or at freeway interchanges to prevent weaving and other similar conflict movements when such are potentially hazardous due to lane con- figurations and/or heavy traffic volumes. In particular a CHANNELISING LINE is recommended to demarcate the diverging portion of an EXCLUSIVE or DEDICATED exit or turn lane. ACHANNELISING LINE may occasionally be warranted in combination with a LANE LINE marking GM1 on a one-way roadway, to control lane changing or overtaking manoeuvres, from the side on which the CHANNELISING LINE is marked. This application may be particularly appropriate when such manoeuvres have been shown to be a contributory cause of accidents, i.e. such as if a CHANNELISING LINE is marked across the length of the exit to a freeway off-ramp to prohibit a lane change from a right side lane towards the off-ramp, in a potentially hazardous manner. Basic applications are illustrated in Figure 7.6.

6 A CHANNELISING LINE should normally be preceded by a section of CONTINUITY LINE marking WM2.

7 A CHANNEUSING LINE may be used to replace a PAINTED ISLAND when junction space is very limited. Additional examples of the use of CHANNELISING LINES are included in Volume 2, Chapters 2 and 3.



Detail 7.6.1 Signalised Junction



Detail 7.6.2 At a Freeway Off-ramp

NOTES:

(1) Details 7.6.1 and 7.6.2 illustrate only three of the many possible applications of CHANNELISING LINE marking RM3. Further applications are covered in Volume 2, Chapters 2 and 3.

Fig. 7.6 Channelising Lines

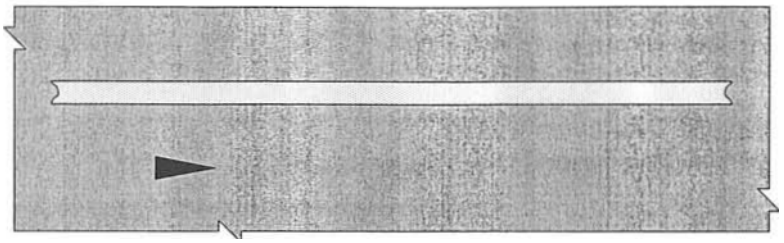
LEFT EDGE LINE/RIGHT EDGE LINE

COLOUR:

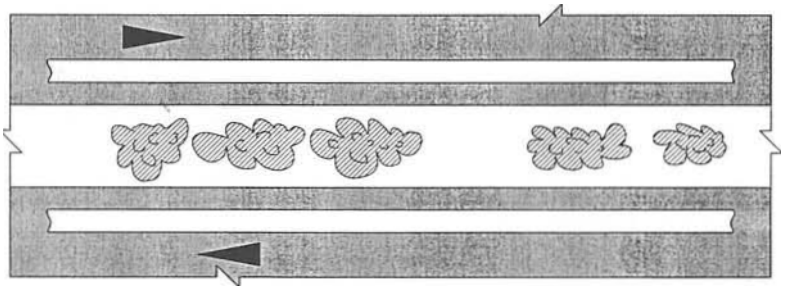
RM4.1 Yellow

RM4.2White

For dimensions ref. Vol.4 page 12.1.2 to 12.1.7



Left Edge Line **RM4.1**



Right Edge Line **RM4.2**

7.2.8 Left Edge Line/Right Edge Line

1 LEFT EDGE LINE and RIGHT EDGE LINE regulatory markings RM4.1 and RM4.2 impose a mandatory requirement on drivers of vehicles :

(a) in the case of a LEFT EDGE LINE marking RM4.1 marked on a roadway with more than one lane in either or both directions of travel :

(i) not to drive on the area {shoulder) to the left of such a line;

(ii) not to use the area {shoulder) to the left of such a line for the purpose of overtaking another vehicle;

(iii) to make every reasonable effort to move their vehicle completely to the left of such a line in the event of an emergency stop;

(b) in the case of a RIGHT EDGE LINE marking RM4.2 when such marking is used on the right edge of a one-way portion of roadway to demarcate a dividing space or barrier which is not protected by barrier or un-mountable kerbs **not to drive a vehicle in such a manner that it crosses such RIGHT EDGE LINE so as to travel on, over, across or within the median island, dividing space or barrier.**

An authority marking o-way roadway with LEFT EDGE LINE markings RM4.1,so that surfaced shoulders are created, shall take the necessary steps to permit overtaking on the left side of a turning vehicle proceeding in the same direction (see paragraph 7.2.8.9).

2 A LEFT EDGE LINE shall comprise a continuous solid yellow line with a minimum width of 100 mm.

3 A LEFT EDGE LINE may be used to demarcate the left hand edge of the roadway, and a surfaced emergency shoulder between the roadway and the verge or kerb- line on the left hand side of a roadway. When used without a surfaced shoulder it should be marked a minimum distance of 150 mm from the edge of roadway surface.

4 LEFT EDGE LINE markings should not be marked on the right hand side of one-way carriageways of urban or rural dual carriageways, including freeways. A RIGHT EDGE LINE marking RM4.2, shall be used for this purpose if required.

5 A RIGHT EDGE LINE shall comprise a continuous solid white line with a minimum width of 100 mm.

6 RIGHT EDGE LINES shall be provided on the right side of all one-way roadways comprising part of a dual carriageway freeway whether the dividing space between the carriageways is a median island or a barrier. Use of the line may be similarly warranted on the right side of one-way roadways comprising part of a non-freeway dual carriageway road. However, subject to the level of street lighting and the need to provide right side visual delineation, it is not necessary to provide RIGHT EDGE LINES adjacent to urban median islands which are defined by barrier or un-mountable kerbs.

7 In addition to their regulatory function LEFT EDGE LINES can perform an important safety function by:

(a) providing a continuous demarcation of the edge of roadway, thereby reducing the tendency of drivers of vehicles to drift off the edge of the roadway, especially at night;

(b) providing lateral continuity of the edge of roadway when a driver is faced with on-coming headlights on a two-way roadway;

(c) providing guidance to pedestrians and cyclists, especially when no sidewalk is provided;

(d) reducing the travel, particularly by heavy vehicles, on shoulders of limited structural strength.

8 When shoulders are not permanently surfaced their gravel surface may provide adequate colour contrast with the permanent road surface by day. At night, however, this effect may be significantly diminished. As a result the edge of the surfaced roadway can become ravelled and ragged due to vehicles regularly straying off and on the edge. This in turn can constitute a hazard. Where there is a lack of colour contrast between shoulder and travelled way, or the roadway edge condition needs regular maintenance the marking of a LEFT EDGE LINE is recommended.

9 When two-lane two-way roadways are marked with LEFT EDGE LINES so that a shoulder is created these lines should be tapered towards the edge of the roadway opposite an intersecting side road to permit vehicles to pass to the left of other vehicles which are waiting to turn, or are in the process of turning, to the right, so that they do not need to cross the LEFT EDGE LINE. The LEFT EDGE LINE should be set back in this manner for a sufficient distance to permit the smooth flow of traffic. Marking RM4.1 should be run parallel to this edge and 150 mm from it. Whilst this treatment is recommended to permit safe and legal overtaking manoeuvres the adequacy of such a treatment with regard to traffic volumes should be assessed by an engineering study. The treatment described should not be considered as an alternative to the provision of properly designed auxiliary lanes with continuous shoulders. LEFT EDGE LINES may be continued round the left side of left turn lanes, turning slip roads or corner perimeters at road junctions.

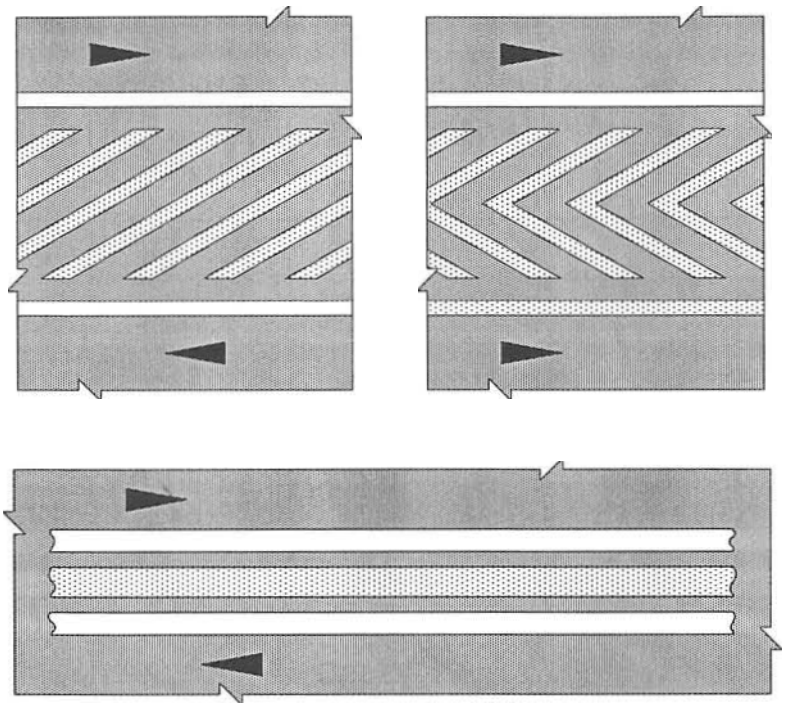
10 When used on freeways LEFT EDGE LINES shall be marked as described in earlier paragraphs. When approaching an off-ramp the LEFT EDGE LINE should turn and continue as the off-ramp LEFT EDGE LINE. The main carriageway LEFT EDGE LINE should then re-commence as the boundary of the freeway gore island and continue until a point 600 mm transversely to the right of the on-ramp right side CONTINUITY LINE warning marking WM2.The freeway LEFT EDGE LINE should then be discontinued until its prolongation intersects the on-ramp LEFT EDGE LINE at which point it should be continued. The sections where the LEFT EDGE LINE has been omitted across the off-ramp and on-ramp should be marked with a CONTINUITY LINE (see Subsection 7.3.2).

11 If the terrain is such that slower vehicles are likely to constitute an obstruction to normal traffic it is recommended that shoulders formed by a LEFT EDGE LINE should NOT be created. This should discourage the development of the practice of slow-moving traffic running on such shoulders. Preference should rather be given to marking an additional lane line which will permit safe overtaking by faster traffic.

12 Examples of typical applications which include the use of LEFT EDGE LINE and RIGHT EDGE LINE markings are given in Volume 2, Chapters 2 and 3.

COLOURS:

Border: White and/or yellow
Bars: Yellow



RM5

For dimensions ref. Vol. 4 page 122.3 to 12.2.11

7.2.9 Painted Islands

1 A PAINTED ISLAND regulatory marking RMS imposes a mandatory requirement that drivers of vehicles ***shall not drive a vehicle In such a manner that it, or any part of it, crosses such a marking, OR to park or stop a vehicle upon such marking,***

EXCEPT:

(a) if directed to do so by a traffic officer;
(b) in the case of an emergency.

2 A PAINTED ISLAND MARKING shall comprise **EITHER:**

(a) a single continuous solid white boundary line with a minimum width of 100 mm and another boundary formed by a kerb line, **AND** within the area contained by these boundaries, yellow marked sloping bars in a diagonal pattern of a minimum width of 150 mm and a maximum width of 1m, measured across the fine at goo to the slope of the bar; the recommended ratio of bar width to space between bars is 1to 2 measured on the line of the centre fine of the island; **OR**

(b) two continuous white boundary lines each with a minimum width of 100 mm, **AND**, within the area contained by these lines, yellow marked sloping bars in either a diagonal or chevron pattern of a minimum width of 150 mm and a maximum width of 1m, measured across the line at goo to the slope of the bar : EXCEPT that in one-way roadway applications, including freeway applications, one boundary line may be a yellow line (LEFT EDGE LINE marking RM4.1); the recommended ratio of bar width to space between bars is 1 to 2 measured on the line of the centre line of the island; **OR**

(c) two continuous solid white NO OVERTAKING LINE markings RM1 containing a continuous solid yellow marking with a minimum width of 200 mm up to a maximum width of 600 mm so that there is a minimum clear space between each marking of 50 mm if roadstuds are not used or 150 mm if roadstuds are used.

3 The diagonal or chevron bar of a PAINTED ISLAND shall not normally extend to the boundary line. In order to obtain maximum conspicuity from the painted island marking a minimum gap of 150 mm should be left between the ends of the sloping bars and a boundary line. If an application calls for yellow sloping bar widths of 600 mm to 1 m these may be applied in an open box form to economise on materials e.g. for a 1m bar the bar can be made up of marked boundary lines 300 mm wide with a gap between of 400 mm, both measured at 90° to the slope of the bar.

4 PAINTED ISLANDS **should be marked with bars in one of two ways,** according to the type of traffic flow around the island:

(a) with **diagonal bars** sloping forward in the direction of traffic movement at an angle of 30° to the centre line or edge line as appropriate, when traffic flows ONLY on the left, or ONLY on the right of the island, OR in opposite directions on each side of the island;
(b) with **chevron bars** sloping forward in the direction of travel of traffic, with an included angle of 60° (or 30° on each side of the centre line) when traffic flows in the same direction on each side of the island.

5 The setting out of a PAINTED ISLAND in the gore approach to a channelising island may present difficulties due to the rate of divergence of the traffic streams or the offset of the island end. In some instances a curved island centre line may be effective in producing

an aesthetically acceptable set of sloping bars. In such case the bars may not all slope at the same angle to the centre line. It may be better in fact to maintain a constant angle to the curving edge line of the island (see Volume 2, Chapter 2).

6 There are many possible applications for PAINTED ISLAND markings. Among the more common are:

(a) in advance of pedestrian refuge islands on two-way roadways;

(b) in advance of the start of a median island;

(c) in advance of channelising kerbed islands;

(d) at freeway off-ramp gores;

(e) at freeway on-ramp gores following 180° to 360° loop ramps;

(f) as a separator island between opposing flows of traffic when there is insufficient space for a median island or barrier;

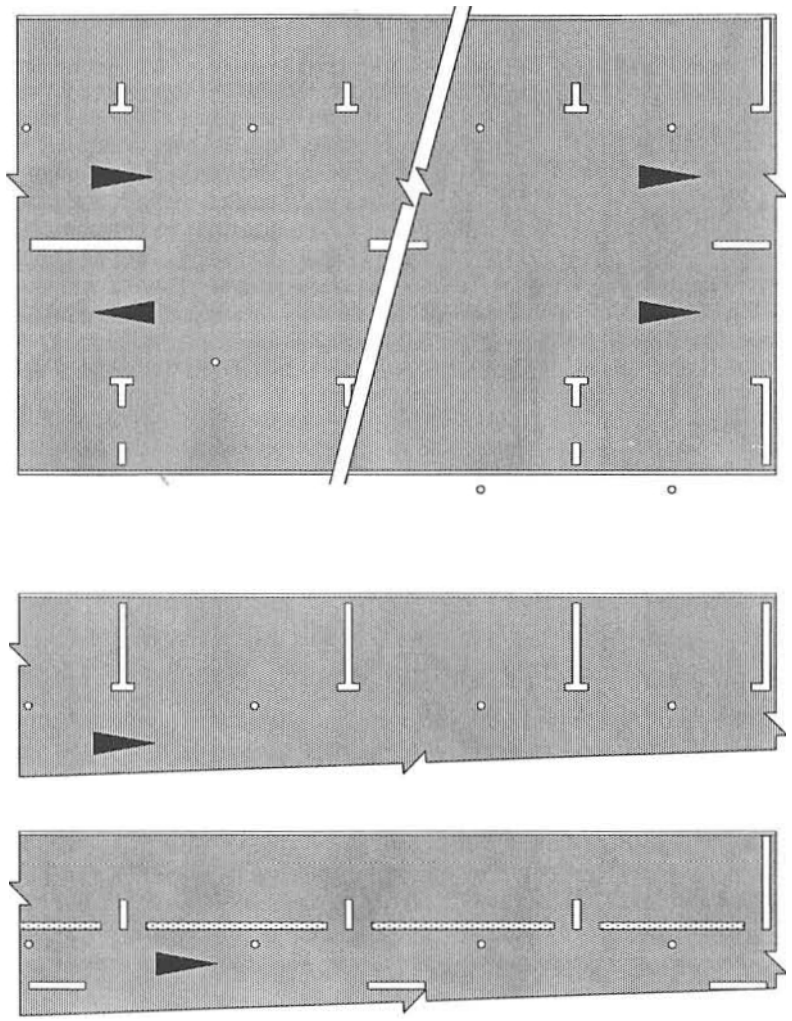
(g) as a channelising device to prevent straight through traffic entering a turning lane which is in line across a junction from a similar lane serving turning traffic in the opposite direction;

(h) as a "shadow" island next to a kerbed island to control general traffic movement but allow over-running by extra-large vehicles.

COLOUR:

White

For dimensions ref. Vo/4 page 12.1.2 to 12 1.7



RM6

7.2.10 Parking Bays

1 PARKING BAY regulatory markings RM6 impose mandatory requirements that drivers of vehicles ***shall:***

(a) park their vehicles wholly within the lines defining the limits of a parking bay; AND

(b) park their vehicles within 150 mm of the kerb line when the parking bays are marked at an angle to such kerb; OR

(c) park their vehicles as far forward as possible onto the adjacent verge if the roadway does not have a kerb, without encroaching on any sidewalk.

2 PARKING BAY markings shall be white lines with a minimum width of 100 mm. They may take a range of forms according to whether the parking is angled or parallel to the kerb or edge of roadway, or whether it is all-day parking or time-limited parking. The PARKING BAY marking spacing may also be varied as necessary to cater for special vehicles such as motorcycles, mini-buses or buses. (Examples of typical parking layouts in roadways are given in Volume 2.)

3 In order to give adequate indication of the limits of individual parking bays for the purpose of reasonable enforcement of relevant regulations the minimum effective marking that shall be provided for each bay shall be ,for each side of the bay:

(a) a 600 mm length of white line extending from the outer limit of the bay towards the kerb line at an angle appropriate for the type of parking being marked; AND

(b) a 600 mm length of white line parallel to the kerb line forming a "T" with the line in (a).

PROVIDED that:

(i) if the parking bay is available during off-peak hours only. and the space occupied by the bay is used as a traffic lane during peak hours, the length of line forming the head of the "T" may be omitted;

(ii) if the line is the line at the beginning or end of a number of parking bays only half of the marking forming the head of the "T" shall be marked, and the line shall be marked for the full distance to the kerb.

4 When parking bays are marked to the minimum level as described in paragraph 7.2.10.3(b)(i) it is recommended that the NO STOPPING LINE marking

RM12 or NO PARKING LINE marking RM13,applicable during parts of the day, be marked in line with the outer edge of the bays to improve the visibility of such line markings and to give adequate general long1tudmal delineation to a block of parking bays.

5 The minimum marking indicated in paragraph 7.2.10.3 may be supplemented by an additional inner 600 mm length of white line extending outwards from the kerb or channel towards the outer "T". The inner and outer lines may be joined to make a continuous boundary line to the parking bay if a road authority or developer wishes to improve the visual impact of the markings. This will, however, significantly increase the line marking maintenance costs. The minimum width of a parking bay should be 2,2 m and an effective length of at least 6 m should be provided for all bays except those at the end of a block of parallel bays UNLESS some other street feature prevents end-on-entry to such bays.

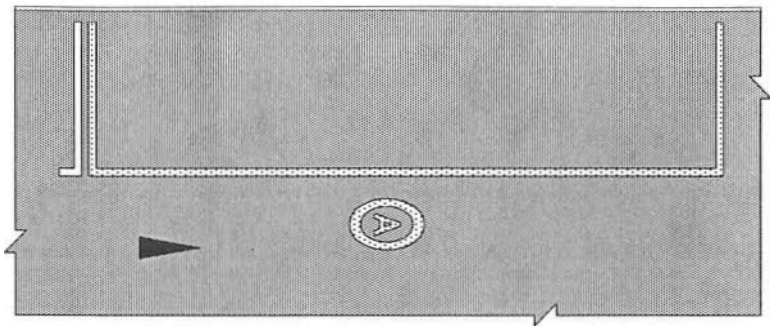
6 The marking of a guide dot on the right hand side of the parking bay, or on the kerb or sidewalk .in one-way streets, is recommended at parallel parking bays to improve the placing of cars within such bays.

