SECTION 1

INTRODUCTION

June 2009

CONTENTS

CONTENTS (continued)

(This page is intentionally blank)

1. INTRODUCTION

1.1 GENERAL

Part 3 of the Manual of Traffic Signs and Markings (MOTSAM) sets out the requirements for regulatory, warning, guide and information signs on New Zealand motorways and expressways. A list of the signs currently covered by this part of MOTSAM is included in Appendix A.

1.1.1 MOTORWAYS

A motorway is a defined class of road for which certain activities or uses are restricted or prohibited by legislative provision. They are normally divided roads that mainly carry through traffic, access is fully controlled and intersections are generally grade separated. There are two types of motorway, **Urban** and **Rural**:

(a) Urban Motorways

Urban motorways are located in:

- inner urban areas where land costs are high and the general development consists of multi-storey buildings and factories; and
- suburban areas where the land cost is lower and single storey housing development predominates.

Urban motorways are generally characterised by having:

- carriageways with two or more lanes;
- high traffic volumes;
- closely spaced and/or heavily trafficked interchanges;
- street lighting;
- several interchanges serving an urban area; and
- a loop, circumferential or spur route that serves a large urban area.

Motorways in outer metropolitan areas, i.e. areas that do not have full urban development, should normally be considered as rural motorways.

(b) Rural Motorways

Rural motorways are normally located in open country that is:

- sparsely settled or uninhabited; and
- has mainly pastoral, agricultural and/or horticultural activities.

1.1.2 EXPRESSWAYS

An expressway is a road that mainly carries through traffic, usually has a dual carriageway, has full or partial control of access and its intersections may be at grade or grade separated.

NOTES:

1. ***The general principles of Guide, Motorist Service and Tourist signing are covered in MOTSAM Part I: Traffic Signs, Sections 7, 8 and 9.***
2. ***Motorist Service information is not normally shown on guide signs.***
3. ***Tourist information may, under certain conditions, be shown on/combined with guide signing.***
4. ***Except where they interfere with signing for interchanges or other equally critical points, miscellaneous signs of a format approved by the road controlling authority may be erected on motorways and expressways, e.g. "Welcome to __" signs. The full cost of manufacture and installation of such signs shall be borne by the relevant territorial local authority requesting the signs.***
5. ***The general principles of colour, shape, size of letters and letter spacing for guide signs are described in MOTSAM Part I: Traffic Signs, Section 7: Guide Signs. These principles are expanded for motorway and expressway guide signs in this section of the manual.***
6. ***The signs within this manual have been prepared in AutoCAD using the relevant alphabet letter and stroke widths and letter spacings detailed in MOTSAM Part 1, Traffic Signs, Appendix A1, Standard Alphabets.***
7. ***The dimensioned signs shown in this document have been designed for the specific locations to which they refer by applying the sign design principles within this document. Each motorway and expressway sign will normally need to be specifically designed for its particular location.***

1.2 MOTORWAY AND EXPRESSWAY SIGNING PRINCIPLES

Guide signing is a critical element in the effective, efficient and safe operation of motorways and expressways. Signing issues must, therefore, be fully considered at the feasibility stage of any project and the principle *'if you can't sign it, don't build it'* must be applied in all situations.

It is not possible, however, to sign every destination to which road users may want to travel. The basic assumptions made for guiding travellers through any roading system are that they will:

- do some preparation to determine the route to be followed before commencing a journey; and
- use a road map while travelling.

Motorways and expressway signs are primarily for the benefit and direction of drivers who are not familiar with the route or area. Therefore, they must:

- command attention;
- have a consistent appearance;
- be located in positions that give adequate times for drivers to respond safely to their messages, particularly where unusual manoeuvres are required;
- contain clear and simple messages in the same terms as information available from other sources; and
- achieve continuity throughout a route.

Where the information contained in this manual does not cover a particular motorway or expressway guide signing situation two other reference documents may be used to help resolve the problem. These, in order of preference, are:

1. The US Department of Transportation, Federal Highway Administration, *Manual of Uniform Traffic Control Devices* (MUTCD) as it applies to Expressway and Freeway signing.
2. The Australian Standard AS 1742.8 *Manual of Uniform Traffic Control Devices Part 8: Freeways*.

1.3 SIGN COLOURS

1.3.1 REGULATORY AND PERMANENT WARNING SIGNS

The colours for these signs are specified in MOTSAM Part I: *Traffic Signs*.

1.3.2 GUIDE SIGNS

All guide signs on motorways and expressways shall have white legends and borders on standard green backgrounds. Where an 'EXIT ONLY' panel is used on these signs it shall have a black legend on a yellow background and be positioned immediately below the green guide sign panel. A dividing line shall not be used between the panels.

Off-ramp guide signs should have white legends and borders on standard green backgrounds but the colour scheme adopted by the local road controlling authority for guide signing on their roads may also be used if desired.

Guide signs on local authority road approaches to ramp terminal intersections shall have the colour scheme used by the road controlling authority for their guide signing, except that the panels on the signs showing directions to motorway or expressway entrances shall have white legends and borders on standard green background.

1.3.3 MOTORIST SERVICE SIGNS

All motorist service signs shall have white symbols and legends on blue backgrounds.

1.3.4 TOURIST SIGNS

All tourist signs shall have white legends on brown backgrounds.

1.3.5 TOLL ROAD SIGNS

Signs identifying toll roads, outlining toll charges and payment facilities, and directly relating to the tolling facility shall have yellow legends and borders on blue backgrounds. Where the identification of any of the former is by way of an inset panel into a motorway or expressway guide sign then the inset panel shall not have a border.

1.3.6 BACK OF SIGN PANEL COLOUR

The backs of all sign panels shall be finished in a semi-gloss aircraft grey colour (colour standard Pantone PMS 431) by a process that conforms to the Road Safety Manufacturers Association (RSMA) *Compliance Standard for Traffic Signs*.

1.4 REFLECTORISATION AND ILLUMINATION

1.4.1 GENERAL

All motorway and expressway signs shall be fully reflectorised.

Because the photometric performance of red, green, brown and blue reflectorised materials is much lower than that of white and yellow it is important to ensure that each colour component of each sign has the same retroreflectorised performance or Class.

Signs with black lettering on highly reflective white, yellow, fluorescent yellow and fluorescent yellow green backgrounds can become illegible to some motorists because of overglow problems. Therefore only Series E and Modified Series E lettering should be used for black legend on any of these reflectorised backgrounds.

Four classes of retroreflective sign face material are defined in the Australian and New Zealand *combined retroreflective sheeting standard AS/NZS 1906.1:2007*. These are Classes 1, 1W, 2 and 2A. Only Class 1 and Class 1W materials shall be used on motorway and expressway signs. (Class 1A was withdrawn from the sign standard in 2007.)

The main features of these materials, together with suggestions as to when and where they should be used, are summarised in the following sections.

1.4.2 CLASS 1 MATERIAL:

Class 1, or “High Intensity”, material provides a high level of photometric performance and durability. Historically manufactured using glass beads encapsulated in a series of cells, High Intensity retroreflective materials are now more likely to be manufactured using a minute corner cube prismatic technology.

Although these sheetings can be tinted to match all the AS/NZS 1906.1:2007 specified colours, signs are more likely to be tinted to the required colours using either a screen printing ink or an electronically cuttable colour overlay film (EC Film).

Standard Class 1 materials generally give a satisfactory performance for many road sign purposes but can be less than satisfactory on multilaned motorways and expressways where an approaching vehicle can be several lanes away from a left shoulder ground mounted sign. Additionally the Standard Class 1 High Intensity photometrics do not provide a performance suitable for use on overhead signs.

Standard Class 1 materials can be used for ramp signs that are not regulatory RG sign series e.g. MI-33 ‘Motorway’ signs.

1.4.3 CLASS 1W MATERIAL:

This is a new class of retroreflective material added to the revised 2007 edition of AS/NZS 1906.1:2007.

Manufactured using minute corner cube prismatic technology the AS/NZS Standard defines Class 1W as “tending towards the option of a wider observation angle so that a roadside or overhead sign laterally or vertically displaced by an appreciable amount from the observer's path of travel can still be satisfactorily read by retroreflected light at close viewing distances”.

When used for signage on motorways and expressways the photometrics for class 1W must comply with the photometrics specified in the American Society for Testing and Materials ASTM D4956 for Type IX materials.

It is this Class of reflectorised material that includes the fluorescent colours.

The use of Class 1W materials must be considered when more effective performance is required, such as:

- All overhead guide signs where the need for floodlighting signs has been eliminated.
- All ground mounted guide signs, tourist signs and motorist service signs where the lateral side displacement of the sign could be greater than one lane.
- All regulatory signs in the RG series.
- All warning signs in the PW series.

The use of fluorescent yellow can be considered when more effective signing is required in special circumstances.

Signs using Class 1W materials can be visible from long distances but their legends are often illegible because of overglow problems. The legibility of signs with dark coloured text on light coloured reflective backgrounds may be improved if Modified Series E lettering with a stroke width increased by about 15% is used.

1.5 SIGN SIZE, SHAPE AND LAYOUT

1.5.1 GENERAL

On motorways and expressways the sizes of regulatory and permanent warning signs shall be the largest specified for those signs.

On ramps and local roads the sizes of regulatory and permanent warning signs should be determined by the operating speed of the road.

Guide, motorist service, tourist and general information signs should be individually designed to suit specific traffic and site conditions with sign size determined by:

- route marker, cardinal direction and route name requirements;
- the amount of worded legend to be shown, at the appropriate lettering size and style, plus any associated direction arrow(s);
- any traffic instruction(s) necessary;
- the need to provide inset panel(s);
- the provision of lane assignment arrows;
- any extra clearances between the various components of the sign necessary to give a visually pleasing layout;
- top/bottom/side spacings; and
- border width.

Sign legends should be visually centred unless some special effect, e.g. a directional bias, is required.

The overall dimensions of a sign may be reduced/increased to fit a standard sign blank, when necessary, by reducing/increasing:

- the space between the top of the upper line of legend and the top border and the lower line of legend/traffic instruction and the bottom sign border by equal amounts; and/or
- both left and right edge spaces by equal amounts.

1.5.2 SHAPE

Guide, motorist service, tourist and general information signs should generally be rectangular in shape with their long axis horizontal and have all corners rounded.

Sign corner radii for ground mounted signs should be approximately: 0·125 times the smallest dimension of the sign, with a maximum of 150 mm, unless otherwise specified.

For aesthetic and appearance reasons all overhead gantry mounted signs, except supplementary exit number plates, shall have a common 150 mm corner radius. Overhead gantry mounted supplementary exit number plates shall have 100 mm corner radii.

Support framing or edge stiffening shall not extend beyond the outline of a sign, including the rounded corners.

1.5.3 LAYOUT

Signs should conform to the typical layouts illustrated in this manual and, unless specified otherwise, the following general layout rules applied:

(a) Border Width

The border width for all overhead guide signs shall be consistent at 50 mm. The border width for all other signs should be approximately the stroke width of the largest letters used on the sign, rounded to the nearest 5 mm but not greater than 50 mm.

The requirements of MOTSAM Part 1: *Traffic Signs* shall apply to the border width for ramp terminal guide signs except for large diagrammatic guide signs which shall have a border width of 50 mm.

(b) Dividing Lines

A dividing line should be made approximately 0·75 times the stroke width of the largest letters used on the sign, rounded to the nearest 5 mm.

(c) Horizontal Spaces

The spacing between words, words and an arrow, a letter and an arrow, or a word and a number in a line of legend should be approximately 1·0 times the uppercase letter height used in that line.

(d) Interline Spacings

The spacing between adjacent lines of legend should be approximately 0·75, and not less than 0·50, times the uppercase letter height in those lines. The allowance for ascenders and descenders is covered in Section 4.3.1.

(e) Top and Bottom Spaces

The spacing to the top and bottom borders should be approximately 1·0, and not less than 0·5, times the uppercase letter height of the adjacent line of legend.

(f) Edge Spaces

The lateral spacing to vertical borders should be 1·0, and not less than 0·60, times the largest uppercase letter height used in the legend.

1.5.4 UNITS OF MEASUREMENT

When numerals are followed by a unit indicator, e.g. 2 km, 300 m etc, the unit shall be shown in Modified Series E lower case lettering. As a general rule the loop height of the units 'kg', 'km' and 'km/h' should be approximately 50% of the height of adjacent numerals, rounded to the nearest 5 mm. The loop height of an 'm' should be approximately 67% of the height of adjacent numerals, also rounded to the nearest 5 mm.

The spacing between a numeral and a unit indicator should be approximately 0·5 times the numeral height.

1.6 LETTERING STYLES AND SIZES

The lettering styles and minimum sizes of letters and numerals for motorway and expressway guide signs are given in TABLE 1.1 herein.

The lettering styles and minimum sizes of letters and numerals to be used for signs erected on off-ramp to ramp terminals, local road approaches to ramp terminals and on-ramps are detailed in MOTSAM Part I: *Traffic Signs*, Sections 7.1.4 (f) and 7.1.4 (g).

Lines of legend may be compressed and expanded, but only when absolutely necessary. The degree of horizontal compression or expansion shall be uniform within any letter, or numeral, or within any set of characters and shall not exceed 15% of the design base letters for:

- character width;
- stroke width; and
- spacing between characters.