7 PARKING BAY markings RM6 shall be marked on the road surface to supplement the significance of a regulatory sign related to parking or in conjunction with parking meters. It is recommended that parking bays should also be marked when there is no restriction on their use or charge for their use. By so doing the use of the available space will be optimised in the interests of all road users.

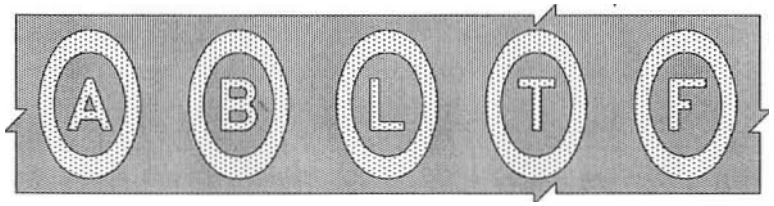
COLOUR:

Yellow

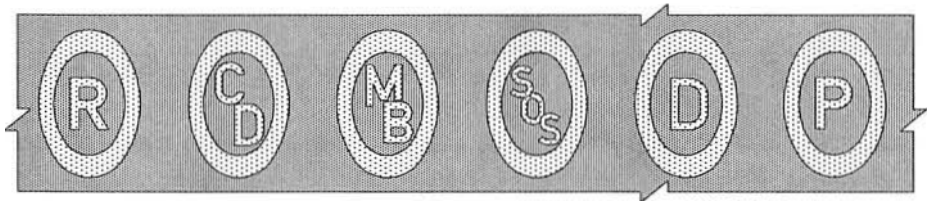
For dimensions ref. Vol. 4 pages 12.4.6 to 12.4.12



RM7



Ambulance Bus Loading Zone Taxi Fire-fighting



Rickshaw Diplomatic Minibus SOS phone Defence Force Police

RM7.1

7.2.11 Exclusive Parking Bay

1 EXCLUSIVE PARKING BAY regulatory marking RM7 imposes a mandatory requirement upon drivers ***not to park or stop their vehicles within the area of the bay unless their vehicle Is of the class indicated by letter(s) in supplementary oval marking RM7.1,*** OR in the case of a bay marked at an SOS emergency telephone ***not to park or stop their vehicle except in an emergency.***

PROVIDED that specific applications of EXCLUSIVE PARKING BAY marking RM7 impose additional mandatory requirements upon drivers as follows :

(a) when the bay is a LOADING ZONE (Letter "L" within marking RM7.1) ***no vehicle, other than a goods vehicle, or a motorcycle, motor tricycle or motor quadricycle designed or adapted to convey goods on a public road shall park or stop in the bay while it Is being used for the loading or unloading of goods and only for a period which is reasonably necessary for the loading or unloading of goods;***

(b) when used for a bus or minibus (letters "B" or "MB" respectively within marking RM7.1) ***no vehicle other than a bus or minibus, as appropriate, while it is operating on a fixed route shall park or stop in the bay.***

2 EXCLUSIVE PARKING BAY markings may be used in a similar manner contemplated for PARKING BAY markings RM6, in which case the mandatory provisions of paragraph 7.2.10.1 **shall apply *mutatis mutandis.***

3 EXCLUSIVE PARKING BAYS shall be demarcated by a continuous solid yellow boundary line on three sides with a minimum width of 100 mm and a minimum depth from the kerb line of 2,2 m. The length of the bay marking is not fixed, but it shall be greater than 6 m. An oval marking RM7.1 containing the appropriate letter(s), also in yellow, shall be marked so that it is visible to drivers even when the bay is occupied. Marking RM7.1 shall be marked approximately in the centre of the bay. When the bay is more than 30 m in length two or more RM7.1 markings shall be displayed.

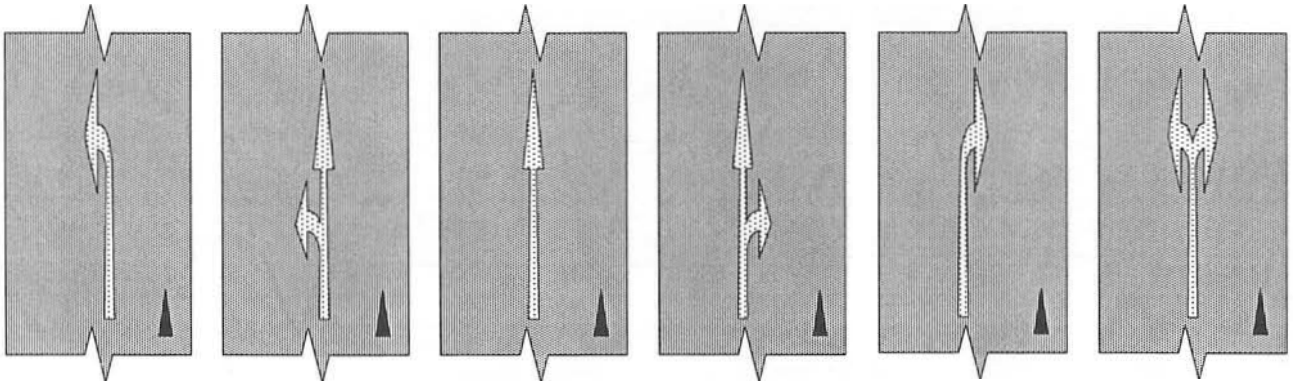
4 An EXCLUSIVE PARKING BAY may be used in conjunction with a BUS STOP RESERVATION sign R325, a MINIBUS STOP RESERVATION sign R326 or an SOS emergency telephone in such a manner that it replaces part or all of a shoulder demarcated by a LEFT EDGE LINE marking RM4.1. In such circumstances the LEFT EDGE LINE marking should be discontinued, OR, preferably, tapered at an appropriate rate to the edge of the roadway, then continued parallel to the edge of the roadway and 150 mm from it for the required length of the EXCLUSIVE PARKING BAY and then returned to its normal shoulder position at an appropriate taper rate.

MANDATORY DIRECTION ARROWS

For dimensions ref. Vol. 4 pages 12 3.2 to 12.3.4

COLOUR:

Yellow



RM8.1 **RM8.2** **RM8.3** **RM8.4** **RM8.5** **RM8.6**

RM8

7.2.12 Mandatory Direction Arrows

1 MANDATORY DIRECTION ARROW regulatory markings RM8 impose a mandatory requirement that drivers of vehicles ***shall only proceed in the direction indicated by such arrow.***

2 MANDATORY DIRECTION ARROWS shall be marked in yellow and should be of a size as indicated in Table 7.1. Arrows may be used to indicate a mandatory requirement to turn left only, turn left or proceed straight only, proceed straight only, turn right or proceed straight only, turn right only or turn right or left only.

3 MANDATORY DIRECTION ARROWS will most commonly be marked in lanes although in some instances such as slip roads or turning roadways they may be marked in such a roadway. The arrows may be marked on controlled or uncontrolled approaches to a junction whether the control is by means of a road sign or a traffic signal. When marked in a lane they should be located between the CHANNEUSING LINE markings RM3 and approximately 1m before the point of entry into a junction but not beyond any transverse road marking. If a STOP LINE or YIELD LINE is provided, and the word "STOP" or YIELD AHEAD marking is used, the arrows should be located approximately 1m before such markings.

4 A MANDATORY DIRECTION ARROW shall be marked in:

(a) a lane when the lane is an EXCLUSIVE or DEDICATED TURN lane;

(b) a lane when more than one directional movement is permitted from the lane e.g. a right turn movement AND a straight-on or through movement;

(c) a lane adjacent to a kerbed or painted channelising island which defines a turning roadway or slip road;

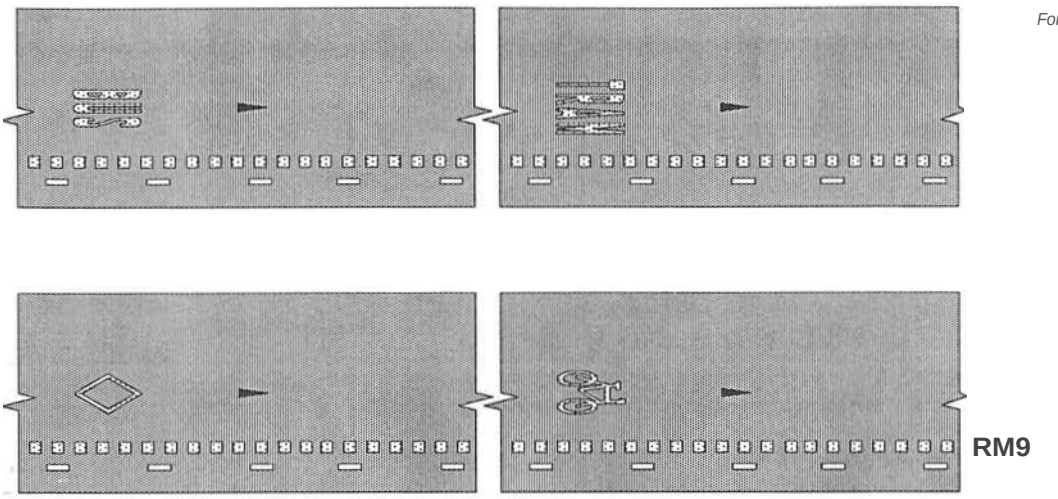
(d) all lanes, when turning movements are permitted to the left and/or right, from two or more lanes.

5 In order that drivers may be made aware of mandatory direction control ahead as early as possible, MANDATORY DIRECTION ARROWS shall be preceded by at least one or preferably two DIRECTION ARROW AHEAD markings WM7, in each lane which is controlled (see Subsection 7.3.7.)

6 Neither a MANDATORY DIRECTION ARROW nor a DIRECTION ARROW AHEAD marking shall be used to indicate a split in lanes ahead or an increase in the number of lanes ahead e.g. when an exclusive right turn lane is developed. The appropriate arrow marking in such a situation is the BIFURCATION ARROW guidance marking GM3.

COLOUR:

Yellow



RM9

For dimensions ref. Vol.4 pages 12.1.2 12.4.9 12.4.12 12.5.1 to 12.5.7

7.2.13 Exclusive Use Lane Line

1 EXCLUSIVE USE LANE LINE regulatory marking RM9, when used in conjunction with an appropriate EXCLUSIVE USE LANE SYMBOL or WORD marking RM17, imposes a mandatory requirement that drivers of vehicles ***shall not drive, park or stop In a lane with such markings if the vehicles they are driving are not of the class indicated by the SYMBOL or WORD marking RM17; PROVIDED, that if such a marking is used In conjunction with an appropriate road sign, the Jane may be used by such class or classes of vehicle as indicated by symbol on such sign.*** The significance of the marking may be time-limited by virtue of the enabling regulatory sign message (see paragraph 7.2.13.7).

2 EXCLUSIVE USE LANE LINE marking RM9 may be designated for the exclusive use of a specific class of vehicle by the addition of symbol marking RM17 and an appropriate road sign at regular intervals, subject to a maximum spacing of 250 m, as follows:

(a) for exclusive use by bicycles - by the addition of SYMBOL marking RM17.1 and CYCLE LANE RESERVATION regulatory sign R304;

(b) for exclusive use by high occupancy vehicles - by the addition of SYMBOL marking RM17.4 and HIGH OCCUPANCY VEHICLE LANE RESERVATION regulatory sign R336;

(c) for exclusive use by buses - by the addition of WORD marking RM17.2, "BUS", and BUS LANE RESERVATION regulatory signs R302 and/or R303;

(d) for exclusive use by trams - by the addition of WORD marking RM17.2, "TRAM", and TRAM LANE RESERVATION regulatory sign R339.

3 EXCLUSIVE USE LANE LINE marking RM9 shall comprise a broken yellow line with a minimum width of 150 mm. A standard line-to-gap ratio of 1 to 1 shall be used with line and gap lengths of 750 mm. When being used to mark a full width traffic lane (2,8 m to over 4 m) marking RM9 shall be marked in addition to, and on the inside of, a LANE LINE marking GM1 or other appropriate marking (such as a length of “Stacking Line” CHANNELISING LINE RM3). The parallel lane lines should be marked with a 50 mm lateral space between them. If a situation arises where it is required to provide an EXCLUSIVE USE LANE with other lanes on both sides of it then marking RM9 should be used on both sides of the lane as described above.

4 The use of EXCLUSIVE USE LANES by public transport vehicles can result in many possible detail variations according to mode of operation and multiple classes of vehicle. The indication of such detail variations should be made by use of the most appropriate road sign, in conjunction with a standard or common road marking treatment for all variations (with the exception of the relevant GM6 or GM7 markings). In urban environments, particularly in one-way street networks, exclusive use lane variations may include lanes shared by more than one class of vehicle and/or the use of an exclusive right side lane instead of the more common exclusive left side lane. In this way marking RM9 may be used to cater for the following situations (see Chapter 2, Section 2.5):

(a) right side exclusive use lanes by:

(i) buses - R348;

(ii) high occupancy vehicles - R352;

(b) shared use of a left side exclusive use lane by:

(i) buses and minibuses - R328 and R329;

(ii) buses and trams - R343 and R344;

(iii) buses, trams and minibuses - R346 and R347;

(c) similar shared use of a right side exclusive use lane by:

(i) buses and minibuses - R349;

(ii) buses and trams- R350;

(iii) buses, trams and minibuses- R351.

5 It should be noted that in terms of the legal definitions of the different classes of public transport vehicles a "midi bus" is covered by the definition of a "bus". A midi bus may therefore use a facility set aside for the use of buses unless expressly prohibited from doing so. In

order to keep the road marking of public transport exclusive use lanes by more than one class of vehicle as simple as possible it is recommended that WORD message markings be limited to "BUS" and/or "TRAM" irrespective of whether the lane in question is also used by minibuses or midi buses. This recommendation does not preclude the use "MINI BUS" or "MIDI BUS" word messages (which will have to occupy two lines of message within the lane). The positioning of RM17 markings should be done with particular care if pedestrians are likely to need to cross exclusive use lanes (see Volume 2, Chapter 8).

6 The most common use of marking RM9 is likely to be to mark an exclusive use lane used by buses and/or other public transport vehicles (including high occupancy vehicles).Such lanes may be WITH-FLOW i.e. the traffic in the exclusive use lane is travelling in the same direction as traffic in the adjacent lane, or CONTRA-FLOW i.e. the traffic in the exclusive use lane is travelling in the opposite direction to traffic in the adjacent lane(s). The indication of CONTRA-FLOW exclusive use lanes is of particular importance to pedestrians. To assist pedestrian aware- ness of a CONTRA-FLOW situation is recommended that, when a CONTRA-FLOW lane is created in a street which previously catered only for one-way traffic, the street be marked and signed as a two-way traffic street (see Volume 2,Chapter 8). When signing a CONTRA- FLOW exclusive use lane the signs, such as R303,should be provided to face in both directions, preferably mounted back-to-back on a common support.

7 The significance of EXCLUSIVE USE LANES may be time-limited by means of SELECTIVE RESTRICTION versions of the various regulatory signs mentioned in paragraphs 7.2.13.2 and 7.2.13.4 which state the time of applicability of the signs, and thereby the markings.

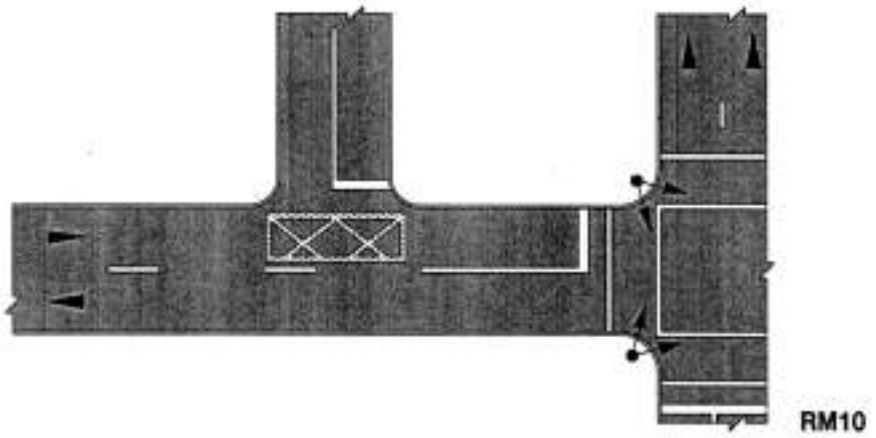
8 An EXCLUSIVE USE LANE LINE marking RM9 shall end AT LEAST 20 m before an intersecting side road where vehicles are permitted to turn left or right, as the case may be, across the line of the lane. In such situations the use of warning road markings END OF EXCLUSIVE USE LANE ARROWS WM11.1 or WM11.2 is recommended.

9 EXCLUSIVE USE LANE LINE marking RM9 shall be used with SYMBOL marking RM17.1, with the same colour and dimensions as given in paragraph 7.2.13.3, to demarcate a bicycle lane. The minimum width recommended for a bicycle lane is 1,5 m. If a bicycle lane marked by line RM9 is under 2,8 m in width a LANE LINE marking GM1 shall not be provided as well as marking RM9. An exclusive use bicycle lane may sometimes be contiguous with a roadway and at other times be separated from the road. Marking RM9 is not required when the bicycle lane is separated from the road (see Volume 2, Chapter 3).

BOX JUNCTION

COLOUR:

Yellow



For dimensions ref. Vol. 4 page 12.2.12

7.2.14 Box Junction

1 A BOX JUNCTION regulatory marking RM10 imposes a mandatory requirement that drivers of vehicles ***shall not enter the box marked area within a junction If they are not able to leave such box marked area due to stationary vehicles ahead of them,***

EXCEPT that, vehicles turning to the left or to the right may enter such box junctions.

2 BOX JUNCTION markings shall comprise continuous yellow boundary lines of a minimum width of 100 mm, enclosing cross-hatched continuous yellow diagonal lines of a minimum width of 100 mm. The boundary lines should preferably be spaced at least 500 mm from PEDESTRIAN CROSSING LINE markings RTM3 or pedestrian guide markings, when these are marked. The cross-hatching lines should be related to the diagonals of the overall BOX JUNCTION marking. If the perimeter of the box is less than 20 m in length the cross-hatching should be limited to the diagonals. If the box has a perimeter of 20 m or more in length additional cross-hatching should be marked at approximately equal spacings between the diagonal and the corner of the box so that no two lines are more than approximately 3 m apart. If the sides of the box junction are such that one pair of sides are more than twice the length of the other pair then the cross-hatching may be modified to produce a more "square" appearance. In this case diagonals will not be marked but the other guidelines will still apply. Insufficient cross-hatching will result in the BOX JUNCTION marking RM10 having poor visual impact particularly when certain road profiles occur such as a crest curve within a junction (see Figure 7.7).

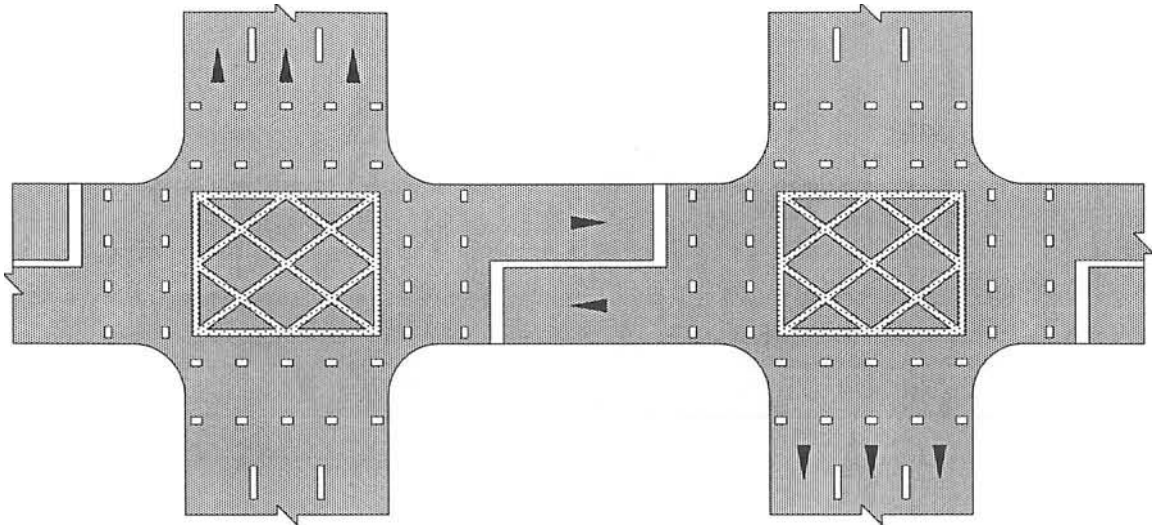
3 Care must be taken with the application of BOX JUNCTION markings. They are not a substitute for traffic signals. They are simply an aid to traffic flow when, for various reasons, traffic queues may extend across junctions to the extent that this has a detrimental effect on surrounding junctions in the area leading eventually to a "lock-up" of such junctions. All junctions are not suitable for BOX JUNCTION markings. An engineering study should be undertaken to ascertain the extent and nature of the problem which it is considered would be assisted by the use of BOX JUNCTION markings. A traffic survey should be undertaken to determine what benefits, or disbenefits might be achieved, and to consider what other remedial measures might be effective.

4 Factors which should be considered are:

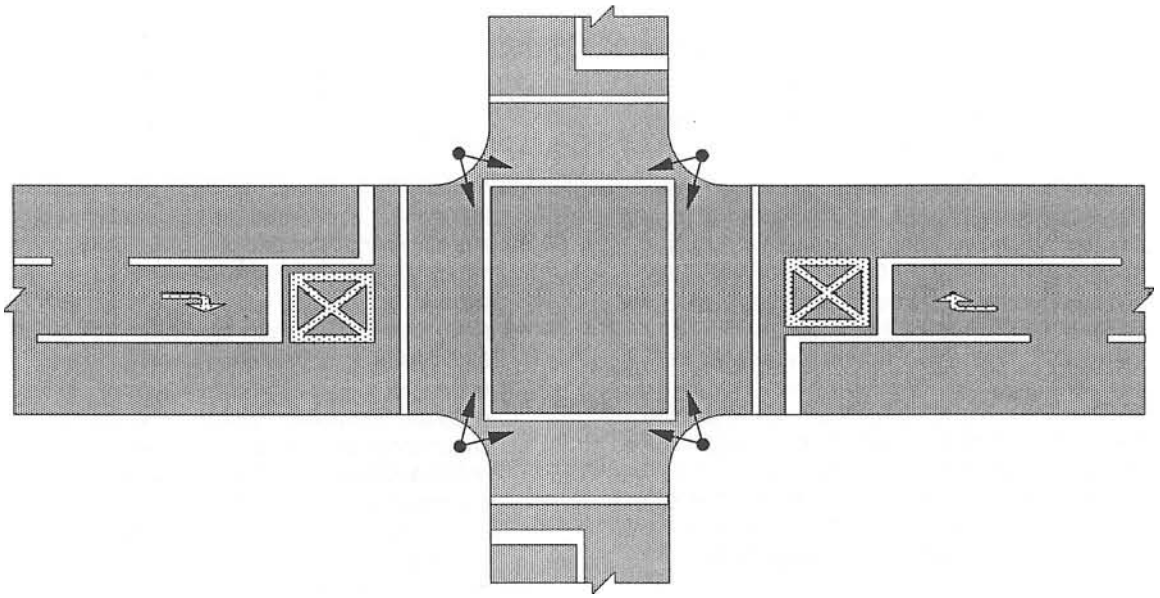
(a) the junction should not be controlled by traffic signals;
(b) blocking back from one or more adjacent junctions should already be occurring, even if only for short periods;
(c) there should preferably be heavy traffic flows on both opposing approaches to the junction;
(d) entrances to and exits from the junction should be opposite each other; however, in exceptional circumstances the markings may be considered for a right-hand stagger on the minor road provided there is a maximum box length of 30m and asymmetrical box shapes are avoided (two half boxes may be considered as an alternative);
(e) normally there should be at least two lanes on each major road approach;
(f) the roadway beyond the junction should be free of obstructions (this may require the relocation of bus stops and/or the imposition of time limits on loading operations);
(g) when there is a sufficiently high percentage of right turning traffic BOX JUNCTION markings are less effective, therefore such sites should be given particularly careful attention.

5 A HALF BOX JUNCTION marking may be used, in which only half the junction is marked. This is commonly appropriate at T-junctions. Marking RM10 may also be placed over part of an approach lane, outside the area of the junction. This application may be useful to keep a right turning path clear in narrow roadways (see Figure 7.7).

6 BOX JUNCTION marking RM10 shall be applied using materials with a superior skid resistance quality.



Detail 7.7.1 Box Junction Markings in a One-Way



Detail7.7.2 Box Junction Markings Applied to Turning Lanes Only

NOTE:

(1) The Details given here are representative only. Many other variations are possible.

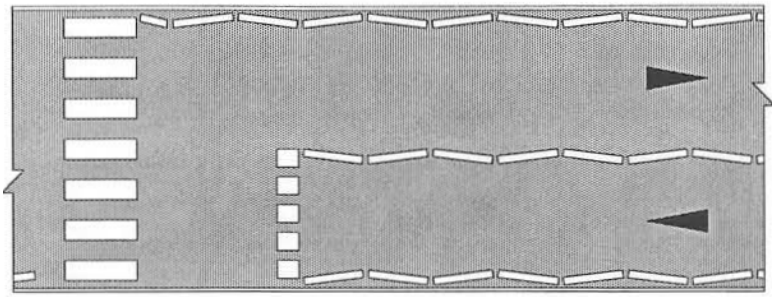
Fig.7.7 Typical Box Junction Markings

ZIG-ZAG ZONE LINES

COLOUR:

White

For dimensions ref. Vol. 4 page 12.2.13



RM11

7.2.15 Zig-Zag Zone Lines

1 ZIG-ZAG ZONE LINES regulatory markings RM11 impose a mandatory requirement that drivers of vehicles:

(a) shall not bring their vehicles to a stop within the "zig-zag" zone marked by such lines EXCEPT to:

(i) yield right-of-way to pedestrians on the crossing; or

(ii) stop behind a vehicle complying with paragraph (i);

(b) shall not change lanes within the zig-zag zone.

AND the markings impose a mandatory requirement that pedestrians ***shall not cross the roadway within a zig-zag zone except at a PEDESTRIAN CROSSING LINES marking RTM3 or BLOCK PEDESTRIAN CROSSING marking RTM4.***

2 ZIG-ZAG ZONE LINE markings shall comprise a broken white zig-zag line with a minimum width of 100 mm, using a line length of 2 m and a gap length of 150 mm.

3 The total area on both approaches contained within the zig-zag marking shall be known as the zig-zag zone.

4 ZIG-ZAG ZONE LINES shall replace LEFT EDGE LINE markings RM4.1, LANE LINE markings GM1, and DIVIDING LINE markings WM3, or NO OVERTAKING LINE markings RM1, on both approaches to a non-signal controlled mid-block pedestrian crossing, PROVIDED that for reasons of safety, road curve delineation etc., a NO OVERTAKING or NO CROSSING LINE marking may be retained in addition to marking RM11. PEDESTRIAN CROSSING AHEAD LINES should extend at least 30m back from the YIELD LINE marking RTM2 on each approach.

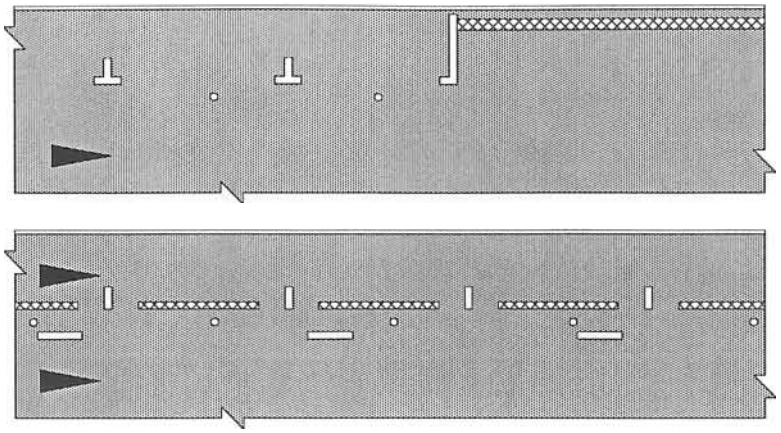
5 Parking bays should not be marked within 30 m of a non-signalised mid-block pedestrian crossing. They may, however, be provided within 30 m of the crossing if they are marked on an area that is fully recessed to the left of the normal kerb line. If parking bays are provided in this manner the ZIG-ZAG ZONE LINE markings RM11 shall be retained.

6 Pedestrian crossings should be located so that no crossing of zig-zag marking RM11 by traffic is necessary.

7 There are a number of different ways in which a pedestrian crossing can be indicated. Details of the relevant markings are covered in Subsections 7.2.1, 7.2.2, 7.2.3, 7.2.4, this subsection and Subsection 7.4.2. **It is important that a high degree of standardisation be achieved in the practice of indicating pedestrian crossings in the interests of pedestrian safety.** Details of the various options for the indication of pedestrian crossings are given in Volume 2, Chapters 2 and 3.

NO STOPPING LINE

For dimensions ref. Vol. 4 page 12.1.2 to 12.1.7



COLOUR:

Red

RM12

7.2.16 No Stopping Line

1 A NO STOPPING LINE regulatory marking RM12 imposes a mandatory requirement that drivers of vehicles:

(a) shall not stop their vehicles adjacent to such line;

(b) where such line is a broken line, shall not stop their vehicles adjacent to such line during the time period indicated by an accompanying road sign.

2 A NO STOPPING LINE shall comprise:

(a) for 24-hour applicability, a continuous solid red line with a minimum width of 150 mm; **OR**

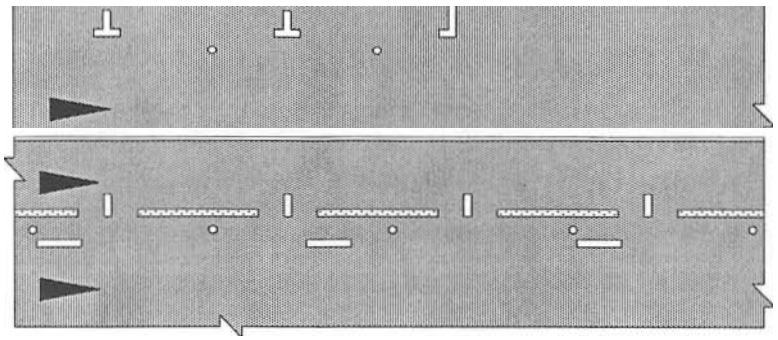
(b) for applicability during limited periods of the day, a broken red line with a minimum width of 100 mm. (The line length may be varied to suite the PARKING BAY markings RM6. For 6 m long bays a line length of 4 m and a gap of 2 m is recommended.)

3 A NO STOPPING LINE may be marked parallel to a left side kerb line EXCEPT that for urban one-way roadways the line may also be marked on the right side. The line may be marked on the kerb itself to improve visibility of the line and to reduce wear on the marking. Otherwise the line may be marked between 150 mm and 2,5 m from the kerb line depending on what other markings are present on the road surface.

NO PARKING LINE

COLOUR:

Yellow



24 hours

Selective periods

For dimensions ref. Vol. 4 page 12.1.2 to 12.1.7

RM13

7.2.17 No Parking Line

1 A NO PARKING LINE regulatory marking RM13 imposes a mandatory requirement that drivers of vehicles:

(a) shall not park their vehicles adjacent to such line;

(b) where such a line is a broken line, shall not park their vehicles adjacent to such line during the time period(s) indicated by an accompanying road sign.

2 A NO PARKING LINE shall comprise:

(a) for 24-hour applicability, a continuous solid yellow line with a minimum width of 100 mm; **OR**

(b) for applicability during limited periods of the day, a broken yellow line with a minimum width of 100 mm. (The line length may be varied to suite the PARKING BAY markings RM6. For 6 m long bays a line length of 4 m and a gap of 2 m is recommended.)

3 A NO PARKING LINE shall only be marked on an urban roadway which is subject to the general speed limit for urban areas, other than a freeway.

4 A NO PARKING LINE may be marked parallel to a left side kerb line at a minimum distance of 150 mm and a maximum distance of 2,5 m from such kerb, EXCEPT that for urban one-way roadways the line may also be marked on the right hand side. It is recommended that the line be marked 2,5 m from the edge of the roadway when used in isolated situations to improve awareness of the marking.

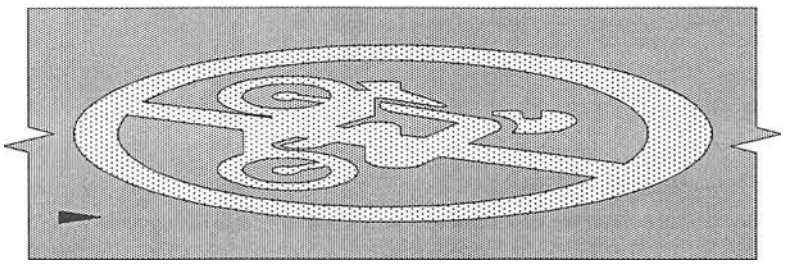
5 NO PARKING LINES may be short in length and are commonly used in urban areas where it is impractical to erect an individual NO PARKING sign R216, or one of its variants. It should be noted that parking may be automatically prohibited by general road traffic legislation in some situations. On an area-wide basis the effect of not duplicating these messages may have a significant economical benefit (see Volume 2, Chapter 3).

NO MOTOR CYCLES MARKING

For dimensions ref. Vo/4 page 12.4.13

COLOUR:

Yellow



RM14

7.2.18 No Motor Cycles Marking

1 NO MOTOR CYCLES regulatory marking RM14 imposes a mandatory requirement that drivers of motor cycles ***shall not proceed beyond such a marking.***

2 Marking RM14 may be used in addition to NO MOTOR CYCLES sign R222 to amplify the message of the sign. Marking RM14 may also be used on its own at specific points where provision of a sign is not practical. It is recommended that in the latter circumstances an effort be made to erect sign R222 in close proximity to marking RM14, if not at the same point.

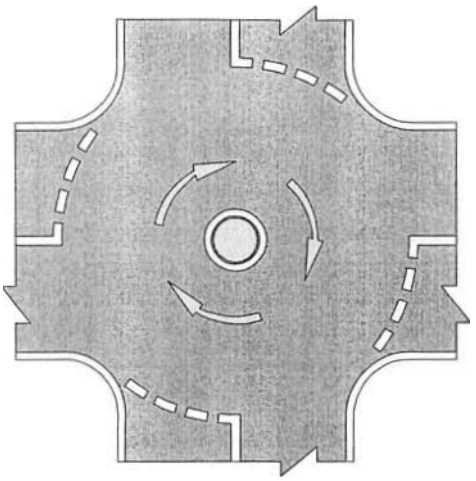
3 NO MOTOR CYCLES marking RM14 shall comprise an elongated image representing the prohibition shape and symbol of sign R222 and it shall be yellow in colour.

4 Notwithstanding the provision of marking RM14 and/or sign R222 it is good practice to give motor cyclists an advance indication of a prohibition on motor cycles ahead of them. Sign R222 may be incorporated into a map-type or diagrammatic sign with a distance indication to the point of prohibition. The use of marking RM14 in advance of the point of prohibition is not recommended.

TRAFFIC CIRCLE MANDATORY DIRECTION ARROWS

COLOURS:

Arrows: Yellow
Outer circle: White
Inner circle: Yellow



For dimensions ref. Vol. 4 page 12.3.5 12.3. 6

RM15

7.2.19 Traffic Circle Mandatory Direction Arrows

1 The TRAFFIC CIRCLE MANDATORY DIRECTION ARROWS regulatory markings RM15 ***indicate a mandatory requirement that drivers of vehicles shall only proceed in the direction indicated by the arrows.*** When a raised channelising island is not pro- vided at a traffic circle a painted traffic island shall be marked in the appropriate position relative to the design of the traffic circle, which shall ***indicate a mandatory requirement that drivers of vehicles shall drive their vehicles in such a manner as to not encroach onto the circle, nor to fully cover the circle or pass to the right of it.***

2 TRAFFIC CIRCLE MANDATORY DIRECTION ARROWS shall be marked on the road surface in yellow, in sets of three arrows, at all mini circles where the size of the circle is such that the full circular roadway created can be seen by approaching drivers. The three arrow markings shall be equally spaced but may be positioned to best suit the number and angle of inter- section of the approach roadways.

3 The provision of a painted traffic island, round which traffic is required to drive in a clockwise direction, is an alternative to a raised channelising traffic circle and is particularly appropriate for use in mini circles. If a raised island is not constructed a painted traffic island shall be provided at a junction intended to operate as a mini circle. The marked circle is a form of PAINTED ISLAND marking RM5.The circumference of the circle should comprise a white boundary line with a minimum width of 300 mm. The central portion may be marked with a solid yellow marking so that there is a minimum gap of 200 mm between the central area and the boundary line. For larger painted circles the central area need not be fully painted. This area may be replaced by an inner circular yellow marking 300 mm wide.

4 A minimum diameter of 2 m and a maximum diameter of 6 m are recommended for marked mini circles. It is recommended that the road surface be raised but mountable by traffic over the area of the marked circle. Central channelising islands may be defined by mountable or un-mountable kerbing depending on the dimensions of the circle and the junction.

5 The recommended lengths of arrow for use with mini circles up to 2 m in diameter is 4 m, whilst for larger circles 5 m arrows may be used. The size of arrow chosen should also be dependent on the width of the circular roadway. If the roadway width is narrow the smaller arrow should be used. If necessary 7,5 m arrows may be specified for larger circles (see Volume2, Chapters 2 and 3).

6 As with any form of road marking care must be always be taken to reduce the risk of presenting motor-cyclists with large areas of surface with poor friction properties. Since a relatively large portion of the road surface within a traffic circle may be marked by arrows and a central circle the use of materials with the best friction qualities is recommended.

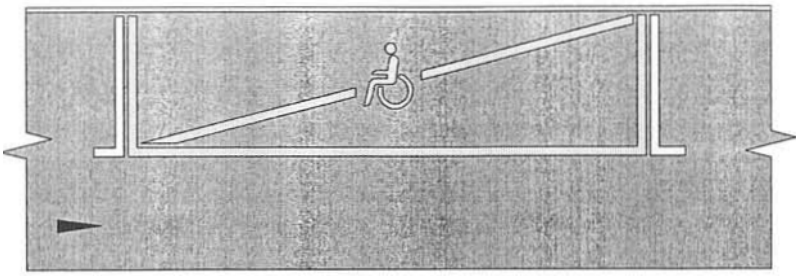
7 Traffic circles may range widely in size and functions. They may be used in the form of mini circles as an alternative to 4-way stop or traffic signal control, particularly as part of a traffic calming exercise. Traffic circles, or roundabouts, may also be used as a form of geometric junction design with specific traffic capacity design parameters, often as an alternative to traffic signal control. If a roundabout is designed to accommodate more than one lane of traffic on any approach the road marking treatment should be similar to that for other types of junction. CHANNELISING LINE marking AM3 ("stacking line"), LANE LINES marking GM1 and PAINTED ISLAND marking RM5 will commonly be required. It should be noted that a CHANNELISING LINE marking is subject to a minimum length requirement (see Table 7.5 in Subsection 7.2.5). For details of appropriate road signs see Subsection 2.2.4.

DISABLED PERSONS PARKING BAY

For dimensions ref. Vol. 4 pages 12.1.2 12.4.4

COLOURS:

Yellow



RM16

7.2.20 Disabled Persons Parking Bay

1 DISABLED PERSONS PARKING BAY regulatory marking RM16 imposes a mandatory requirement upon drivers of vehicles ***not to park their vehicles within the area of the bay unless their vehicle is transporting a person or persons with a physical disability.***

2 DISABLED PERSONS PARKING BAY markings RM16 may be used in a similar manner contemplated for EXCLUSIVE PARKING BAY marking RM7, when provided as a parallel parking bay. Marking RM16 may, however, be provided in any of the traditional patterns of parking bay, in which case the requirement not to use the parking bay unless the vehicle is transporting a person with a physical disability is applicable.