Adjacent line(s) of legend on the sign should also be compressed or expanded, but to a lesser extent, to ensure the sign has a 'balanced' look. Experience has shown that compression or expansion of adjacent lines of legend of the same size and alphabet series should not exceed 5%. FIGURE 3.10 is an example of legend compression.

The principal crossroad used as the destination accessed by an exit on an urban motorway or expressway shall be shown on the guide signs in Modified Series E lower case lettering, with an initial capital.

1.7 VARIABLE MESSAGE SIGNS

Variable Message Signs (VMS) are one of the most widely used tools in Intelligent Transport Systems (ITS) and Advanced Traffic Management Systems (ATMS) in particular. The ATMS application is characterised by a high volume and frequently congested motorway environment, where VMS are commonly used to provide:

- advance warning to motorists on incidents (including crashes and non-recurrent or unusually severe congestion and queues);
- guidance on alternative routes (where necessary and available);
- information on travel times to downstream locations;
- information on unusual or hazardous driving conditions, e.g. high winds, ice, poor visibility etc;
- information on future events including major sporting/cultural events and planned road closures; and
- generic safety messages.

VMS should not compete with other existing signs or interfere with traffic control devices. The signs should be well separated from permanent static signs, to avoid sign information overload that can lead to driver confusion and safety problems. As a general rule the minimum distance between any static guide sign and a VMS shall be no less than the longitudinal separation required between static signs, refer to Section 1.18 Sign Location for more details.

VMS signing on state highways must comply with the requirements of SP/M/026R1: *Guideline and Reference Manual for New Zealand Transport Agency (NZTA) Variable Message Signs*.

1.8 RAMP SIGNAL MANAGEMENT SIGNS

Ramp signals are traffic lights at the top of motorway on-ramps that manage the flow of traffic onto the motorway during peak periods or an incident on the motorway potentially leading to break down of mainline flow. With each green light, two cars (one from each lane) are able to drive down the ramp to merge easily, one at a time, with motorway traffic.

By managing the rate at which vehicles enter the motorway, ramp signalling results in:

- more consistent and predictable travel times;
- safer merging;
- fewer accidents;
- better throughput of vehicles on the motorway; and
- more consistent speeds.

The signs associated with ramp signalling are covered in Section 2.4.3.

TABLE 1.1: STYLES AND SIZES OF LETTERS / NUMERALS FOR PERMANENT STATIC MOTORWAY AND EXPRESSWAY GUIDE SIGNS

Type of Sign	Ground Mounted		Overhead	
	Font Series	Size (mm)	Font Series	Size (mm)
A. Advance Exit and Exit Direction				
Supplementary Exit Number Plate				
Letters	E	200	E	250
Numeral and Letter Suffix	E	300	E	375
SH Route Marker				
Numeral				
1 Digit	D	300	Mod. E	300
2 Digits	D	225	Mod. E	300
Urban Route Marker				
Numeral				
1 Digit	E	270	E	300
2 Digits	C	270	C	300
Toll Road Route Marker				
Letters	C	130	C	135
Cardinal Direction				
First Letter	E	300	E	375
Rest of Letters	E	250	E	300
Destination				
Upper-Case Letters	Mod. E	300	Mod. E	400
Lower-Case Letters	Mod. E loop height	225	Mod. E loop height	300
Distance				
‘1’, ‘1·5’, ‘2’, ‘2·5’ etc	Mod. E	300	Mod E	400
‘X00’	E	250	E	300
Measurement Unit	Mod. E loop height	150	Mod. E loop height	200
Traffic Instruction	E	200	E	250

TABLE 1.1: STYLES AND SIZES OF LETTERS / NUMERALS FOR PERMANENT STATIC MOTORWAY AND EXPRESSWAY GUIDE SIGNS *(continued)*

Type of Sign	Ground Mounted		Overhead	
	Font Series	Size (mm)	Font Series	Size (mm)
B. Exit Signs				
Letters	Mod. E	300		
Numeral				
1 Digit	E	400		
2 Digits	E	400		
3 Digits	E	400		
3 Digits + Letter	E	400		
C. Pull-Through Signs				
Route Marker				
Numeral				
1 Digit			Mod. E	300
2 Digits			Mod. E	300
Cardinal Direction				
First Letter			E	375
Rest of Letters			E	300
Destination				
Upper-Case Letters			Mod. E	400
Lower-Case Letters			Mod. E loop height	300
D. Interchange Sequence Signs				
SH Route Marker				
Numeral				
1 Digit			Mod. E	300
2 Digits			Mod. E	300
Urban Route Marker				
Numeral				
1 Digit			E	300
2 Digits			C	300
Destination				
Upper-Case Letters			Mod. E	400
Lower-Case Letters			Mod. E loop height	300
Distance			E	400
E. Confirmation Signs				
SH Route Marker				
Numeral				
1 Digit	D	300		
2 Digits	D	225		
Cardinal Direction				
First Letter	D	300		
Rest of Letters	D	250		
Destination				
Upper-Case Letters	Mod. E	300		
Lower-Case Letters	Mod. E loop height	225		
Distance	E	300		
Measurement Unit	Mod. E loop height	175		
F. Supplementary Destination Signs				
Exit Number Plate				
Letters	E	200		
Numeral and Letter	E	300		
Destination				
Upper-Case Letters	Mod. E	300		
Lower-Case Letters	Mod. E loop height	225		
Distance	E	300		
Traffic Instruction	E	200		

1.9 AMOUNT OF LEGEND ON GUIDE SIGNS

1.9.1 GENERAL

The amount of legend shown on motorway and expressway guide signs must be kept to a minimum, to ensure it is instantly legible to drivers.

Advance exit and exit direction signs should show no more than two destinations. Up to three additional lines of directional information, which may include symbols, route numbers, arrows, cardinal directions, interchange number(s) and other exit instructions, may also be shown.

Interchange sequence and supplementary destination signs should show no more than three lines of directional information, which includes place names, route numbers and street names. Supplementary destination signs should include a traffic instruction on a fourth line.

Confirmation signs should show the route number, where applicable, and no more than three destination names.

1.9.2 DESTINATION AND ROUTE NAMES

The following guidelines shall be used for the selection of destination names to be shown on motorway and expressway guide signs:

(a) Rural Areas

The continuing route direction, where shown, shall be the stage destination name used for the guide signing system in that area. For state highways refer to MOTSAM Part I: *Traffic Signs*, Section 7.12 for the mandatory state highway stage and destination names.

Advance exit, exit direction and exit sign legends shall be limited to one or two destination names, normally the towns or localities immediately accessed from the exit. Where an exit is to another motorway, expressway or major rural arterial road, the name of the next city, town or significant urban area on that route may be more appropriate.