3 DISABLED PERSONS PARKING BAYS shall be demarcated by a continuous solid yellow boundary line on three sides with a minimum line width of 100 mm. The internal area of the parking bay shall additionally be marked with a yellow diagonal line, of minimum width 100 mm, running from the front left corner of the bay to the inner or back right corner. A yellow DISABLED PERSONS SYMBOL marking RM17.3 shall be marked approximately in the centre of this diagonal line. When the parking bay is a parallel bay it should have a minimum width from the kerb line of 2,2 m. It is recommended that angled or 90° DISABLED PERSONS PARKING BAYS be marked at a greater width than normal to allow for the frequent need to accommodate a wheelchair next to the parked vehicle.

4 Marking RM16 may be marked in convenient positions within ranks or rows of conventional PARKING BAY markings RM6 to best suit the needs of disabled persons for safe movement from the parking area to their destination. Whenever practical, and subject to overall demand, it is recommended that RM16 markings be placed in a convenient position in a segregated group. Such a practice is likely to assist enforcement.

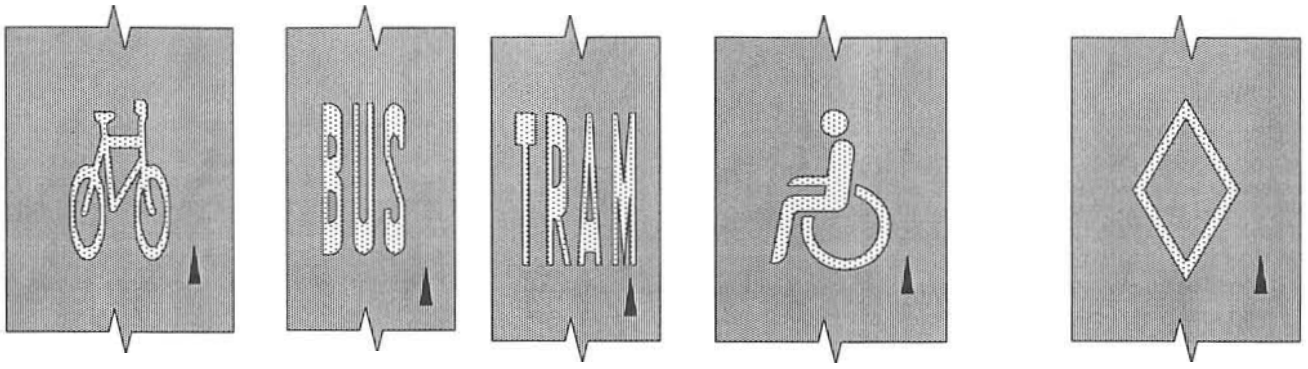
5 Since marking RM16 is a regulatory marking it can be enforced without additional regulatory signs. RM16 parking bays are commonly placed within large parking areas such as at shopping centres or educational institutions. It is therefore recommended, particularly in such environments, that DISABLED PERSONS VEHICLE PARKING RESERVATION regulatory signs R323-P be provided. These signs will further aid observance of the bays or enforcement, and will also make the location of the bays within the parking area discernible from a distance.

EXCLUSIVE USE LANE/PARKING SYMBOLS

COLOUR:

Yellow

For dimensions ref. Vo/4 pages 12.4.2 to 12.4.4 12.5. 9



RM17.1 **RM17.2** **RM17.3** **RM17.4**

RM17

7.2.21 Exclusive Use Lane/Parking Symbols

1 EXCLUSIVE USE LANE/PARKING SYMBOLS (which include WORD markings for this function) may be used in conjunction with EXCLUSIVE USE LANE LINE marking RM9 or DISABLED PERSONS PARKING BAY marking RM16, as appropriate ***to indicate to drivers the specific applicability of markings RM9 and RM16.*** Approved EXCLUSIVE USE LANE/PARKING SYMBOLS are:

(a) yellow BICYCLE SYMBOL marking RM17.1 which shall be used in conjunction with EXCLUSIVE USE LANE LINE regulatory marking RM9 (see Subsection 7.2.13);

(b) yellow BUS, TRAM or other WORD symbol marking RM17.2 which shall be used in conjunction with EXCLUSIVE USE LANE LINE regulatory marking RM9;

(c) yellow DISABLED PERSONS SYMBOL marking RM17.3 which shall be used with DISABLED PERSONS PARKING BAY regulatory marking RM16 (see Subsection 7.2.20);

(d) yellow HIGH OCCUPANCY VEHICLE (HOV) SYMBOL marking RM17.4 which shall be used with EXCLUSIVE USE LANE LINE regulatory marking RM9 (see Subsection 7.2.13).

Only approved symbols shall be used.

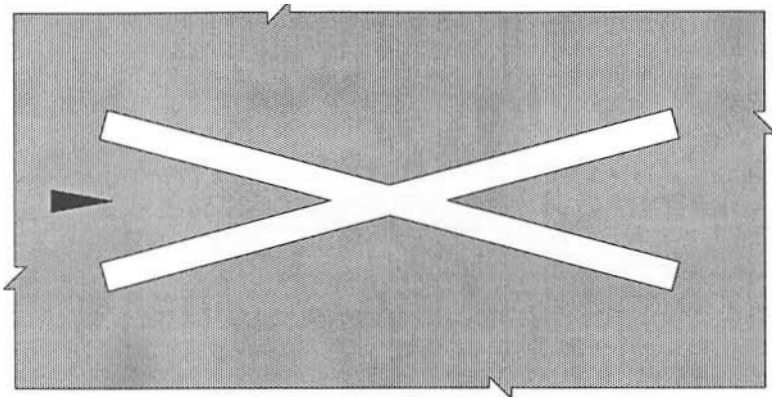
2 The length of RM17 markings should generally be in accordance with Table 7.1. Dimensional details of all RM17 symbol or word markings are given in Volume 4, Chapter 12.

3 If a new symbol is being considered for use with EXCLUSIVE LANE marking RM9 under free-flow traffic conditions the length relationship between the symbol and a normal pictogram of the subject should involve a lengthwise elongation of the order of three times or more. The marking should be sized to be fully contained within a lane. If a suitable symbolic message cannot be derived an appropriate RM17.2 word message may be used.

RAILWAY CROSSING AHEAD

COLOUR:

White



For dimensions ref. Vol.4 page 12.4.13

WM1

7.3.1 Railway Crossing Ahead

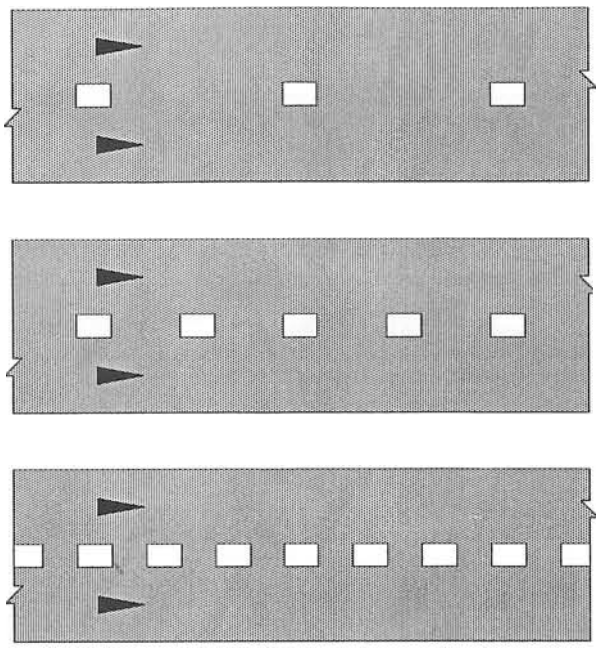
1 RAILWAY CROSSING AHEAD warning marking WM1 is ***to warn road users of a railway crossing ahead.***

2 A RAILWAY CROSSING AHEAD marking is classified as a symbol marking and shall comprise a cross consisting of two continuous white lines of minimum width 200 mm and length 4 000 mm in urban areas, and 400 mm and 7 500 mm in rural areas.

3 Warning marking WM1 should be used in conjunction with one of the warning signs GATE W314, or RAILWAY CROSSING W318, or HEIGHT RESTRICTED W320,as appropriate. The marking should be located between the sign and the railway crossing (see Volume 2, Chapter 7, for the application of signs and markings to railway crossings).

CONTINUITY LINE

For dimensions Ref. Vol. 4 page 12.1.2 to 12.1.7



COLOUR:

White

WM2

7.3.2 Continuity Line

1 A CONTINUITY LINE warning marking WM2 is ***to warn road users of a discontinuity in the through portion of the roadway and to warn road users that if they are travelling to the left of such a line on the left side of the roadway, or to the right side of such a line on the right side of the roadway, the portion of roadway on which they are travelling will shortly deviate from the through roadway.***

2 A CONTINUITY LINE marking shall comprise a broken white line with a minimum width of 200 mm, marked as a Standard, Reduced or Extra density line as indicated in Table 7.6. The recommended line width for use on freeways is 300 mm.

3 A CONTINUITY LINE shall only be used to define the continuity of the through travelled way and if used between two streams of traffic shall only be used between streams travelling in the same direction.

4 A CONTINUITY LINE should be used:

(a) as a continuation of a LEFT EDGE LINE marking RM4.1 to warn that such a line is discontinued or diverted at an off-ramp or an on-ramp on freeways;

(b) at a turning slip road, at junctions with a geometric design which includes raised or painted islands;

(c) on the main road at junctions where STOP LINE marking RTM1, or YIELD LINE marking RTM2, are significantly set back from the edge of roadway (particularly when the side road intersects on a horizontal and/or vertical curve);

(d) as a definition of the edge of roadway if an edge line is not used;

(e) in place of a LANE LINE marking GM1 to warn of the fact that the lane in question is not on the through travelled way but is dedicated to a left or right turn movement ahead.

5 If a CONTINUITY LINE application is required over some considerable length, particularly for an EXCLUSIVE or DEDICATED turn lane, or a weaving lane on a freeway, the marking should be commenced as a reduced density line. This should then be changed to a standard density marking and then, if an increased level of warning message is required, to an extra density marking. It is recommended that whenever space permits, a section of CHANNELISING LINE regulatory marking RM3 should be preceded by a section of CONTINUITY LINE.

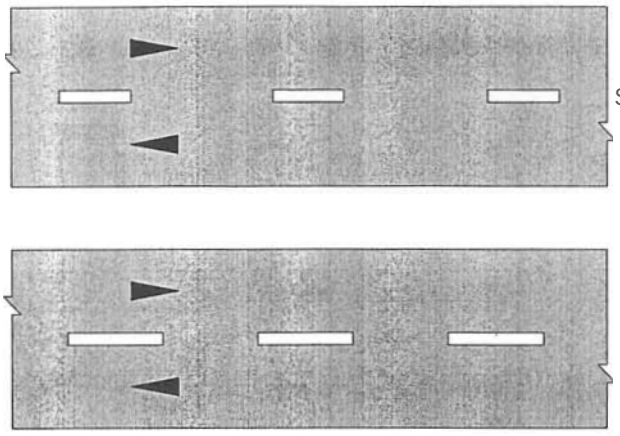
6 Further details involving applications of CONTINUITY LINE warning markings are given in Volume 2, Chapters 2 and 3.

TABLE 7.6 CONTINUITY LINE-LINE/GAP MODULES TABLE 7.6

Line Density	Urban		Rural	
	Module(m)	Line/Gap (m)	Module(m)	Line/Gap (m)
Standard	9 m-	1,5 m,3 m,1,5m,3m	12m-	2 m,4 m,2m,4 m
Reduced	9m-	1,5m,7,5m	12m-	2m,10m
Extra	9 m-	1,5m,1,5m,1,5m,1,5m,1,5m,1,5m	12m-	2m,2m,2m,2 m,2m,2m

COLOUR:

White



WM3

For dimensions ref. Vol. 4 page 12.1.2 to 12.1.7

7.3.3 Dividing Line

1 A DIVIDING LINE warning marking WM3 is ***to warn road users that vehicles travelling on the other side of such a marking are travelling in the opposite direction*** (and if they wish to cross such a line, for whatever reason, they must wait until it is safe to do so).

2 A DIVIDING LINE marking shall comprise a broken white line with a minimum width of 100 mm and a line-to-gap ratio of 1 to 2 using dimensions on a 12m module of 4 m and 8 m on rural roads, and on a 9 m module of 3 m and 6 m on urban roads. PROVIDED that the 12 m module using a 4 m line on an 8 m gap may be used on urban or peri-urban roads with a speed limit of 80 km/h or higher. When a DIVIDING LINE is used on multi-lane roadways it is recommended that the line width be increased to 150 mm and that the line-to-gap ratio be altered to 1 to 1 (see Figure 7.2).

3 A DIVIDING LINE marking shall only be used between portions of roadway carrying traffic travelling in opposite directions. The marking may be used in conjunction with a NO CROSSING LINE regulatory marking RM2 or a NO OVERTAKING LINE regulatory marking RM1 (see Subsections 7.2.5 and 7.2.6). It should be noted that a DIVIDING LINE has the same marking module length as a LANE LINE marking GM1, but has a different line-to-gap ratio. On multi-lane two-way roadways it is recommended that the DIVIDING LINE and LANE LINE modules be commenced at the same point whenever possible (see Figure 7.2).

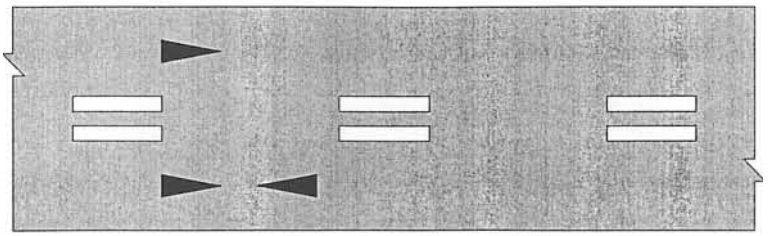
4 A DIVIDING LINE shall be marked on all permanently surfaced rural roads with a surface width of 5,5 m or more. A DIVIDING LINE may be marked on roads of lesser width, in rural or urban areas, if, on engineering assessment, it is considered beneficial in safety terms to do so. The marking may be used also for relatively short distances. Likely situations for such use include sharp horizontal and/or vertical curvature, the approaches to road junctions, railway crossings or bridges/culverts, on roadways under 5,5 m in width, to warn traffic to pay particular attention to the risk of straying into the path of oncoming traffic.

REVERSIBLE LANE LINES

For dimensions ref. Vol. 4 page 12.1.2 to 12.1.7

COLOUR:

White



Alternating Directions of Flow

WM4

7.3.4 Reversible Lane Lines

1 A REVERSIBLE LANE LINE warning marking WM4 is ***to warn road users that the lane so marked may be used by vehicles in the opposite directions at different times of the day and/or night***. PROVIDED that warning marking WM4 shall only be used in conjunction with signing and/or other traffic control measures which make it clear in which direction the lane is in use at a particular time.

2 Such signs or devices are:

(a) an overhead variable message sign or signal indicating whether the lane is open or closed to travel in a particular direction, or whether the lane is available only to a specific class of vehicle (such a message may be given by use of a custom de- signed overhead variable message guidance sign or by use of OVERHEAD LANE DIRECTION CONTROL signals S16 and S17);

(b) temporary delineation devices.

3 A REVERSIBLE LANE LINE marking shall comprise two broken white lines marked side by side, each of minimum width of 100 mm, spaced 100 mm apart, and with a line-to-gap ratio of 1 to 2, using dimensions of 3 m and 6 m on urban roads. (This is in effect a double DIVIDING LINE warning marking WM3.) When the reversible lane is NOT a kerbside or median island-side lane both sides of the lane shall be marked using REVERSIBLE LANE LINE markings.

4 The use of REVERSIBLE LANE LINE markings should only be considered after a detailed engineering study of alternative methods of traffic control and after careful assessment of the necessary regulatory, warning and/or guidance signs or signals.

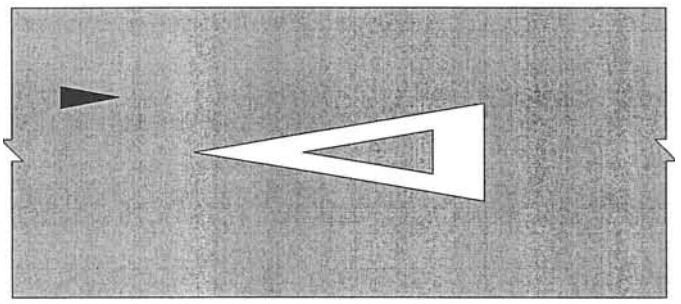
5 INFORMATION ARROW markings GM4.2 should be marked as described in Subsection 7.4.4.

YIELD CONTROL AHEAD

For dimensions ref. Vol. 4 page 12.4.14

COLOUR:

White



WM5

7.3.5 Yield Control Ahead

1 A YIELD CONTROL AHEAD warning marking WM5 is *to warn road users of a YIELD sign R2 or YIELD LINE marking RTM2 ahead* (including any and all derivatives of sign R2).

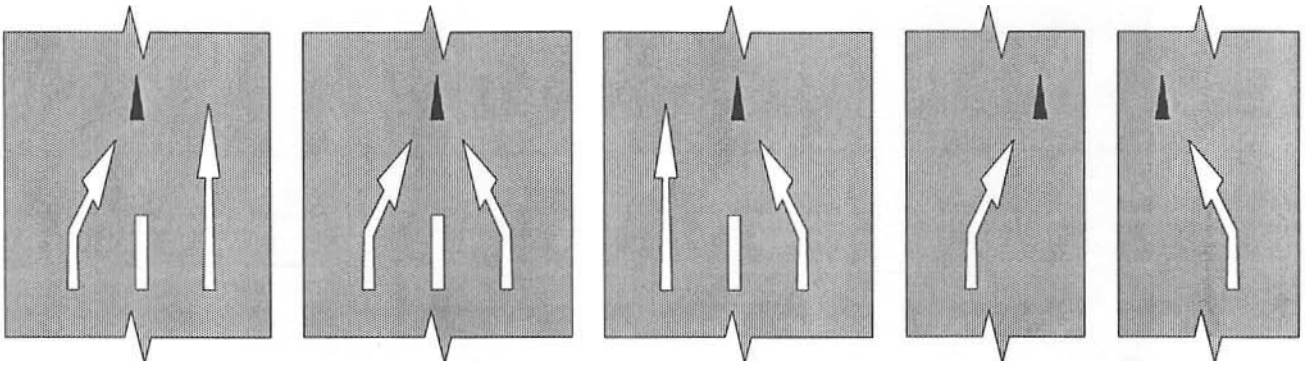
2 A YIELD CONTROL AHEAD marking shall comprise an elongated white open block triangular symbol. The length of the marking should be determined from Table 7.1.

3 It is recommended that a YIELD CONTROL AHEAD marking be marked on the road surface approximately 1m in advance of the YIELD LINE marking RTM2. The Marking may also be displayed in advance of a junction controlled by a YIELD sign R2 where inadequate approach sight distance or other factors make the form of control unexpected. A white INFORMATION ARROW marking GM4.1 may also be marked beyond marking WM5 to indicate that the yield control is some distance ahead. The marking should be used in conjunction with warning sign YIELD CONTROL AHEAD W303 and should be located between the warning sign and the YIELD regulatory control sign and/or marking.

COLOUR:

White

For dimensions ref. Vol. 4 page 12.3.7 1238



WM6.1 WM6.2 WM6.3 WM6.4 WM6.5

WM6

7.3.6 Lane Reduction Arrows

1 A LANE REDUCTION ARROWS warning marking WM6 is ***to warn road users that a lane on a multi - lane roadway ends some distance ahead either from the left or the right, or from both left and right.***

2 A LANE REDUCTION ARROWS marking shall comprise two white arrows, normally one straight and one bent, (WM6.1 or WM6.3) but occasionally two bent arrows (WM6.2). Arrows shall be located on the centre lines of the appropriate lanes. The bent arrow head shall be inclined towards the lane which continues. When two lanes reduce in width from both sides of the roadway to form one lane, two bent arrows shall be used.

3 The length of the straight arrow should be determined from Table 7.1.

4 In order to achieve smooth, high speed, merging of two adjacent streams of traffic at a lane drop the LANE LINE marking GM1 should be terminated before the beginning of the edge line and/or no overtaking line taper. For high speed roads it is recommended that three sets of the appropriate LANE REDUCTION ARROWS WM6 be marked on the lane marked section so that the last of the WM6 arrow markings coincides with the last GM1 marking. Provided the LANE LINE marking GM1 has been set back from the beginning of the taper as recommended extra single bent arrow markings (WM6.4 or WM6.5) may be provided one quarter and one half of the distance into the lane line free plus taper section (see Figure 7.8 and Table 7.7). The treatment described is a standard geometric traffic engineering principle detailed in the MUTCD from the United States. **Under no circumstances should LANE LINE marking GM1 be continued INTO the tapering section of roadway** since this will result in late efforts by drivers to merge into one traffic stream. This will, in turn, result in unnecessary "friction", when traffic density is even moderately high, to the extent that traffic will slow significantly in the taper or even come to a stop.

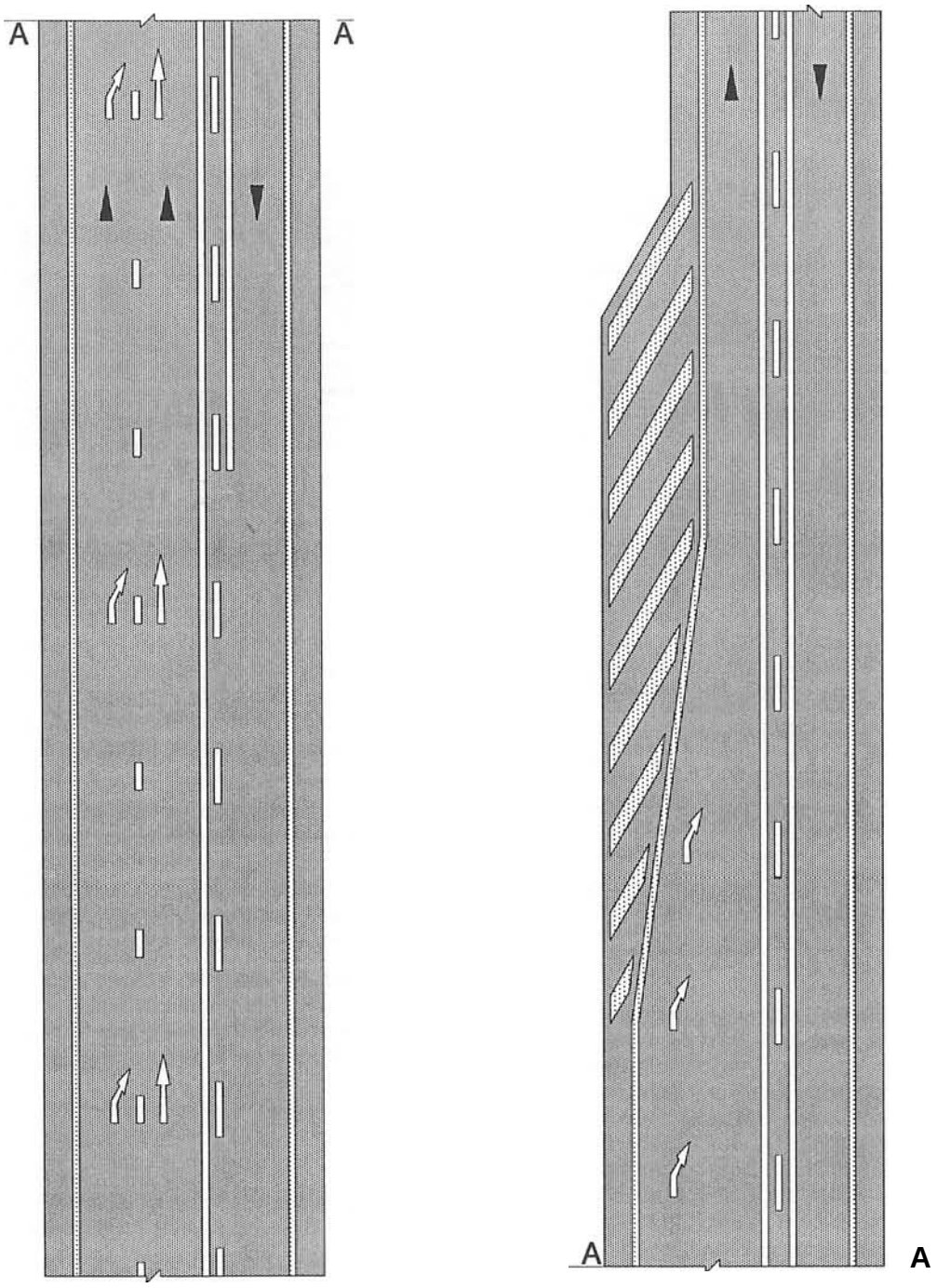
5 PAINTED ISLAND marking RM5 should be marked on the shoulder or the dividing line on the side of the road which is tapered. Lane reduction markings may be used in conjunction with DIAGRAMMATIC guidance signs GS101 to GS106 and their overhead or temporary variants (see Section 4.12).

6 A lane reduction may be a permanent or temporary feature of a roadway and may be achieved on the left (slow) side OR the right (fast) side. **The selection of a left or right side lane drop is dependent on many factors and should be determined as a result of a thorough engineering assessment.** Any detail given in this manual does not imply a preference for one system over the other.

7 If it is necessary to drop more than one lane on a section of roadway each lane should be dropped separately with a correctly designed taper and the appropriate road signs and markings, including LANE REDUCTION ARROWS. There should also be a stabilising section of roadway between successive lane drops. Such a treatment is particularly appropriate for temporary lane drops at roadworks. The use of temporary bonded tapes for LANE REDUCTION ARROWS is recommended at temporary lane drops.

TABLE 7.7 LANE REDUCTION MARKING SPACING TABLE 7.7

Operating Speed	Distance to Last Arrow	Marking Spacing (m)	
		Urban	Rural and Freeway
60	96	27	36
80	120	36	36
100-120	144-192		48



NOTES:

(1) The detail represents a typical road marking treatment for a lane drop (dropping the "slow" lane). The lengths of taper and recovery area are not to scale.

(2) It is strongly recommended that the length of roadway required to achieve safe merging of traffic include a section without LANE LINE marking GM1 in addition to the taper. The overall length of roadway from the end of the lane marking should be defined by engineering assessment (see United States MUTCD).

(3) Single bent arrows may be used as illustrated (see paragraph 7.3.6.4).

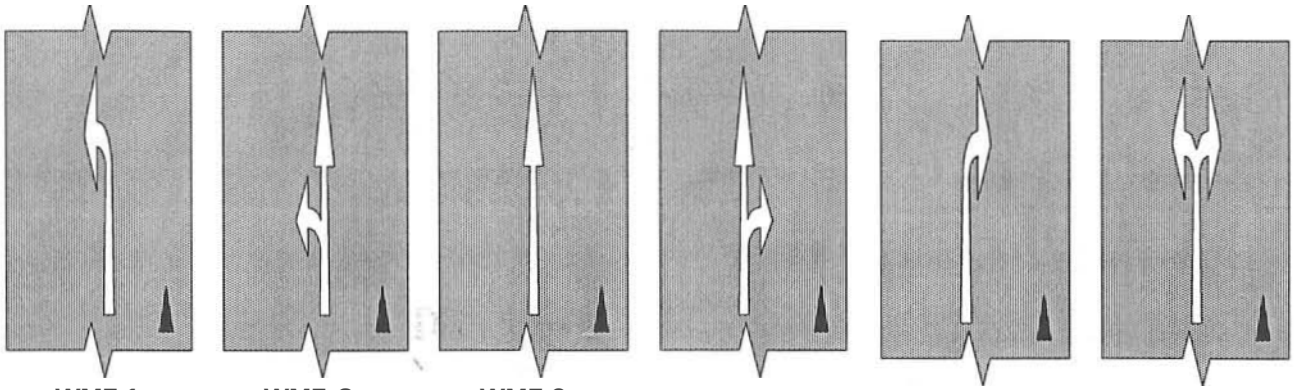
Fig 7.8 Example of the Use of Lane Reduction Arrows

MANDATORY DIRECTION ARROW AHEAD

COLOUR:

White

For dimensions ref. Vol. 4 page 12.3.2 to 12.3.4



WM7.1 WM7.2 WM7.3 WM7.4 WM7.5 WM7.6

WM7

7.3.7 Mandatory Direction Arrow Ahead

1 MANDATORY DIRECTION ARROW AHEAD warning markings WM7 are ***to warn road users that a MANDATORY DIRECTION ARROW marking RM8 is ahead which will require the driver to proceed only in the direction indicated by the arrow.*** The MANDATORY DIRECTION ARROW AHEAD marking used in a lane **shall have the identical shape to the MANDATORY DIRECTION ARROW marking RM8 used in such a lane.**

2 MANDATORY DIRECTION AHEAD arrows shall be marked in white and should be of a size as indicated in Table 7.1.

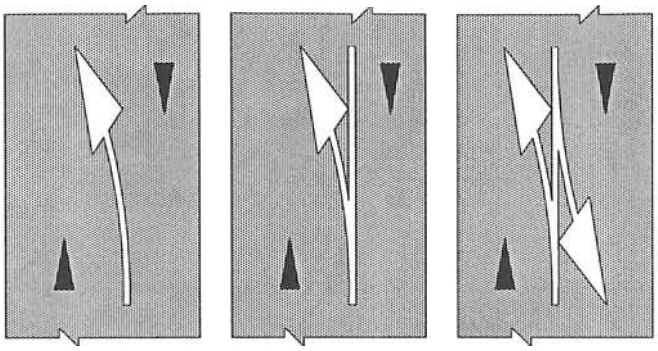
3 At least one WM7 arrow marking shall precede an RMB arrow marking, EXCEPT when the RMB marking is in a recessed EXCLUSIVE or DEDICATED left or right-turn lane which is less than 25 m in length. The MANDATORY DIRECTION ARROW AHEAD marking shall be marked at least 25m in advance of the RM8 marking to which it refers. A spacing between markings of 30m to 40 m is preferred. Where sufficient approach length is available the use of two WM7 arrow markings located at spacings of 30m to 40 m is recommended. However, NO WM7 arrow shall be marked in such a way that another intersecting side road is located between the WM7 marking and the junction to which it refers.

4 MANDATORY DIRECTION ARROW AHEAD markings **shall NOT be used to indicate the development of additional lanes, such as left or right turn lanes, because the mandatory direction arrows which follow in the two lanes may bear no relationship to the arrow used to indicate the lane split.** If it is required to indicate a lane split the appropriate version of the BIFURCATION ARROW marking GM3 should be used (see Subsection 7.4.3).

NO OVERTAKING LINE OR NO CROSSING LINE AHEAD

For dimensions ret. Vol. 4

pages
12.3.9
12.3.10



COLOUR:

White

WM8 **WM8.1** **WM8.2** **WM8.3**

7.3.8 No Overtaking Line or No Crossing Line Ahead

1 A NO OVERTAKING LINE OR NO CROSSING LINE AHEAD warning markings WM8 are ***to warn road users that a NO OVERTAKING LINE marking RM1 or NO CROSSING LINE marking RM2, is ahead.***

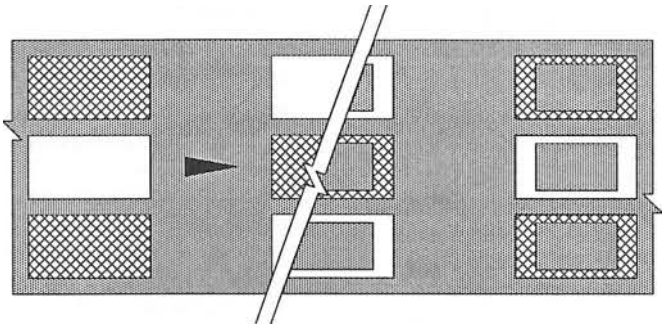
2 A NO OVERTAKING LINE or NO CROSSING LINE AHEAD marking shall normally comprise a white arrow which shall be marked on top of an appropriate DIVIDING LINE marking to form the composite marking WM8.2. If marking WM8 is required in both directions within a common section of DIVIDING LINE the composite marking WM8.3 may be used. Marking WM8.1 may be used on its own if necessary.

3 Two, and preferably three, such arrow markings should be marked in advance of the start of RM1 or RM2 markings at decreasing spacings of four, three and two DIVIDING LINE modules towards the start of such regulatory markings. (This amounts to 24 m, 60 m and 108 m from the start of the no overtaking line for rural and 18 m, 45 m and 81 m for urban conditions - see Volume 2, Chapter 2.)

4 The length of the WM8 marking shall be the same as the length of the DIVIDING LINE marking WM3.

ARRESTOR BED/ESCAPE ROAD AHEAD

For dimensions ref. Vol. 4 page 12.2.6 and 12.2.7



COLOUR:

Red and White

WM9.1 **WM9.2**

7.3.9 Arrestor Bed/Escape Road Ahead

1 An ARRESTOR BED/ESCAPE ROAD AHEAD warning marking WM9.1/WM9.2 is *to warn road users that an arrestor bed/escape road is ahead.*

2 ARRESTOR BED AHEAD marking WM9.1 shall comprise a chequer-board arrangement of white and red markings elongated in the direction of travel. Recommended dimensions are 3 m by 1 m, with gaps in the longitudinal direction between markings of 3 m. The lateral gaps will depend on the width of surface but should be of the order of 250-300 mm. An ARRESTOR BED AHEAD marking "pattern" comprises two transverse rows of rectangular markings.

3 ESCAPE ROAD AHEAD marking WM9.2 shall comprise a similar pattern to marking WM9.1 but using hollow box markings in the same alternating red and white pattern. Marking WM9.2 may commence in the middle of a roadway (see Volume 2, Chapter 2).

4 Arrestor beds may be provided on the left or right side of a carriageway according to the road geometry and the topography of a site. For additional warning of the exit to the arrestor bed the red and white blocks should be marked along the shoulder, in advance of the exit for approximately 75 m.

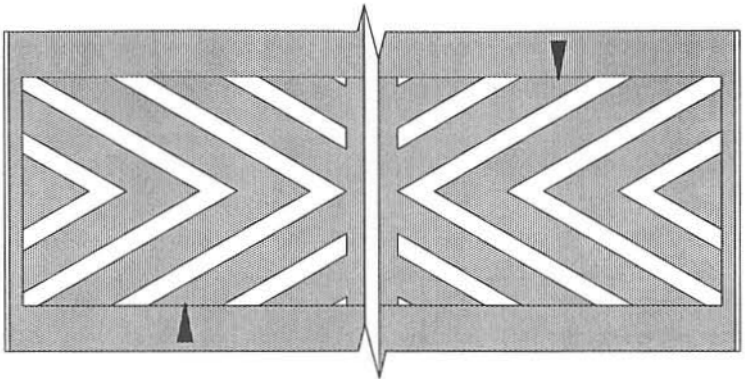
5 The markings shall be applied in skid resistant materials of a superior quality. ARRESTOR BED/ESCAPE ROAD AHEAD markings may be used in con- junction with white ROADSTUDS and shall be used in conjunction with DIAGRAMMATIC guidance signs in the GS500 series (see Section 4.12 and Volume 2, Chapters 2 and 11). It is suggested that LEFT EDGE LINE marking RM4.1 be continued unbroken across the entry to an arrestor bed.

SPEED HUMP

COLOUR:

White

For dimensions ref. Vol. 4 page 12.2.16



WM10

7.3.10 Speed Hump

1 A SPEED HUMP warning marking WM10 is ***to warn road users of a speed hump in the roadway.***

2 A SPEED HUMP marking shall comprise diagonal white lines with a minimum width of 200 mm. The marking shall be applied to the approach side of the speed hump. Its use on the whole speed hump is optional.

3 It is recommended that when speed humps are used a NO OVERTAKING LINE marking RM1 be marked from 9m in advance to 9 m beyond the speed hump.

4 If speed humps are used in areas which are environmentally sensitive in that special roadway finishes have been used the SPEED HUMP marking need not be used. It is recommended that a similar pattern of diagonal lines be incorporated into the roadway surface finish if possible.

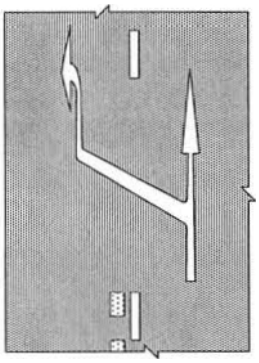
5 Examples of typical applications of SPEED HUMPS are given in Volume 2, Chapter 12.

END OF EXCLUSIVE USE LANE ARROWS

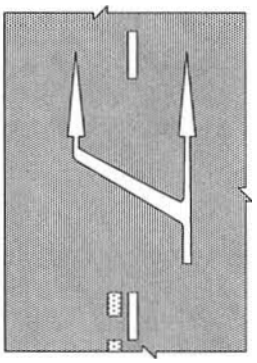
COLOUR:

White

For dimensions ref. Vol. 4 page 12.3.11 12.3.12



WM11.1



WM11.2

WM11

7.3.11 End of Exclusive Use Lane Arrows

1 END OF EXCLUSIVE USE LANE ARROW warning markings WM11.1 and WM11.2 are ***to warn road users that an exclusive use lane has ended and that they may move Into the continuation of such lane subject to normal lane changing protocols.***

2 END OF EXCLUSIVE USE LANE ARROW markings WM11.1 and WM11.2 shall be marked in white. Marking WM11.1 shall have a minimum overall length of 7,2 m and marking WM11.2 shall have a minimum length of 6,0 m. The arrow markings shall be positioned symmetrically over the relevant LANE LINE marking GM1 or CONTINUITY LINE marking WM3 so that the transverse shaft falls in a gap in these lines.

3 Exclusive use lanes may be provided for priority movement of buses, trams, high occupancy vehicles or bicycles,(see Subsection 7.2.13). When other traffic is to be permitted to turn left (or right) at an intersecting side road EXCLUSIVE USE LANE LINE marking RM9 should be stopped in advance of the side road to permit traffic to move into the lane prior to turning. Marking WM11.1 may be used to indicate that this option is available and shall be followed, in the turning lane, by a MANDATORY DIRECTION ARROW marking RM8.1 (or RM8.5). It may be necessary to terminate an exclusive use lane to permit other traffic use of the lane for some distance. In this case arrow marking WM11.2 may be used.

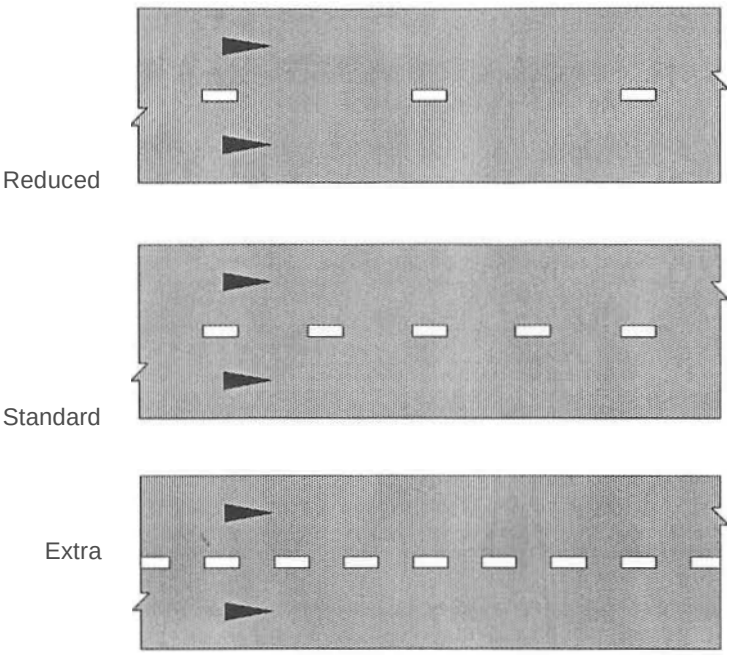
4 If an exclusive use lane is provided on the right side of a roadway mirror-images of markings WM11.1 and WM11.2 may be used.