Confirmation signs must be erected beyond each entrance. Destinations shall be listed from the top of the sign in order of increasing distance and no more than three shall be displayed on a confirmation sign, i.e. the next two major destinations on the route and the stage destination name used for the guide signing system in that area.

(b) Urban Areas:

Exits from urban motorways usually provide access to an urban area(s). Exit signs should, however, only show the name of the principal crossroad accessed by the exit, rather than the name(s) of the urban area(s).

Where it is considered desirable to show the names of urban areas accessible from an exit they should be shown on a supplementary destination sign erected between the second advance exit sign and the exit direction sign.

The continuing route direction, where shown, shall be either the intermediate destination name or the stage destination name used for the guide signing system in that area. For state highways refer to MOTSAM Part I: *Traffic Signs*, Section 7.12 for the mandatory state highway stage and destination names. If applicable, intermediate destination names will be given in the relevant NZTA regional signs manual supplement.

For radial routes the stage destination should be the town or city centre in the inbound direction and a major urban area or town/city name in the outbound direction. If there is no significant urban area or town/city the stage destination for the route should be used.

Exceptions to the general urban motorway exit naming guidelines described above and subject to the limits on the amount of legend that may be shown on motorway guide signs given in Section 1.9.1, are:

- Where an exit provides access to a destination shown on previous guide signs, that destination must be shown.
- Where an exit provides access to an urban area its name may also be shown.
- Where an exit gives direct access to a city centre or to a major traffic generator such as a major sporting venue or large university, its name may also be shown.
- Where exits access roads with different names on either side of a motorway or expressway the name of the higher hierarchy road should be used as the destination name.

Interchange sequence signs may replace confirmation signs on urban motorways. These should be erected at mid points between interchanges and no more than three destination names shall be shown on them. The names shall be the cross roads served by the next three exits and they shall be listed from the top of the sign in order of increasing distance.

When there is insufficient distance between interchanges for advance exit signs, the interchange sequence sign may be used in lieu of advance exit signs for the affected interchanges.

1.9.3 STANDARD ABBREVIATIONS

Only the abbreviations recognised and understood by motorists through common usage shall be used. These include:

- Rd for Road
- St for Street
- Dr for Drive
- Ave for Avenue
- Pl for Place
- HWY for Highway
- EWY for Expressway
- MWY for Motorway
- JCT for Junction
- Gt for Great

The use of any of the above in full will only be warranted where it appears on its own line due to sign width constraints.

1.10 ROUTE NUMBERING

Route identification by means of numbers and distinctively shaped and/or coloured route markers is a very important driver navigation aid and should be used on all motorways and expressways.

Route number markers must be shown on state highway motorways and expressway guide signs. A freestanding reassurance route marker shall also be placed beside the through route carriageway approximately 60 m beyond each exit, as shown on NZTA Drawing M1, *Standard Exit and Entrance Geometric Details and Traffic Signs With Exit Numbering* which is reproduced at reduced scale In FIGURE 2.6 (a).

State highway route markers (SHRM) shall have a white border and numeral(s) on a red background. Urban route markers (URM) shall have a black border and numeral(s) on a white background.

Route marker numerals shall have 'balanced' edge clearances with two digit numerals also having a standard spacing between numerals.

FIGURE 1.3 shows details of the large route markers used on motorway and expressway guide signs. The ground and overhead mounted URMs are as detailed in MOTSAM Part 1: *Traffic Signs*, FIGURE 7.9.1, enlarged by 50% and 67% respectively. The ground mounted SHRMs are as detailed in MOTSAM Part 1: *Traffic Signs,* FIGURES 7.8.1 and 7.8.2, for State Highway RM-1 and RM-2 Route Marker sign details, enlarged by 50%.

Standard SHRMs as detailed in MOTSAM Part 1: *Traffic Signs,* are used on off-ramp, on-ramp and ramp terminal signs, and on the signs erected on local road approaches to ramp terminals.

Toll roads shall be identified by a route marker containing the word 'TOLL' as detailed in FIGURE 1.3.

1.11 CARDINAL DIRECTIONS

Cardinal directions are the prime compass points, e.g. North, South, East and West, and are never abbreviated. Where approved for use within a region they should be used on guide signs, in conjunction with route markers, to provide additional driver navigation information, particularly on motorway/expressway 'Pull-Through', confirmation and intersection direction signs.

The cardinal direction should be located adjacent to and on the right hand side of the route marker. On intersection direction signs the word 'MOTORWAY' on the top line of the sign should be replaced the abbreviation 'MWY' followed by the cardinal direction.

The cardinal direction should also be shown on a supplementary plate erected immediately above the free-standing route marker signs at motorway/expressway exits and entrances.

Details of cardinal direction letter size and style are given in Table 1.1.

FIGURE 1.4 shows details of the supplementary cardinal direction plates used with free-standing route marker signs.

1.12 EXIT NUMBERING

1.12.1 GENERAL

Interchange exit numbering is common practice in many countries. It is another driver navigation aid that provides valuable orientation information, particularly for drivers who are not familiar with the English language but can readily recognise numerals.

Where approved for use within a region, exit numbering must be implemented over the entire motorway and/or expressway system within that region. Exit numbers shall be shown on supplementary plates attached to the top of advance exit, supplementary destination and exit direction signs. An exit number shall also be incorporated into the exit sign located in the gore area at each exit.

When exit numbering is used motorway to motorway connections shall be included as they are exits from one motorway to another.

Exit numbering shall only apply to exits that can be used by all vehicles, i.e. Busway exits and the like shall not be numbered. Service Centre exits and other and minor exits shall also not be numbered.

1.12.2 EXIT NUMBER DETERMINATION

(a) General

Exit numbering may be sequential or distance based. A distance based numbering system is recommended for two reasons:

- Adding interchanges into a route does not normally require exit numbering changes.
- Distances to destinations and total distance travelled can be determined at reasonable intervals, i.e. at each exit.

(b) For State Highways

Exit numbering for state highways shall be distance based and related to the Location Referencing Management System (LRMS).

Exit numbers shall be the distance from the relevant state highway zero datum to the centre of the interchange, rounded to the nearest whole kilometre in the following manner:

i. there is no EXIT 0 (zero);

ii. the EXIT 1 zone covers 0·00 to 1·499 km; and

iii. the EXIT 2 zone covers 1·500 to 2·499 km and each exit number zone thereafter shall be one (1) km in length.

(c) Interchange Sub Ramps

Off-ramps are numbered using a numeric, while sub-ramps are numbered using the relevant off-ramp numeric and an alphabetic suffix such as A, B, C, D, E, etc.

Where there is more than one exit within the same exit number zone it may also be necessary to use the relevant off-ramp numeric with an alphabetic suffix.

Refer to the exit numbering section in MUTCD for more information on:

i. exit number letter suffix progression;

ii. exit numbering at motorway to motorway interchanges; and

iii. exit numbering on routes that share a common alignment for some distance.

1.12.3 EXIT NUMBER FORMAT AND LOCATION ON SIGNS

When exit numbering is implemented exit numbers shall be displayed on separate plates mounted immediately above each advance exit, supplementary destination and exit direction sign. These plates should be located at the top left edge of the signs for left-hand exits and at the top right edge of the signs for right-hand exits.

The implementation of exit numbering does not eliminate the need on advance exit signs to include the text '"EXIT" in the traffic instruction as in each case the word "EXIT" serves a different function.

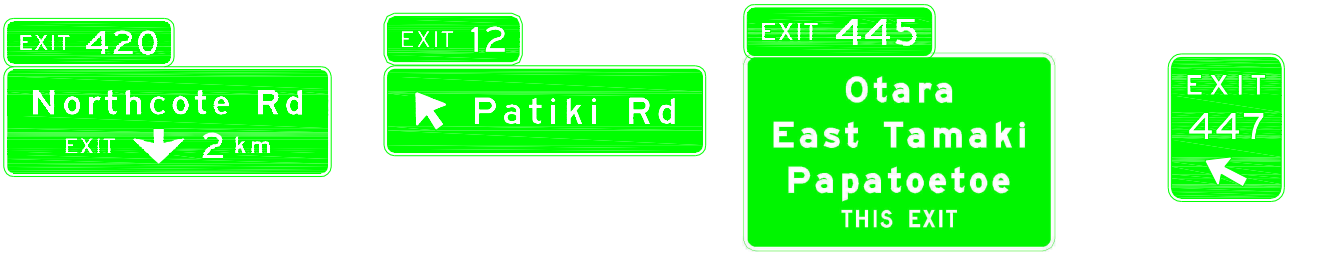
Exit number plates shall contain, in a single-line format, the word 'EXIT', the exit number and, where necessary, a suffix letter. The word 'RIGHT' may also be added for a right-hand exit.

The minimum numeral and letter sizes for exit numbering are given in Table 1.1.

Exit numbers on exit signs shall be displayed immediately below the word 'EXIT' and above the M3 direction arrow. The minimum numeral and letter sizes for exit signs are given in Table 1.1.

FIGURE 1.1 illustrates four typical examples of exit guide signs with exit numbering.

Exit number plates for use on both ground and overhead mounted exit and exit guide signs are detailed in FIGURES 1.5 and 1.6.



MI - 11
Advance Exit Sign
(Overhead Mounted)

MI - 13
Exit Direction Sign
(Overhead Mounted)

MI - 6
Supplementary Destination Sign
(Ground Mounted)

MI - 4.1
Exit Sign
(Ground Mounted)

FIGURE 1.1: EXAMPLES OF EXIT NUMBERING ON GUIDE SIGNS

1.13 ROUTE NAMES

Motorways and expressways are sometimes referred to by a name derived from origins such as the general direction of the route or the area through which the route passes, e.g. 'Northern Motorway', 'Waikato Expressway', etc.

Route naming shall not replace route numbering and cardinal directions but route names may be added to motorway and expressway guide signs in the following manner:

1.13.1 Location of Route Names

Route names may be shown:

(a) on signs leading to the start of a motorway or expressway and at motorway to motorway interchanges; and

(b) on motorway or expressway confirmation signs just beyond its start, or just beyond any entry at an interchange with another motorway, expressway, major urban road or rural arterial road.

1.13.2 Intersecting Route Names

The name of an intersecting route may be shown on motorway and expressway exit signs:

(a) in urban areas where the intersecting route is named, and

(b) in rural areas where the intersecting route is another named motorway, expressway, state highway or route of similar importance.

1.13.3 Memorial Routes

Motorways and expressways should not normally be signed as memorial routes.

However, where a route, bridge or component of a road is officially designated as a memorial notification shall be limited to one sign erected clear of the carriageway at an appropriate location in each route direction.

1.14 SYMBOLS

Only approved symbols may be used on motorway and expressway signs to indicate the whole or part of an approved route e.g. to an airport. On guide signs these include the aeroplane symbol for an airport route and relevant touring route symbols. Approved touring routes and symbols include the 'Twin Coast Discovery', 'Pacific Coast Highway' and 'Thermal Explorer'.

Details on symbols for use on motorist service and tourist signs are covered in Sections 9 and 10 respectively.

Where used on guide signs, approved route symbols shall be located to the right of any route marker. The exception is when the word 'Airport' is included on the sign in which case the aeroplane symbol shall be located in line with and after the word 'Airport'. If there is no route marker or the word 'Airport', then the 'Airport' symbol shall be located to the left of the destination or in the case of an exit direction sign, between the arrow and the destination. For further details and alternatives refer to Section 3.3.3

The 'Airport' route symbol shall be white on a blue background and without a border when included on a guide sign. The 'aeroplane' shall be aligned to conform with the direction of any associated arrow, except a downward pointing arrow. Where the 'Airport' route is indicated by a downward pointing arrow or no arrow, the 'aeroplane' shall be aligned vertically upwards and located to the left of the associated off ramp destination.

Where two destinations are listed on guide signage and the first is a city name and the second is an 'Airport', then '&' shall precede the word 'Airport'. This does not apply when 'Airport' is the first destination.

On intersection direction signs approved route symbols shall be located between the route marker and the destination, refer to FIGURE 10.2.

1.15 STANDARD ARROWS

Details of the standard arrows used on motorway and expressway guide signs are shown in FIGURE 1.7.

M1 and M2 arrows shall only be used on overhead exit direction signs. The M1 arrow is preferred for normal use and the M2 arrow only used when space is limited. These arrows may be rotated to help reduce the width of a sign so it will fit within the space available on a sign gantry. Their centrelines must, however, lie between $12{\cdot}5^0$ and the desirable 35^0 anticlockwise from the vertical.

M3 arrows shall only be used on ground-mounted exit direction and exit signs.

M4 arrows denote traffic lane assignment. Lane assignment arrows shall only be used on overhead signs and only then when the associated destination can be accessed directly from the assigned lane. The only exception to this is where

traffic management/volume assignment provides a benefit. All lane assignment arrows shall be positioned so that they are vertically centred ± 150 mm over the lane to which they refer. Where more than one sign on a gantry has lane assignment arrows, the points of all arrows shall be aligned ± 50 mm to a horizontal line.

M5, M6 and M7 arrows shall only be used on overhead mounted MI - 13 diagrammatic advance exit signs.

1.16 DISTANCE UNITS

Distances should be shown as detailed in Table 1.2.