LANE LINE

COLOUR:

White

For dimensions ref. Vol 4 page 12.1.2 lo 12.1.7



GM1

7.4.1 Lane Line

1 A LANE LINE guidance marking GM1 may be used ***to demarcate traffic lanes for road users travelling on a roadway or portion of roadway In the same direction.***

2 A LANE LINE marking shall only be used within a portion of roadway carrying only vehicles which are travelling in the same direction. On a section of roadway LANE LINE markings should generally be parallel to a DIVIDING LINE marking WM3, a NO OVERTAKING LINE marking RM1 or a NO CROSSING LINE marking RM2. On multi-lane roadways it is recommended that all broken line modules be synchronised across the road cross-section {see Subsection 7.1.5, Figure 7.2, Subsections 7.2.7 and 7.3.2 and paragraph 7.4.1.5).

3 The minimum width of a lane is generally covered by standards or specifications used by road authorities. It is recommended that a LANE LINE marking GM1 is provided when a portion of a roadway carrying traffic travelling in one direction is 6,8 m or more in width, and that no lane be marked with a width less than 2,75 m.

4 A STANDARD LANE LINE marking MODULE shall comprise a broken white line with a minimum width of 100 mm and a line-to-gap ratio of 1 to 2 with dimensions of 2 m lines and 4 m gaps for freeways and rural roads and 1,5 m lines and 3 m gaps for urban roads. Marking GM1 may also be used in a REDUCED or EXTRA density MODULE form. A REDUCED density module utilises a line-to-gap ratio of 1 to 5 with dimensions of 2 m and 10 m on freeways and rural roads and 1,5 m and 7,5 m on urban roads, and is generally appropriate to long straight sections of roadway. An EXTRA density module utilises a line-to-gap ratio of 1 to 1 with the dimensions of 2 m lines and 2 m gaps for rural roads and 1,5 m lines and 1,5 m gaps for urban roads. As can be seen in Figure 7.1 the effect of these dimensions is that a module may consist of one {reduced), two (standard) or three (extra) line/gap groupings.

5 It is generally recommended at multi-lane junctions, whether on free-flowing or STOP/traffic signal controlled approaches, that "Stacking Lanes" be marked on all multi-lane approaches. A "Stacking Lane" comprises a minimum length of solid CHANNELISING LINE marking RM3 (12 m in rural and 9 m in urban areas), PRECEDED by a length of EXTRA density LANE LINE marking GM1 for all through, or shared through/turn lanes (or CONTINUITY LINE WM3 for EXCLUSIVE or DEDICATED turn lanes - see Subsections 7.2.7 and 7.3.2). The minimum recommended length for this section of EXTRA GM1 marking is two modules or 24 m in rural and 18 m in urban situations. Longer lengths may be specified, particularly when longer than 36 m or 27 m queues of traffic are likely to form. In urban environments provided with on-street parking, including one-way street networks, this marking arrangement enables legal movement from parking on one side of the street to a turn lane on the other side.

6 EXTRA LANE LINE marking GM1 may also be specified for curves and other areas where drivers are known to stray out of their lanes, but in which the marking of a CHANNELISING LINE marking RM3 is not considered appropriate i.e. on multi-lane undivided roadways.

7 LANE LINE marking GM1 should be replaced by a CONTINUITY LINE marking WM2 to indicate DEDICATED or EXCLUSIVE exit or turning lanes, whether to the left or right, from which traffic may not proceed in the direction of the through roadway (see Subsections 7.2.7 and 7.3.2).

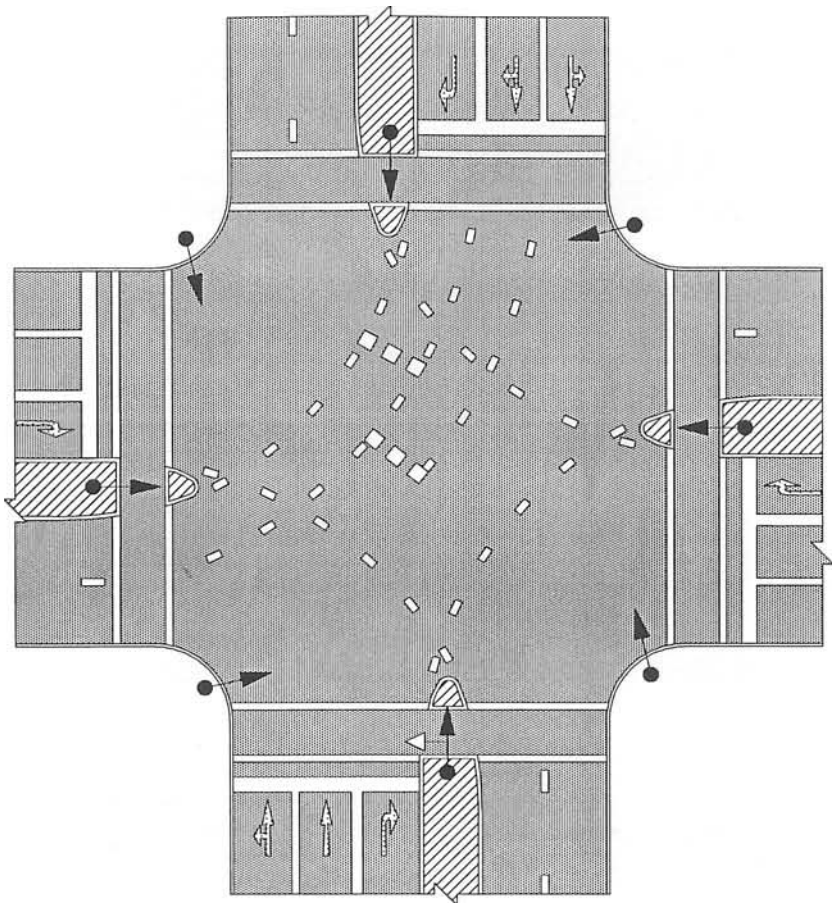
8 The rural module LANE LINE marking GM1 may be considered for use in peri-urban or urban areas with a speed limit of 80 km/h or higher. The urban module may similarly be specified for sections of rural road with a speed limit under 80 km/h.

GUIDE LINES

For dimensions ref. Vol 4 page 12.1.2 to 12.1.7

COLOUR:

White



GM2

7.4.2 Guide Lines

1 GUIDE LINE guidance markings GM2 may be used ***to give additional guidance to road users within a junction.*** Use of the marking is OPTIONAL.

2 A GUIDE LINE marking shall comprise a broken white line with a minimum width of 100 mm and a line-to-gap ratio of 1 to 3 with dimensions of 500 mm and 1,5 m. Guide line marking in modules is not appropriate.

3 GUIDE LINE markings may be used to provide guidance to both drivers and pedestrians in a number of ways, examples of which are:

(a) to provide TURNING GUIDANCE, particularly for right turning traffic at dual carriageway or other wide junctions when a GUIDE LINE may be marked in a curve to guide turning traffic through the most efficient path in terms of safety and turning capacity - this application is highly recommended when traffic is permitted to turn from more than one adjacent lane-in which case a GUIDE LINE should be marked from the right side of each lane to dis- courage traffic from straying into the path of the other turning lane;

(b) to provide ALIGNMENT GUIDANCE across wide and/or complex junctions when there is a shift in alignment through a junction (in such situations a GUIDE LINE may be marked from the end of one or all lane lines (or stacking lines), across the junction in a straight or curved alignment as appropriate, to meet the appropriate far side lane line);

(c) a pair of parallel guide lines may be used at uncontrolled junctions, to guide pedestrians to a preferred crossing point when a formal pedestrian crossing is not warranted; such situations include:

(i) footpath extensions in wide road reserves when the surfaced roadway(s) take up a small portion of the reserve;

(ii) turning roadways at channelised junctions to guide pedestrians on the most efficient or safe route through a complex junction.

4 Attention should be given to the appearance of guide line(s) when viewed by drivers travelling on the intersecting roadway to avoid the risk of creating a confusing situation for such drivers.

5 When used in the manner indicated in paragraph7.4.2.3(a) one or more YIELD LINE markings RTM2 may be incorporated into the guideline marking to advise drivers of the likely need to yield, within the turn, to oncoming traffic.

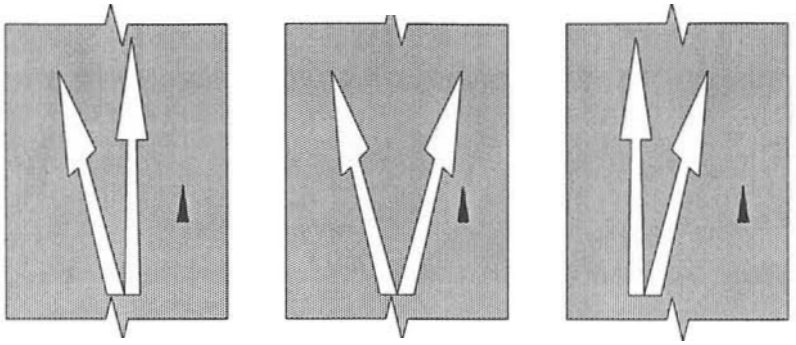
6 When GUIDE LINE markings are used in the manner indicated in paragraph 7.4.2.3(c) there is a risk, as there is with all forms of pedestrian crossing, whether controlled or uncontrolled, that pedestrians may infer a false sense of security from the markings. It should therefore be understood that the principle employed in the use of such markings is one of guidance only. This guidance is directed mainly at pedestrians but is also of value to drivers. The alternative practice of using a PEDESTRIAN CROSSING LINES marking RTM3 at an uncontrolled junction, or in mid-block for that matter, is not recommended because such a marking is normally associated with traffic signal control and is even more likely to infer a false sense of security to pedestrians.

BIFURCATION ARROWS

COLOUR:

White

For dimensions ref. Vol 4 pages 12.3.13 12. 3.14



GM3.1 **GM3.2** **GM3.3**

GM3

7.4.3 Bifurcation Arrows

1 A BIFURCATION ARROWS guidance marking GM3 may be used ***to Indicate to road users an increase in the number of lanes ahead.***

2 A BIFURCATION ARROWS marking shall comprise two elongated white arrows. These may be arranged in any appropriate combination of straight and inclined arrows to indicate the general direction in which the additional lane is provided. The angle included between the arrows may be varied according to the rate of taper by which the additional lane is created. The marking should be located within the tapering section of roadway between 10 m and 25 m from the start of the additional lane.

3 This type of arrow marking shall be used to offer drivers guidance only. The marking bears no relationship to any MANDATORY DIRECTION ARROW markings RMS which may occur in the roadway ahead (see also Subsections 7.2.12 and 7.3.7).

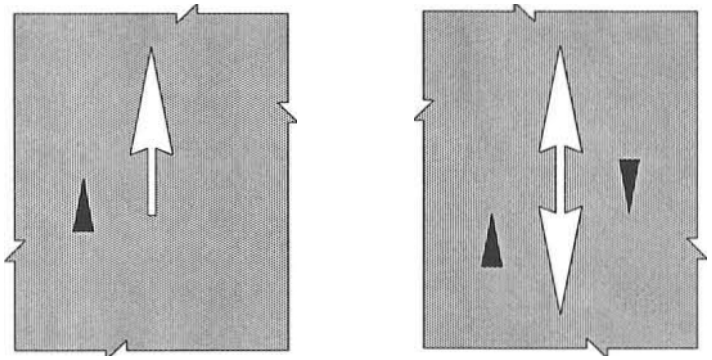
4 A BIFURCATION ARROWS marking may be used to guide drivers in generally free running, higher speed traffic conditions when an extra lane is added, when an EXCLUSIVE or DEDICATED right or left tum lane is provided or when directional ramps split (commonly within systems interchanges).

INFORMATION ARROWS

COLOUR:

White

For dimensions ref. Vol 4 page 12.3.15



GM4.1 **GM4.2**

GM4

7.4.4 Information Arrows

1 An INFORMATION ARROW guidance marking GM4.1 and GM4.2 may be used ***to indicate to road users the direction of travel permitted in a particular lane or roadway.*** Marking GM4.2 is appropriate in a lane subject to controlled reversals in the direction of travel permitted and may be used to supplement EXCLUSIVE USE LANE LINE regulatory marking RM9 or REVERSIBLE LANE warning marking WM4 (see Sub- sections 7.2.13 and 7.3.4).

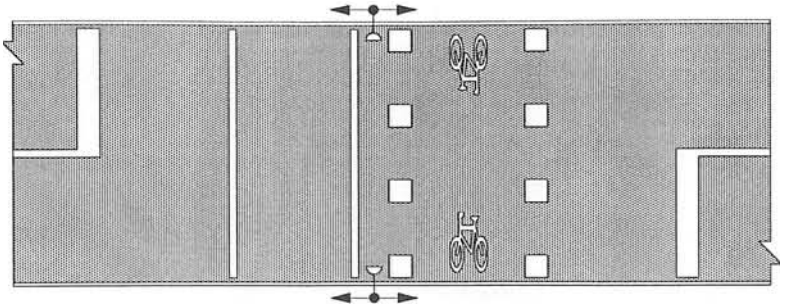
2 An INFORMATION ARROW marking GM4.1 shall comprise a white arrow with a length according to Table7.1. Marking GM4.2 shall be sized in such a manner that both arrow heads are the same size as those of an equivalent GM4.1 arrow head. An INFORMATION ARROW marking should be located on the approximate centre line of the lane. The shape of the INFORMATION ARROW marking is different to that of all other arrow markings.

3 The arrow can be useful when drivers may have difficulty in determining exit paths from entry paths. The arrow should be used in preference to WORD markings GM7 such as "NO ENTRY", KEEP LEFT" or "AHEAD".

4 INFORMATION ARROW marking GM4 is also of advantage in one-way streets, particularly in guiding traffic entering such roadways from minor intersecting roads, in support of regulatory signs such as NO ENTRY R3, ONE-WAY ROADWAY R4.1, R4.2 or R4.3, or KEEP LEFT or RIGHT R103 or R104, or PROCEED LEFT, RIGHT or STRAIGHT ONLY R105, R106 or R107, as appropriate.

BICYCLE GUIDE LINES

For dimensions ref. Vo/4 page 12.1.2 to 12.1.7



COLOUR:

White

GM5

7.4.5 Bicycle Guide Lines

1 BICYCLE GUIDE LINES guidance marking GM5 is ***a transverse marking which may be used to indicate to road users the section of roadway to be used by cyclists to cross the roadway.***

2 BICYCLE GUIDE LINES shall comprise a pair of broken white lines with a minimum width of 300 mm and a line-to-gap ratio of 1 to 3 using dimensions of 300 mm and 900 mm. For the normal application of this marking the pairs of lines shall be spaced at least 1,5 m apart.

3 Bicycle crossings may require to be marked when an exclusive bicycle path, or shared bicycle/pedestrian path, crosses a roadway, normally in a mid-block situation, OR where a bicycle lane running parallel to one roadway crosses an intersecting side road (see Subsection 7.2.13).

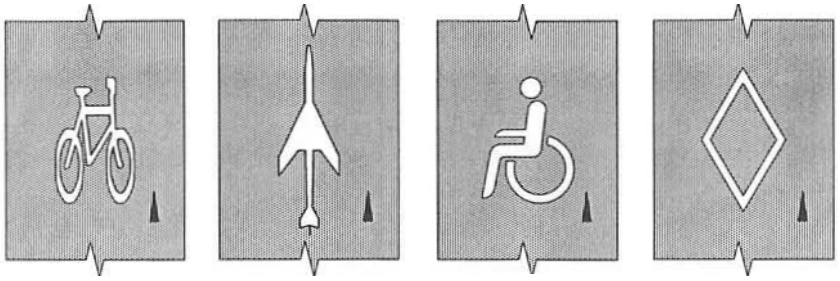
4 Bicycle crossings will frequently be adjacent to pedestrian crossings. In such situations, if space is limited, one BICYCLE GUIDE LINE of the marking may be omitted and that side of the bicycle crossing may be defined by the PEDESTRIAN CROSSING LINES marking RTM3, or BLOCK PEDESTRIAN CROSSING marking RTM4. If there is insufficient space for two separate crossings a pedestrian crossing should be marked and both pedestrians and cyclists directed to use it.

ROAD MARKING SYMBOLS

COLOUR:

White

For dimensions ref. Vol 4 pages 12.4.2 to 12.4.5



GM6.1 **GM6.2** **GM6.3** **GM6.4**

GM6

7.4.6 Road Marking Symbols

1 ROAD MARKING SYMBOLS may be used ***to guide road users as an additional form of marking to standard signs and markings.*** Approved ROAD MARKING SYMBOLS are:

(a) white BICYCLE SYMBOL marking GM6.1 shall be used at bicycle crossings in conjunction with BICYCLE GUIDE LINES marking GM5;

(b) white AIRPORT SYMBOL marking GM6.2 which may be used within a lane or portion of roadway to give directional guidance indicating that the lane so marked leads to an airport;

(c) white DISABLED PERSONS SYMBOL marking GM6.3 which may be used to indicate areas set aside for use by disabled persons;

(d) white HIGH OCCUPANCY VEHICLE (HOV) SYMBOL marking GM6.4 which may be used to give guidance to drivers of HOV vehicles other than with marking RM9.

Only approved symbols shall be used.

2 ROAD MARKING SYMBOLS shall comprise white symbolic markings with a length generally in accordance with Table 7.1. If a ROAD MARKING SYMBOL is being developed for use under free-flowing traffic conditions the length relationship between the symbol and a normal pictogram of the subject should involve a lengthwise elongation of the order of three times or more. The marking should be sized to be fully contained within a lane.

3 If a suitable symbolic message is available it should be used in preference to a WORD marking GM7.

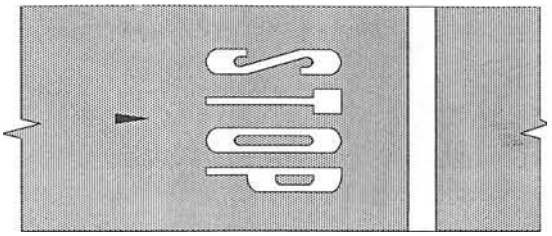
4 Care should be taken in the use of symbols with large surface areas that a potential skidding hazard is not being created for motor-cycles. Markings using materials with the best possible skid resistance characteristics should therefore be specified.

WORD MARKINGS

For dimensions ref. Vol 4 pages 12.5.1to 12.5.9

COLOURS:

White



GM7

7.4.7 Word Markings

1 WORD MARKINGS are guidance markings GM7 which may be used ***when it is absolutely necessary to give additional guidance to road users.*** An appropriate, approved, ROAD MARKING SYMBOL shall always be used in preference to a word message.

2 WORD MARKINGS shall comprise white letters and/or numerals. The letter height should be in accordance with the provisions of Table 7.1.It should be noted that the long-standing letter height of 5,5 m, used on rural roads, has been retained instead of converting to the 5 m used for many other markings.

3 In situations where lane selection is critical, and guidance signing opportunities are limited, guidance word messages consisting of route numbers or abbreviated destination names e.g. "JHB" or "DBN" may be used to advantage. The use of route numbers is recommended in preference to abbreviations.

4 The amount of WORD MARKINGS used at any one point should be limited to reduce the risk of creating a skid hazard. The message should be as concise as possible. If a multi-word message (two or three words) is used the first word in the message should be marked on the road surface first, followed by subsequent words at spacings of one to two times the marking height apart.

KERBFACE MARKING

For dimensions ref. Vol 4 page 12.1.2 to 12.1.7

COLOURS:

Black and white

GM8

7.4.8 Kerbface Marking

1 KERBFACE guidance marking GM8 may be used to indicate to road users ***the presence of kerbing on the kerb line of a roadway.*** Use of the marking is OPTIONAL.

2 In terms of practical economic, aesthetic and design considerations **it is not required nor recommended that all kerbing be marked with KERBFACE marking GM8.**

3 KERBFACE marking GM8 shall comprise alternating sections of black and white painted kerbing. The lengths of the black and white sections should be equal, and in the range of 600 mm to 1 000 mm.

4 KERBFACE marking GM8 can be used to improve conspicuity and therefore the visual impact of a section of kerbing which has been placed to a greater or lesser degree in the path of on-coming traffic (the marking of kerbing within dual carriageway junctions should be undertaken with care since it is possible for different sections of kerbing to blend into each other, possibly resulting in confusion as to the layout of the junction).

5 Experience has shown that the paint used on kerbfaces needs to be to a road marking paint specification for durability. To ensure the effectiveness of the marking under adverse conditions or at night it is recommended that retroreflective white paint be used.

7.5 ROADSTUDS

7.5.1 Introduction

1 ROADSTUDS may be used to supplement road markings more especially in situations where the road markings are subject to conditions of poor or limited visibility.