TABLE 1.2: DISTANCE UNITS

Distance	Increment	Shown as
All signs, excluding the Interchange Sequence Sign		
Up to 1 kilometre:	100 metres	'X'00 m
Whole kilometres	1 kilometre	'X' km
Part kilometres *(greater than 1 kilometre)*	0·5 kilometre	'X'·5 km
Interchange Sequence Sign		
All distances	0·1 kilometre	'X·X' km

Where the spacing of interchanges exceeds 5 kms it is preferable to use whole kilometres. When part kilometres are used the decimal point shall be located midway up the height of the numerals.

The default position for distances on guide signs is as follows:

- to the right of the lane assignment arrow when there is a single lane assignment arrow
- midway between the lane assignment arrows when there are two lane assignment arrows.

When the sign includes the traffic instruction 'EXIT ↓ ONLY' the distance default is on a separate line between the destination and the 'EXIT ↓ ONLY' panel.

1.17 TRAFFIC INSTRUCTIONS

Traffic instructions are frequently used in conjunction with directional information on guide signs. They give drivers advance warnings and/or instructions necessary for the turning, merging or diverging manoeuvres required to travel in the named direction. Typical traffic instruction messages are:

1.17.1 EXIT 1 (2) (4) km

Used on advance exit signs. The distance on the first advance exit sign is normally 1·5 km in urban areas and 2 km in rural areas. The distance on the second advance exit sign is normally 500 m in urban areas and 1 km in rural areas.

The distance is measured from the apex of the off-ramp exit nose.

The implementation of exit numbering does not eliminate the need on advance exit signs to include the text '"EXIT" in the traffic instruction.

Where long weaving distances are required to effect an exit under heavy traffic conditions in urban areas three advance exit signs may sometimes be needed, at distances of 2 km, 1 km and 500 m.

1.17.2 LEFT LANE

Alternative message for a second advance exit sign.

Also used on the sign at the commencement of a diverge taper where an auxiliary lane is provided on a motorway or expressway for slow vehicles.

1.17.3 RIGHT LANE

Used on interchange sequence signs where an exit is on the right hand side of the carriageway rather than the normal left hand side.

1.17.4 EXIT ONLY

Used on advance exit and exit direction signs for a lane drop situation, in conjunction with a lane assignment or an exit direction arrow, to indicate a lane which exits the through route without an escape option, e.g. the left lane of a two lane exit.

The traffic instruction "EXIT ONLY" or "EXIT ↓ ONLY" on advance exit signs and "EXIT ONLY" on exit direction signs is typically located within a yellow panel at the bottom of the sign.

This instruction is also used on the optional ground mounted MI - 5 sign which may be used in a lane drop situation, as an additional reminder for drivers.

1.17.5 THIS EXIT

Used on supplementary destination signs. Refer to Section 4. Supplementary Destination Signs for further details.

1.17.6 NEXT RIGHT

Used on advance lane indication signs on crossroads where the sign is required in advance of the start of the right turn lane onto the motorway or expressway on ramp.

1.17.7 (to 'Route Marker')

A route marker preceded by the word 'to' and enclosed in brackets may be used to indicate the direction to travel to access the numbered route indicated.

1.18 SIGN LOCATION

1.18.1 GENERAL

Motorway and expressway signs are normally erected on the left side of the carriageway and in a manner such that they are clearly visible to approaching drivers.

The longitudinal placement of signs is generally determined by the nature of their message and/or their purpose. However, care is needed in locating signs to ensure that they do not obscure another sign or restrict driver visibility, particularly at ramp terminal intersections. This applies to all signs, including guide signs, VMS, toll road signs and ramp signal management signs.

1.18.2 GROUND MOUNTED SIGNS

(a) General

Normally, only one sign should be erected on each sign support system.

Where it is necessary to convey two or more different types of message separate signs should be used. These signs should be located:

- a minimum of $0{\cdot}6V_{85}$ m apart on ramps; and
- a minimum of 100 m, and desirably 200 m, apart on motorway and expressway carriageways.

NOTE: V_{85} is the 85th percentile speed in km/h.

Drivers must also have a clear view to any ground mounted sign for a distance of at least:

- 60 m in urban areas; and
- 180 m in rural areas.

The standard locations for signs at motorway and expressway exits and entrances are shown in FIGURE 2.6.

The introduction on motorways of new traffic management tools such as ramp signals and toll roads has led to a pluthoria of signs at the entrance to on-ramps and the end of off-ramps. To overcome the associated sign congestion and inconsistent order of signs new combination threshold signs for 'speed limit/motorway or expressway name/no pedestrians/no cycling' and 'speed limit/motorway ends' have been designed and are included within this manual. Where approved for use within a region these combination threshold signs should be used.

(b) Lateral Placement

Ground mounted signs must be located:

- at least 600 mm clear of the outer edge of shoulder, line of edge marker posts or face of road safety barrier; and
- desirably between 2 m and 5 m clear of the nearest traffic lane edge line.

Large ground mounted signs should be located a minimum of:

- 1 m clear of the outer edge of a motorway or expressway shoulder, or 4 m from the nearest traffic lane edge line, whichever is the greater, or
- 1 m behind the face of a road safety barrier, or
- 1 m behind the face of a kerb, or
- 1 m clear of the outer edge of a ramp shoulder.

(c) Mounting Height

The minimum vertical distance, measured from the underside of the sign or the lowest sign in an assembly of signs and the surface of the adjacent road pavement, traffickable shoulder or top of kerb, whichever is the critical dimension, shall be:

- 2 m for advance exit, exit direction, confirmation, supplementary destination, interchange sequence, motorist service, tourist and miscellaneous signs;
- 1·2 m for exit signs;
- 2 m for signs on breakaway supports, to allow an impacting light vehicle to run under the sign;
- 2 m for all signs on ramps and local streets; and
- 2·5 m for signs over footpaths.

(d) Sign Supports

Signposts of strength equivalent to a standard steel pipe with a maximum outside diameter (O.D.) of 76 mm, or an aluminium post with a maximum O.D. of 114 mm, are not considered to be a roadside hazard and will not, therefore, generally require protection.

A breakaway design shall be used for signposts of greater strength unless the sign is located:

- behind road safety barrier, or
- on a cut batter slope of 2:1 or steeper and the base of the post not less than 1·2 m vertically above the road shoulder or verge level, or
- in a location where it is unlikely that the posts could be struck by an errant vehicle, or
- outside the clear zone for that section of road.

(e) Sign Orientation

Except for some parking signs, all traffic signs, including stand mounted temporary warning signs, shall be erected in a vertical plane and oriented at approximately right angles to, and facing, an approaching driver's line of sight.

On curved alignments, sign orientation should be determined by an approaching driver's view of the sign, rather than the alignment of the road at the sign position.

Signs should be turned about 5^0 away from the driver's line of sight or the normal to the road centreline. This is to help reduce possible, and undesirable, specular reflection from reflectorised sign surfaces. FIGURE 1.2 shows how reflectorised signs should be orientated to avoid specular reflection.

If there is still specular reflection on a straight when the sign is turned about 5^0 away from the driver's line of sight, then it shall be increased to a maximum of 10^0.

For ramps on a sharp curved alignment permanent warning signs shall be orientated at 10^0.

Care must be taken to avoid dazzling drivers, particularly in rural and unlit areas where approaching vehicle headlights may shine directly onto signs.

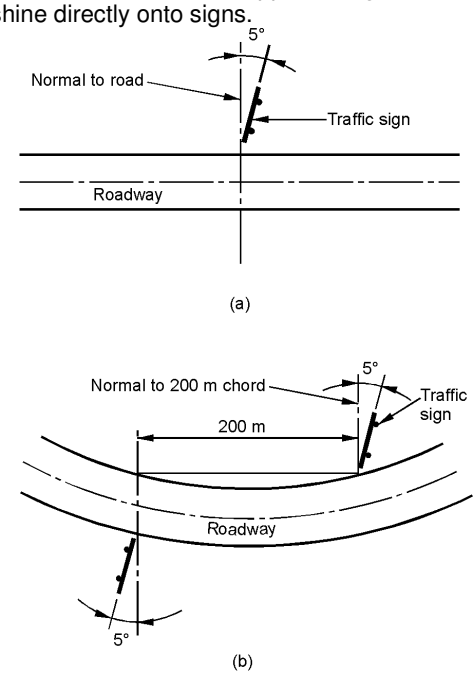


FIGURE 1.2: METHODS OF AVOIDING SPECULAR REFLECTION ON A ROAD SIGN.

1.18.3 OVERHEAD MOUNTED SIGNS

(a) General

Overhead signs must be provided:

- where a motorway has three or more lanes in one direction, i.e. urban motorway conditions;
- where a significant number of heavy commercial vehicles travel in the left lane and ground mounted signs are likely to be obscured from other drivers;
- on the approaches to two-lane, and diverge exits where individual lane assignment directions are needed; and

- at closely spaced exits to allow exit direction and advance exit information for the next exit to be clearly displayed. Refer to Sections 2.2 and 2.3 for details of the Sign Spreading concept and 'Pull-Through' signs used in these situations.

It is also possible that overhead signs may be needed in any one or a combination of the following situations:

- where sight distance to a sign is restricted, e.g. on a left hand curve in a cutting;
- where there is insufficient space available to erect a ground mounted sign; and
- at right hand exits.

The following conditions also apply to overhead signs:

More than one sign may be placed laterally on an overhead gantry but a destination name can only be displayed once, i.e. each sign will only refer to a lane or lanes, an exit, or the continuing route stage destination.

- Gaps between adjoining signs on an overhead gantry are acceptable.
- Signs with lane assignment arrows should not be located on horizontal curves unless drivers can readily relate the arrow(s) to the lane(s) to which it applies.

  NOTE: The horizontal spacing between vertical arrows on an overhead sign can be nominal but must be uniform.
- The desirable longitudinal separation between overhead signs is 300 m with the absolute minimum being 250 m.
- The desirable longitudinal separation between a ground mounted sign and an overhead mounted sign is 200 m.
- Where there is a lane gain prior to a diverge or off-ramp on a motorway or expressway with two or more lanes in one direction overhead signage shall be provided on a gantry located where the lanes are fully developed i.e. beyond the end of the diverge or lane gain taper.
- Due to safety issues, overhead signs shall not be located in merge areas.
- Existing overbridges may provide suitable locations for overhead signs.
- Overhead signs should not be located immediately beyond overbridges unless the longitudinal displacement is at least 250 m.
- At scheme assessment stage consideration should be given to the possibility of locating signs on overhead structures, even if this requires slight adjustment to the positions of either structures or signs.

(b) Lateral placement

Lane assignment arrows shall be positioned vertically ± 150 mm over the centrelines of the lanes to which they refer.

(c) Mounting Height

It is desirable that overhead signs be mounted at least 6 m but not less than 5.5 m vertically above the highest point of the carriageway immediately beneath the sign. However, on overdimension routes a clearance of 6·0 m is mandatory.

All new sign gantries shall allow overhead signs to be mounted with a clearance of at least 6 m.

NOTE: Where more than one sign is mounted on an overhead gantry the base of all signs shall be aligned to a common horizontal line.

(d) Sign Supports

Overhead sign supports cannot be made breakaway and they must be located so that they are either not a hazard to errant vehicles or protected. Supports must, therefore, be located:

- behind road safety barriers, or
- on cut batter slopes of 2:1 or steeper where the base of the posts are not less than 1.2 m vertically above the road shoulder or verge level, or
- in a location where it is unlikely that they could be struck by errant vehicles, or
- outside the clear zone for that section of road.

In addition the following points should also be observed:

- Supports for large butterfly or cantilever signs should not be located in exit gore areas unless appropriate crash cushions protect them. Alternative forms of sign structures, e.g. gantries, are preferred in these situations.
- Appropriate end terminal treatments to shield them are installed. Crash cushions may also be required in narrow median situations.

1.19 PROTECTIVE OVERLAYS

The durability and performance of a sign can be increased with the addition of protective overlays that reduce the detrimental effect dew formation and painted graffiti has on the retroreflective performance of the sign.

1.19.1 GRAFFITI PROTECTION

Graffiti Protection Overlay Films will be provided by a purpose designed durable, solvent resistant, transparent film coated with a transparent pressure-sensitive adhesive that is protected by a removable liner. When applied as a protective overlay on retroreflective signs, the signs will have similar day-night appearance and retroreflectivity will not be reduced by more than 10%, which shall be substantiated by supporting test results.

As a protective overlay, the film is a barrier to staining by many types of graffiti, including spray paint, permanent markers, lipsticks and crayons. Defacement due to vandals will be removable with the use of selected solvent wiping.

The application of graffiti protection to ground mounted guide signs, motorist service signs and tourist signs on motorways and expressways shall be considered on a project by project basis.

Unauthorised access is easily gained to signs erected on truss type gantries. Deterrent barriers shall therefore be provided on the vertical supports of all truss type gantries.

Sign panels erected on the side of bridge superstructures, except for bridge name panels, must have barricades that prevent unauthorised access to the sign face. This shall comprise a protective shield on the back face, top and ends of each panel. The protective shield at the ends of each panel shall be installed parallel with the carriageway to ensure the full face of the signs is visible to drivers.

1.19.2 DEW RESISTANCE

Dew resistant films are designed to restrict the formation of small dew droplets forming on the face of road signs. The formation of these dew droplets has the effect of redirecting light away from an approaching vehicle which greatly lessens the retroreflective performance.