2 The greater height of a roadstud above the road surface and the incorporation of retroreflective lenses, which efficiently reflect vehicle headlamp beams over considerable distances, can improve the guidance normally given by road markings, under conditions where these become ineffective.

3 This section covers the manner in which roadstuds may be used and situations in which they are not recommended. Details are given of typical situations where the use of roadstuds may be beneficial. A road authority may, however, adopt a policy to use road-studs universally on a particular class of road or on all roads within its jurisdiction.

4 It is recommended that only roadstuds which comply with the requirements of the South African Standard Specification SABS 1442-1987, *Roadstuds* or similar, be used.

7.5.2 Colour Coding

1 It is essential that the meaning imparted by roadstuds and the guidance given by them is consistent and predictable. Only three colours of roadstud may be used to supplement road markings. The meanings intended to be conveyed by these three colours, in conjunction with the relevant road markings are:

(a) RED shall mean PROHIBITION;
(b) YELLOW shall mean WARNING;
(c) WHITE shall offer GUIDANCE.

2 The colours permitted, and their functions, are:

(a) RED:

(i) to supplement any road marking to indicate potential "wrong-way" driving situations;

(ii) in conjunction with a white NO CROSSING line marking RM2;

(iii) in conjunction with a white RIGHT EDGE LINE marking RM4.2;

(iv) in conjunction with a white NO OVERTAKING line marking RM1;

(b) YELLOW:

(i) in conjunction with yellow road markings with the exception noted in sub-paragraph 7.5.2.2(a)(i);

(c) WHITE (or clear):

(i) in conjunction with white road markings with the exception noted in sub-paragraph 7.5.2.2(a)(i).

3 Roadstuds may be omnidirectional, uni-directional or bi-directional. Omnidirectional class roadstuds are available in white (clear) and may be specified for white roadstud applications where a uni- or bi-directional requirement is not specifically required. Uni-directional roadstuds may be specified for use in white, yellow or red. Bi-directional roadstuds may be specified as:

(a) white/white;
(b) white/red;
(c) yellow/yellow;
(d) yellow/red;
(e) red/red.

7.5.3 Uses of Roadstuds

1 It is recommended that ROADSTUDS be considered for use to supplement any of the following types of road marking when any of the conditions listed in paragraph 7.5.3.2 exist separately or in combination:

(a) NO OVERTAKING LINE RM1;
(b) NO CROSSING LINE RM2;
(c) CHANNELISING LINE RM3;
(d) LEFT EDGE LINE RM4.1;
(e) RIGHT EDGE LINE RM4.2;
(f) PAINTED ISLANDS RM5;
(g) CONTINUITY LINE WM2;
(h) DIVIDING LINE WM3;
(i) REVERSIBLE LANE WM4;
(j) ARRESTOR BED AHEAD WM9;
(k) LANE LINE GM1.

2 When the following conditions occur either separately or in combination the use of roadstuds may be warranted:

(a) regular occurrence of mist, fog or rain resulting in:

(i) significantly reduced visibility;

(ii) reduced performance of conventional road markings due to standing water;

(b) heavy traffic volumes resulting in:

(i) poor visibility due to glare from the head lamps of oncoming vehicles;
(ii) restricted forward vision due to traffic density and resulting close following distances;

(iii) rapid wear of conventional road markings;

(c) isolated low standard road design resulting from:

(i) changing vertical and/or horizontal alignment;

(ii) reduced carriageway width or lateral clearance to street furniture;

(iii) a speed limit set well below the general limit for the class of road, or an advisory speed displayed which is much lower (>20%) than the general speed limit;

(iv) poor surface water drainage;

(d) hazardous sites, with documented accident records, involving:

(i) T-junctions;

(ii) wrong-way travel;

(iii) complex lane layouts;

(iv) sharp curves;

(v) at grade railway crossings;

(e) roadworks sites of significant time duration to demarcate:

(i) temporary road alignments;

(ii) temporary lane arrangements;

(iii) rapid lane indication after resurfacing;

(f) on all freeways (both Class A1 and Class A2).

3 The use of roadstuds is generally NOT recommended where:

(a) cyclists may be affected;
(b) traffic speeds are low;
(c) street lighting is of a sufficient standard to ensure adequate night-time visibility;
(d) road resurfacing is planned in the near future;
(e) specifically across the exit point to freeway off-ramps and the entry point of freeway on-ramps and any other similar situation where traffic leaves or joins a major roadway in a free-flowing or merging manner.

4 The requirement in paragraph 7.5.3.3(e) will have the effect that roadstuds will not commonly be used with certain applications of CONTINUITY LINE marking WM2.

7.5.4 Temporary Roadstuds

1 Temporary roadstuds may be specified for use at major roadworks sites, particularly at temporary changes in road alignment.

2 A limited number of temporary roadstud designs have been produced which conform to the requirements that they should be inexpensive (therefore expendable and not re-used), and quick, easy and inexpensive to apply and reasonably durable in heavy traffic conditions.

3 A white or yellow temporary roadstud which can com- ply with these performance parameters may be considered for use at very close spacings to simulate a road marking line.

7.5.5 Longitudinal Spacing and Lateral Position

1 When roadstuds are specified for use they should be spaced longitudinally in accordance with the recommendations in Table 7.8. The descriptions "Normal", "Intermediate" and "Abnormal" given in Table 7.8 are general terms intended to offer a limited grading of the severity of conditions which may warrant the use of roadstuds with road markings. The actual level of severity of condition to which individual road authorities relate these terms is subject to their specific policies on the use of roadstuds.

2 In addition to the requirements of Table 7.8 roadstuds shall be spaced so that there are at no time fewer than three roadstuds visible to a driver to define each specific longitudinal line. This may result in a need to upgrade the spacing category from "Normal" to "Intermediate", or "Intermediate" to "Abnormal".

3 On multi-lane roads all roadstuds on parallel longitudinal lines should be spaced to fall on common cross-sections. It is preferable to design the roadstud placement for complex areas first.

4 The spacings of multiple line markings such as NO OVERTAKING LINES RM1 with DIVIDING LINE WM3, and NO CROSSING LINES RM2, should be such that, if a roadstud is to be placed between two parallel lines, there should be a minimum of 150 mm between the lines to allow a minimum side clearance between line and roadstud of 25 mm.

5 Other roadstud applications with continuous lines require the roadstud to be placed to the side of a line using a preferred separation of 50 mm and a minimum separation of 25 mm. Wherever possible the roadstud should be placed on the side of a line outside the travelled way.

6 Where roadstuds are specified with the single continuous longitudinal line markings such as a CHANNELIS- ING LINE RM3, or a single NO OVERTAKING LINE RM1, they should be placed on the road surface prior to marking. They may then be masked to avoid over-painting

7 When a longitudinal marking is more than 200 mm wide it is recommended that two roadstuds of the appropriate colour be placed side by side and at recommended longitudinal spacings. It is also recommended that in such applications "Intermediate" or "Abnormal" spacings are used. Examples of such markings/double stud applications are 300 mm wide CHANNELISING LINES RM3 and EXTRA DENSITY CONTINUITY LINES WM2.

8 A limited range of roadstud and line road marking combinations is given in Figures 7.9 to 7.11. These figures show all roadstuds as bi-directional. Such a specification is optional in certain respects.

Uni-directional or Omnidirectional roadstuds may be specified as follows:

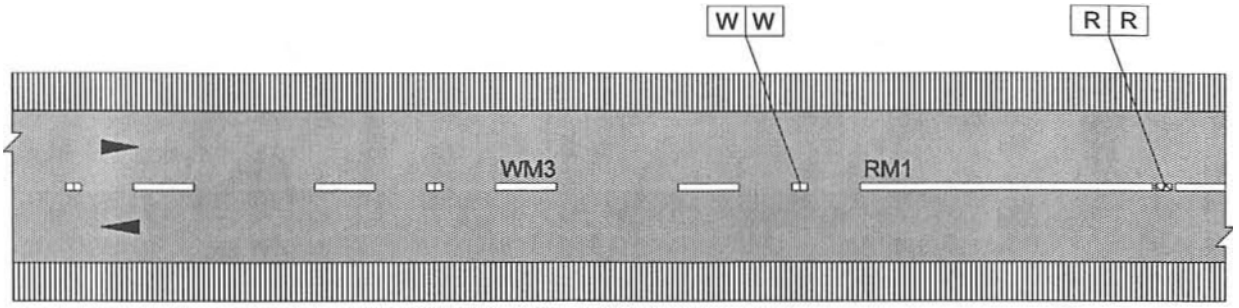
(a) on a one-way roadway all roadstuds may be uni-directional;
(b) on an undivided multi-lane roadway with more than three lanes the roadstuds used with lane line marking may be uni-directional or omnidirectional and those used with edge line markings may be uni-directional.

As a result of these options designers should check the policies of any authority for which they undertake work to determine the specific requirements of the authority.

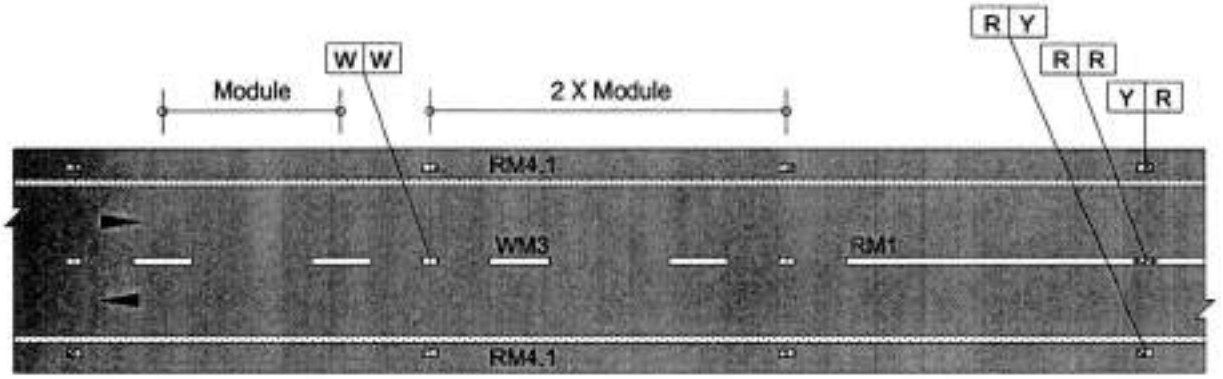
A wider range of roadstud applications is covered in Volume 2, Chapter 2.

TABLE 7.8. RECOMMENDED LONGITUDINAL ROADSTUD SPACING TABLE 7.8.

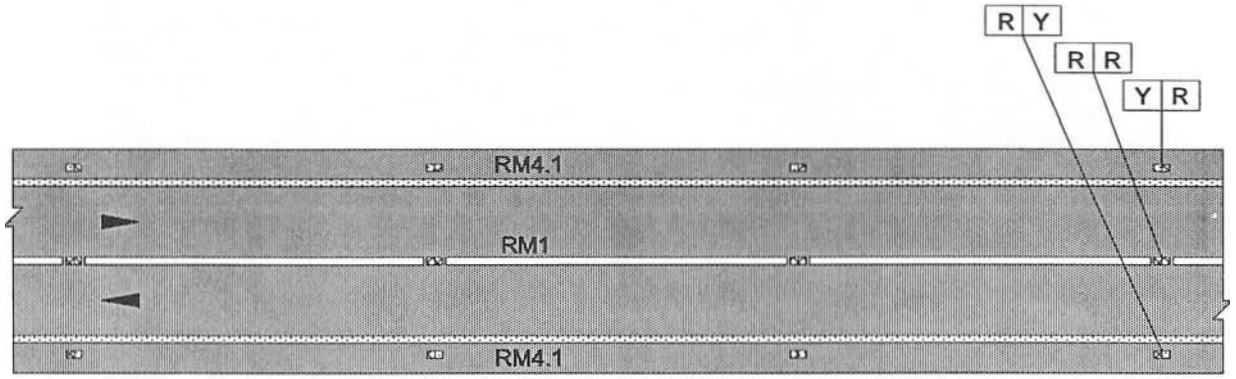
	Normal (m - c/c)	Intermediate (m- c/c)	Abnormal (m - c/c)
Rural	24	12	6
Urban	18	9	3
Temporary	12	6	3 down to 1



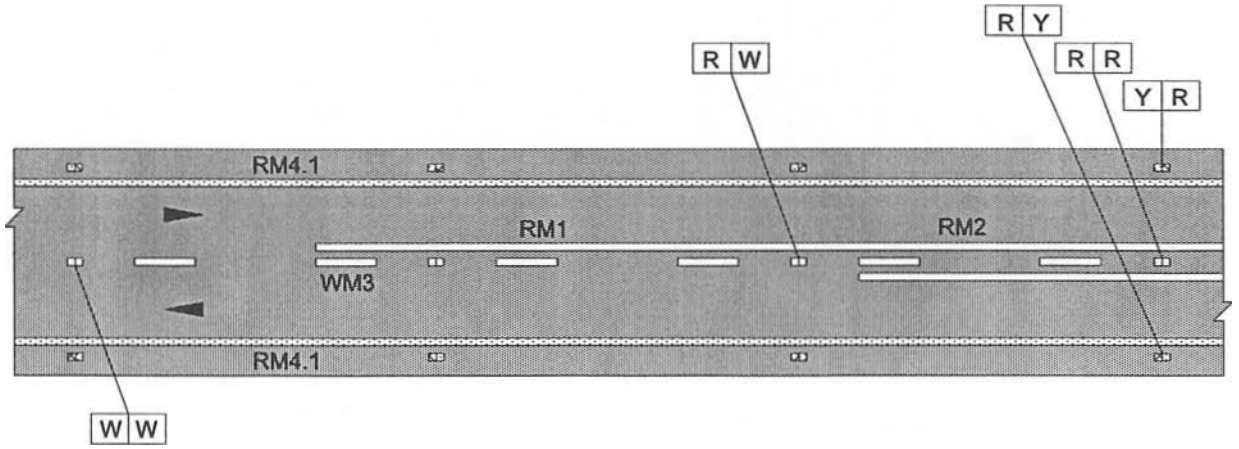
Detail 7.9.1 2 Lane/2 Way - No Surfaced Shoulders



Detail 7.9.2 2 Lane/2 Way - With Surfaced Shoulders

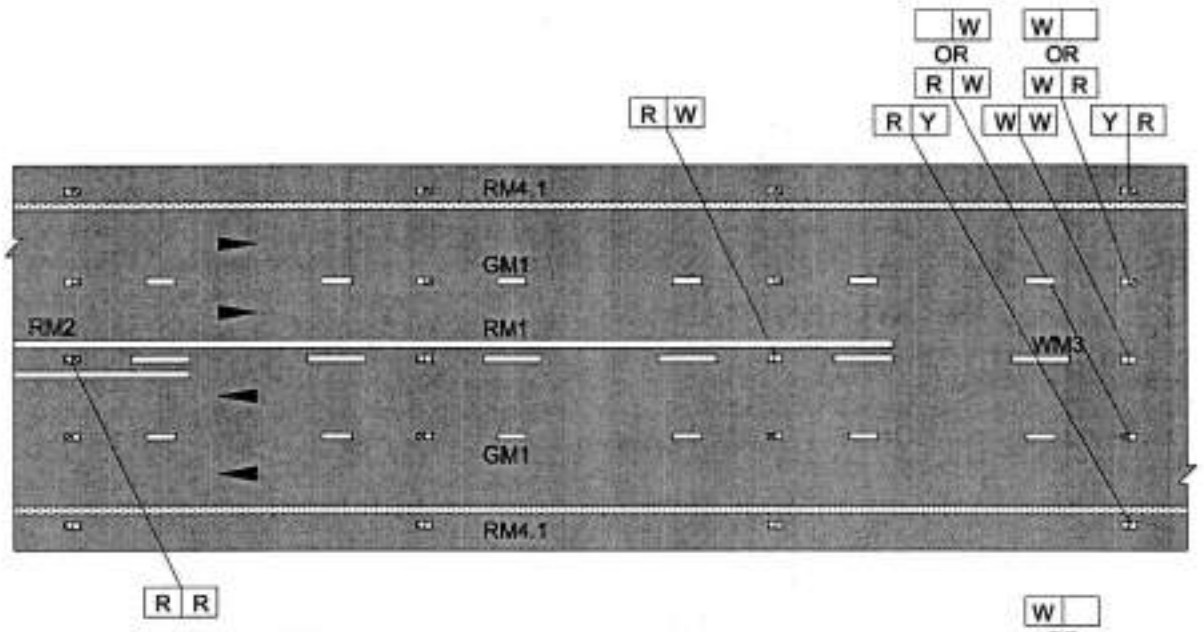


Detail 7.9.3 2 Lane/2 Way- No Overtaking Line

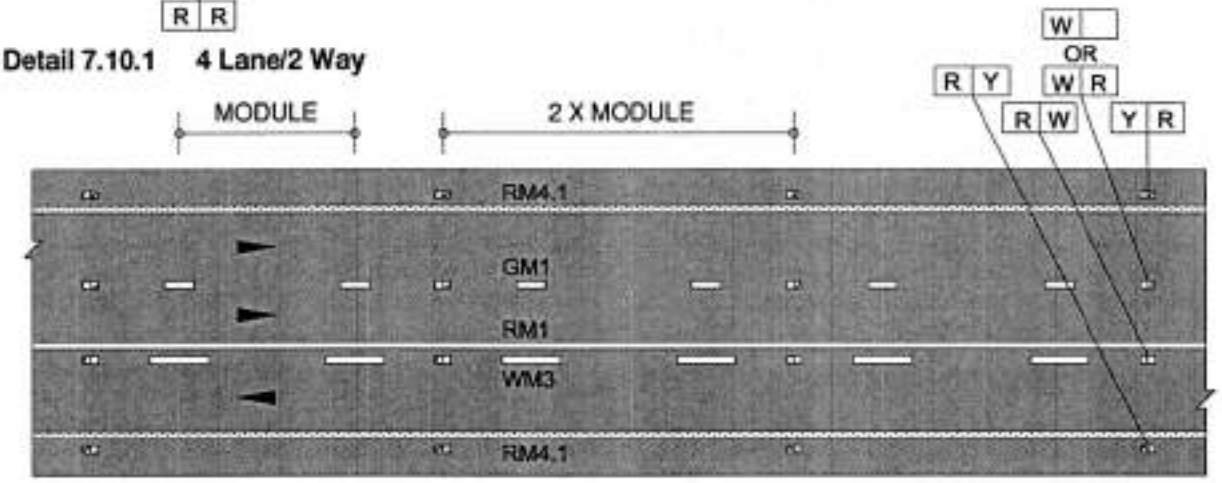


Detail 7.9.4 2 Lane/2 Way- No Overtaking/No Crossing Lines

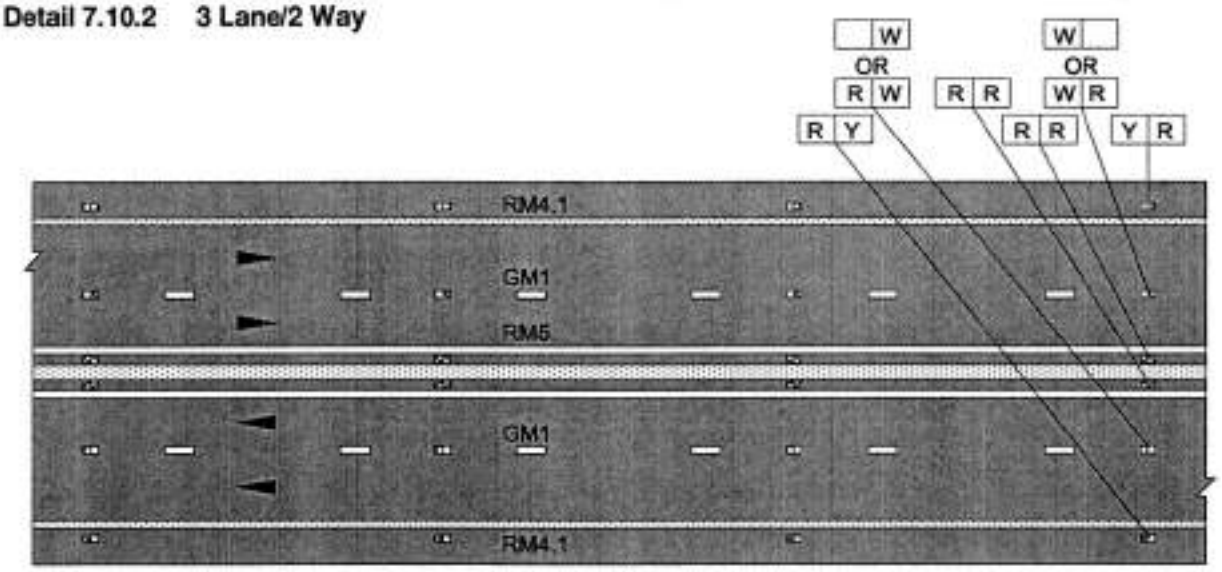
Fig. 7.9 Typical Roadstud Use on Two-way Roadways



Detail 7.10.1 4 Lane/2 Way

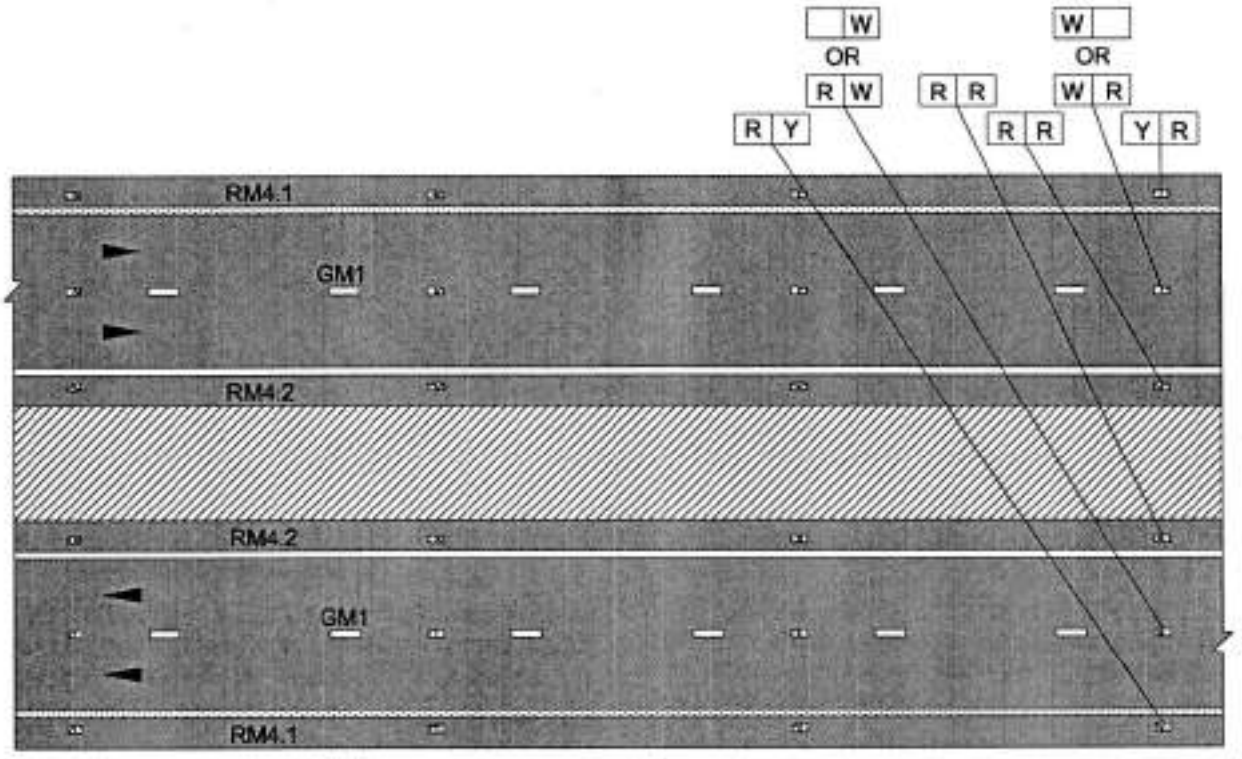


Detail 7.10.2 3 Lane/2 Way

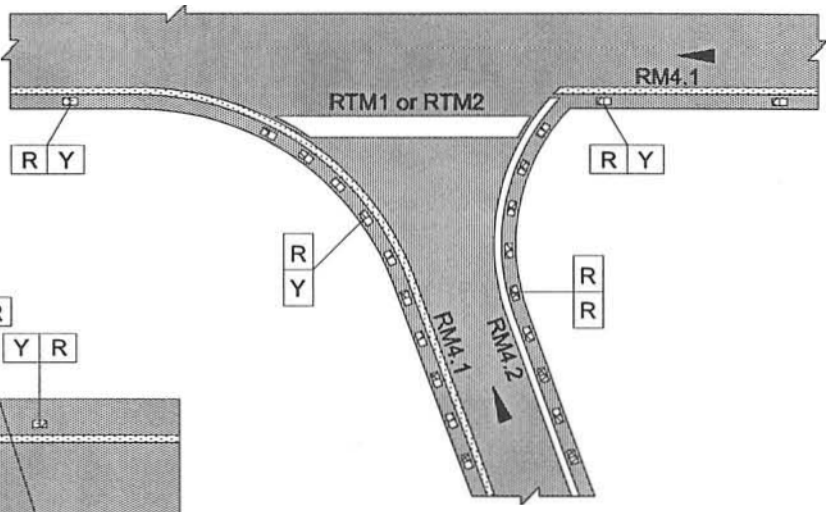


Detail 7.10.3 4 Lane/2 Way with Painted Island

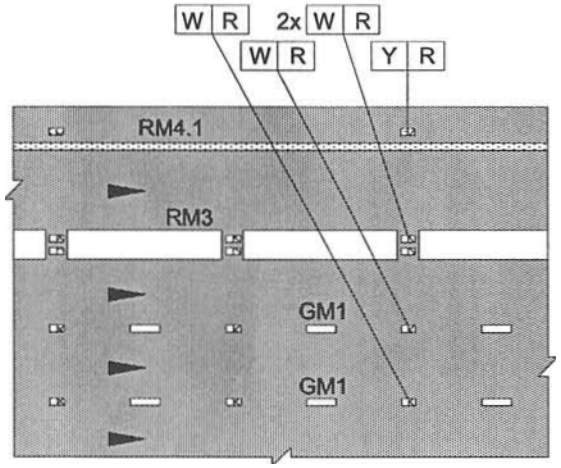
Fig.7.10 Typical Roadstud Use on 2 Way Multiple-Lane Roadways with Dividing Lines



Detail7.11.1 Typical Cross-Section Layout



Detail 7.11.2 Treatment at Off-Ramp Terminal Junction



Detail 7.11.3 Treatment at Dedicated Exit Lane (Channelising Line over 200 mm Wide)

Fig.7.11 Typical Roadstud Use on Freeway Carriageways

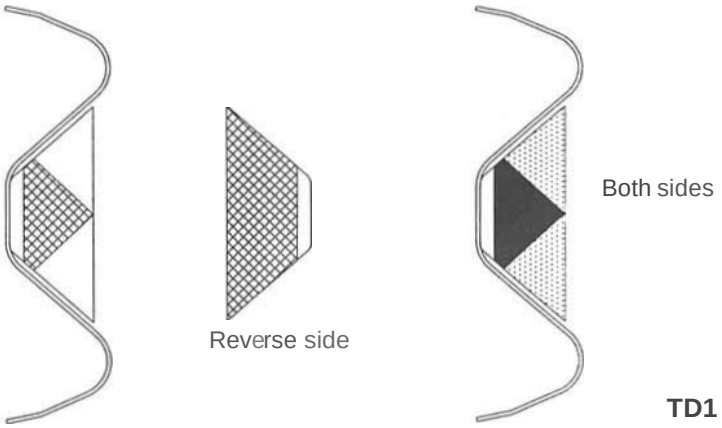
GUARDRAIL DELINEATORS

COLOURS:

PERMANENT
Red retroreflective on white retroreflective

TEMPORARY
Black semi-matt on yellow retroreflective

For dimensions ref. Vol 4 page 12.6.1



D1 **TD1**

7.6.1 Guardrail Delineators

1 GUARDRAIL DELINEATORS D1 are retroreflective devices used ***to warn road users of a barrier guardrail*** (see Chapter 10 for the definition of a barrier).

2 GUARDRAIL DELINEATORS shall be attached securely to W-section, or similar, barriers within the recessed section at a maximum spacing of four standard 7.62 m guardrail sections. The retroreflective area of each face shall be a maximum of 70 cm^2 . The use of higher than Class 1 grade retroreflective material may be considered, particularly in areas subject to regular poor visibility conditions.

3 The "wrong" side of all permanent GUARDRAIL DELINEATORS shall be covered with red retroreflective material to discourage the possibility of wrong-way travel (see Subsection 7.5.2).

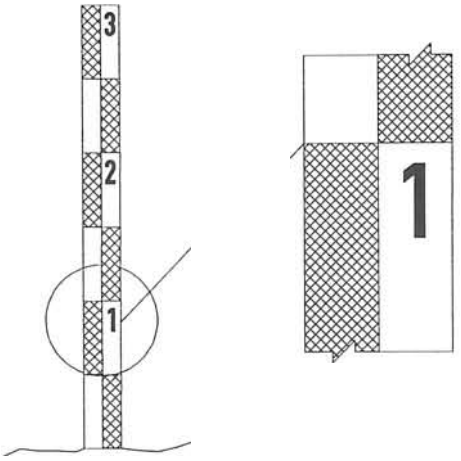
4 TemporaryGUARDRAILDELINEATORSTD1 shall be double-sided and black and yellow in colour. The maximum spacing shall be reduced to two standard7,62 m guardrail sections.

5 A barricade which is not capable of withstanding vehicle impact, but which may have the general appearance of a barrier, shall be provided with GUARDRAIL DELINEATORS D1 or TD1.

6 If a concrete "New Jersey" style barrier is to be used, either temporarily or permanently, it is recommended that such barriers be provided with GUARDRAIL DELINEATORS D1 or TD1. A recess capable of wholly containing the delineator within the vertical projection of the lower edge of the barrier should be provided.

FLOOD or SNOW DELINEATORS

For dimensions ref. Vol4 Not Applicable



D2

COLOURS"

Red and white retroreflective with black semi-matt numerals

7.6.2 Flood or Snow Delineators

1 FLOOD or SNOW DELINEATORSb2 are retroreflective devices used ***to warn drivers that the road ahead is submerged by floodwater or snow drifts to an extent that it may be hazardous for drivers to proceed.***

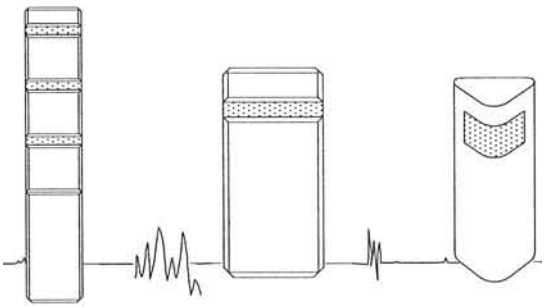
2 FLOOD or SNOW DELINEATORS may comprise a vertical post with a minimum width of flat surface of 150 mm facing traffic in both directions. The flat surface may be covered in red and white retroreflective materials in a chequer-board pattern of 500 mm intervals. The height of the delineator should be a minimum of 3 m, and each metre should be marked in a white panel by a black semi-matt numeral.

3 Use of FLOOD or SNOW DELINEATORS is particularly appropriate to long shallow valleys where a high level bridge has not been provided and where, in the event of flooding, the extent of the flooding may be difficult to judge. The delineation devices may also be useful in mountain passes to indicate the extent of snow falls and the alignment of the roadway ahead.

4 FLOOD or SNOW DELINEATORS should be spaced approximately 50 m to 200 m apart, on both sides of the roadway, located outside the shoulder break point. They should be placed so that the vertical and horizontal profile of the road is accurately delineated. They should be well founded to resist water flow but in such a way that if the roadway is washed away they will also fail.

SHOULDER DELINEATORS

For dimensions ref. Vol4 Not Applicable



D3

COLOURS"

Black and white or natural colour with yellow retroreflective panel(s)

7.6.3 Shoulder Delineators

1 SHOULDER DELINEATORS D3 are devices used ***to indicate to drivers the alignment of roads, and in particular the limits of gravel shoulders around curves.***

2 There is no prescribed shape or size for such devices. It is recommended that they be light in colour. A minimum area of 800 cm^2 facing in each direction is recommended, with a recess in each side in which yellow retroreflective material with a minimum area of 50 cm^2 may be placed

3 Spacings of 50 m on curves between 300 m and 100 m radius, and 100 m on straights and curves over 1 000 m radius are recommended. If smaller radius curves are used spacings should be reduced to those given in Table 3.5 for signs W405 and W406 (see Subsection 3.5.3).

4 SHOULDER DELINEATORS should be located on both sides of the roadway 0,3 m outside the shoulder break-point.

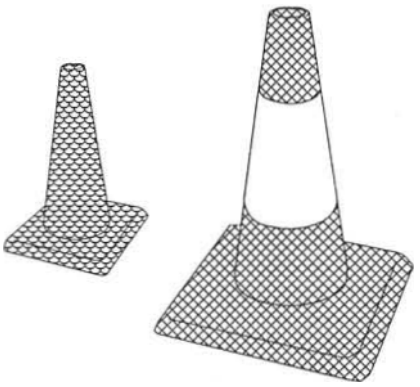
5 Distances or road maintenance information may be included on such devices.

6 SHOULDER DELINEATORS are not a substitute for DANGER PLATES W401 or W402, or SHARP CURVE CHEVRONS W405 or W406. If either of these types of hazard markers are used then shoulder delineators become superfluous.

TRAFFIC CONES

COLOURS:

Red-orange with white or yellow retroreflective sleeve



For dimensions ref. Vo/4
Not Applicable

TD4

7.6.4 Traffic Cones

1 TRAFFIC CONES TD4 are portable temporary devices used ***to indicate to drivers a temporary shift in alignment around a localised work area, an accident site or a roadblock.***

2 TRAFFIC CONES shall have a minimum height of 450 mm in urban areas and 600 mm on high speed roads. A height of 750 mm or more is preferred for all longer term high speed road applications other than when used by accident response units.

3 TRAFFIC CONES should not be used for applications lasting more than 8-10 hours and preferably not on an overnight basis. DELINEATOR PLATES IW401 and IW402, should be used for applications lasting more than 8-10 hours and/or overnight.

4 If traffic cones are used for short periods at night-time they should have at least half of the cone surface covered with a white or yellow retroreflective material. This may be achieved by the use of removable sleeves of retroreflective material. The normal colour for TRAFFIC CONES is a fluorescent red-orange. However, under certain types of street lighting, an all yellow or white cone can be more effective. A light road surface colour may require that the base of a white cone is black or some other dark contrasting colour.

5 The cone base should be NON-CIRCULAR for stability. The cone design should be such that the weight in the base prevents them from being blown over by passing vehicles. Recommended nominal base diameters are 250 mm (for 450 mm height) and 400 mm (for 750 mm height) with proportional dimensions for other sizes.

6 Since traffic cones are intended to be used for easy and rapid deployment they should be stackable for compact storage but still be designed for easy separation.

7 Traffic cones should never be placed on the roadway without appropriate advance temporary signs. Cones should be under constant supervision so that if knocked over or moved they can be replaced in their correct position.

7.7 NATIONAL VARIANTS

7.7.1 General

1 Whilst the objective of the SADC Road Traffic Sign System is to achieve the highest possible degree of harmonization of the system throughout the region it is likely that there will be a number of details which will remain unique to individual member countries.

2 For the purposes of identification any such road markings are considered as NATIONAL VARIANTS specific to one or more of the SADC member countries. Variants can occur in one of three ways, namely:

(a) as an ADDITIONAL variant using a modified or different symbol for a road marking function used in most member countries; or

(b) as a UNIQUE variant where the road marking is used in only one country; or

(c) as an ADDITIONAL variant to accommodate the language of a SADC member country which does not have English as an official language (at the time of publishing such variations apply to the use of Portuguese in Angola and Mozambique, although every effort has been made to minimise this need by the use of symbolic messages).

3 All road markings are listed once in colour in the Contents section and are provided with text describing their meaning and function. Any additional National variants involving a modified or different symbol will be identified pictorially in the National Variants section. Any National Variants which are unique to one country will appear in the National Variants section complete with appropriate text.

4 All road markings are allocated numbers. An additional variant is allocated a three letter suffix identifying the country to which it belongs. In the case of a unique variant such a road marking will be allocated a unique number which includes the appropriate National three letter suffix. If the road marking becomes more widely used the use of the suffix will be discontinued. The letter codes allocated for each member country are as follows:

(a) Angola	Ang;
(b) Botswana	Bot;
(c) Democratic Republic of Congo	DRC;
(d) Lesotho	Les;
(e) Malawi	Mal:
(f) Mauritius	Mau;
(g) Mozambique	Moz;
(h) Namibia	Nam;
(i) Seychelles	Sey;
(j) South Africa	RSA;
(k) Swaziland	Swa;
(l) Tanzania	Tan;
(m) Zambia	Zam;
(n) Zimbabwe	Zim.

5 When National Variants occur they will be covered in Subsections of this Section, bearing the name of the country. All National Variants are identified in the Contents by a black dot thus - ●. The purpose in identifying variants is to assist education on road traffic signs within the region for travellers beyond National borders, and to assist road marking contractors and road authorities.

6 Road markings are much more generic than road signs and there are very limited requirements for National Variants.

7.7.2 Angola

1 Due to the fact that traffic travels on the right side of the roadway in Angola certain road markings are used in what amounts to a mirror image application of those used in other member countries. Most of these, such as STOP LINE marking RTM1, and YIELD LINE marking RTM2, are so obvious that they are not identified here as specific National Variants.

2 Two specific markings are illustrated in Figure 7.23 to ensure their correct application. These markings are:

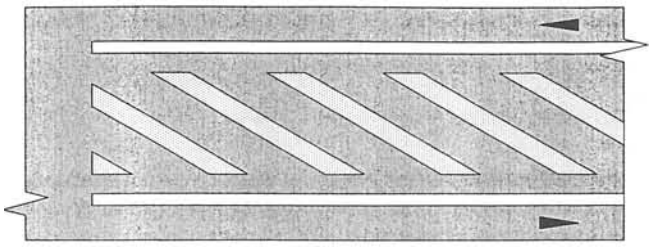
(a) PAINTED ISLAND regulatory marking RM5-Ang;

(b) TRAFFIC CIRCLE MANDATORY DIRECTION ARROWS regulatory marking RM15-Ang.

These two markings are in fact also mirror images of the markings illustrated in Section 7.0 but are shown in Figure 7.23 because of their particular safety aspects with regard to direction of travel.

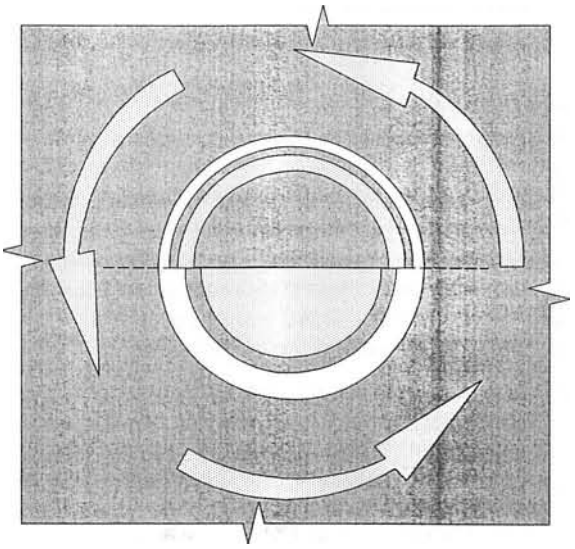
7.7.3 Angola and Mozambique

1 Since English is not an official language in Angola and Mozambique the application of Portuguese WORD MARKING guidance markings GMB is likely.



RM5-Ang

Refer: 7.2.9 page 7.2.15



RM15·Ang

Refer: 7.2.19 page 7.2.29

Fig 7.12 Road Markings with Reversed Elements - ANGOLA