Dew resistant film is typically a clear colourless film that is designed to have minimal effect on a finished sign. Under dew conditions it will resist the formation of dew to maintaining the signs retroreflective properties.

The application of dew resistant film to guide signs, motorist service signs and tourist signs on motorways and expressways shall be considered on a project by project basis.

Any sign protected with dew resistant films must have barricades that prevent unauthorised access to the sign face.

1.20 SIGN MANUFACTURE

1.20.1 SIGN FACE

Road sign manufacture typically uses two primary factory sheeting colours as the basis of retroreflective sign manufacture.

Signs exhibiting a white legend with a coloured background will typically be manufactured from "white" retroreflective sheeting. The coloured background will be created with the addition of a screen printable ink or an electronically cuttable colour overlay film.

Electronically cuttable colour overlay film comes in rolls of the following widths:

- 600 mm;
- 750 mm;
- 900 mm; and
- 1,200 mm (unusual).

Where possible standard retroreflective sheeting sizes shall be efficiently used to reduce wastage and minimise the number of joints.

Signs or portions of a sign with a yellow background will be manufactured from a factory supplied yellow sheeting with the black legend and or symbol created with the use of either screen printable ink or a non-reflective computer cuttable opaque black vinyl.

Protective overlays are then applied over the total sign.

It is important that all sheetings and or inks and overlays used are designed for such use and as such will maintain any stated and guaranteed durability warranty for the sign.

1.20.2 BACKING MATERIAL

Sign backing material shall be 2·0 mm thick aluminium sheet unless otherwise approved by NZTA. Where possible standard aluminium sheet sizes shall be efficiently used to reduce wastage and minimise the number of joints.

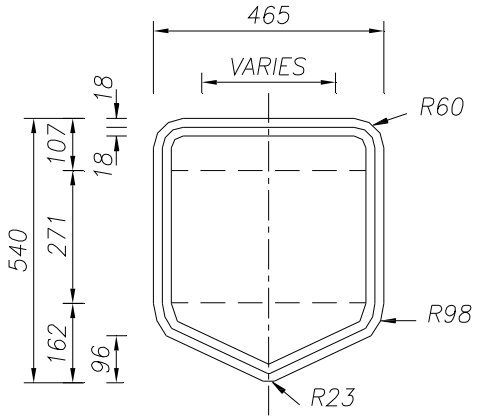
Standard aluminium sheet sizes are:

- 750 mm x 3,000 mm;
- 900 mm x 2,400 mm; and
- 1,200 mm x 2,400 mm.

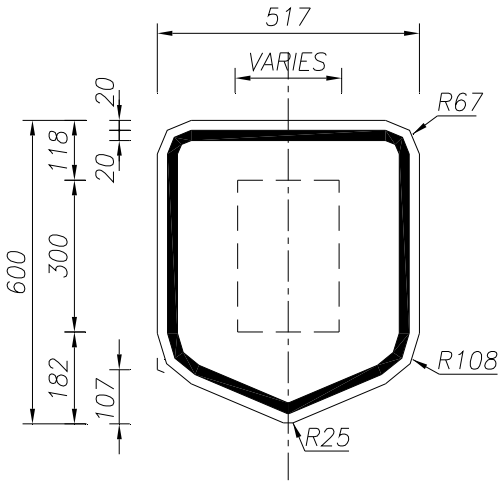
1.21 SIGN DESIGN ASSISTANCE

In addition to the sign design criteria given in this document, two other documents that may be of assistance in the design of motorway and expressway signs are:

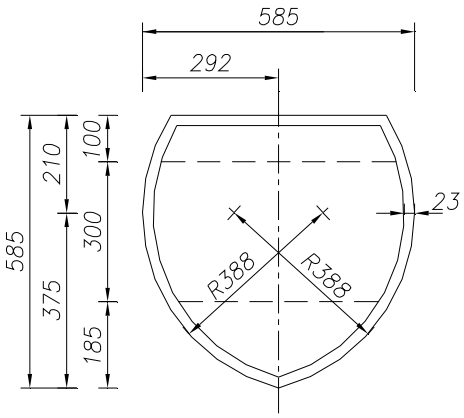
1. The US Department of Transportation, Federal Highway Administration, *Standard Highway Signs* Manual sections that apply to freeway and expressway signing.
2. The Australian Standard *AS 1743-2001 Road Signs-Specifications* sections that apply to freeways and expressways.



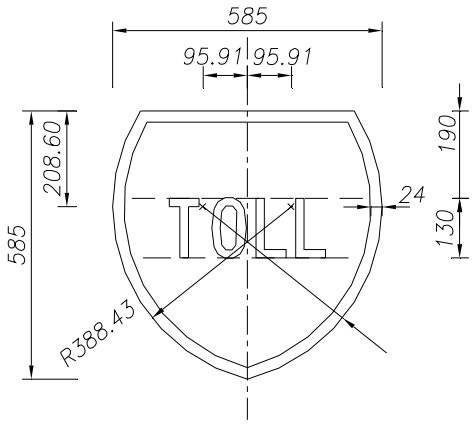
(b) GROUND MOUNTED URBAN ROUTE MARKER



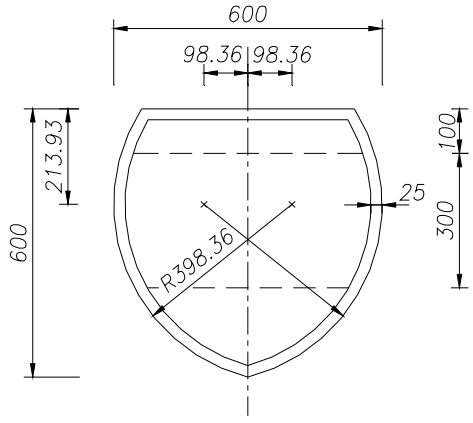
(a) OVERHEAD MOUNTED URBAN ROUTE MARKER



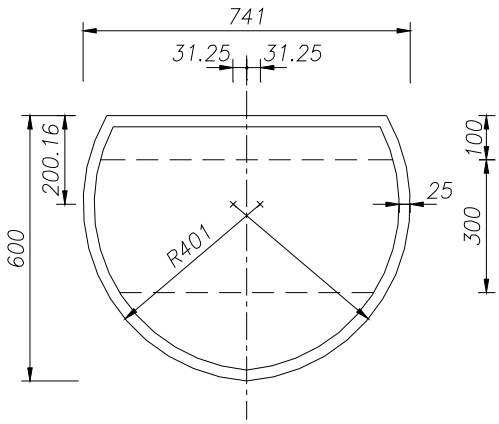
(d) GROUND MOUNTED STATE HIGHWAY ROUTE MARKERS



(c) GROUND MOUNTED TOLL ROAD ROUTE MARKERS

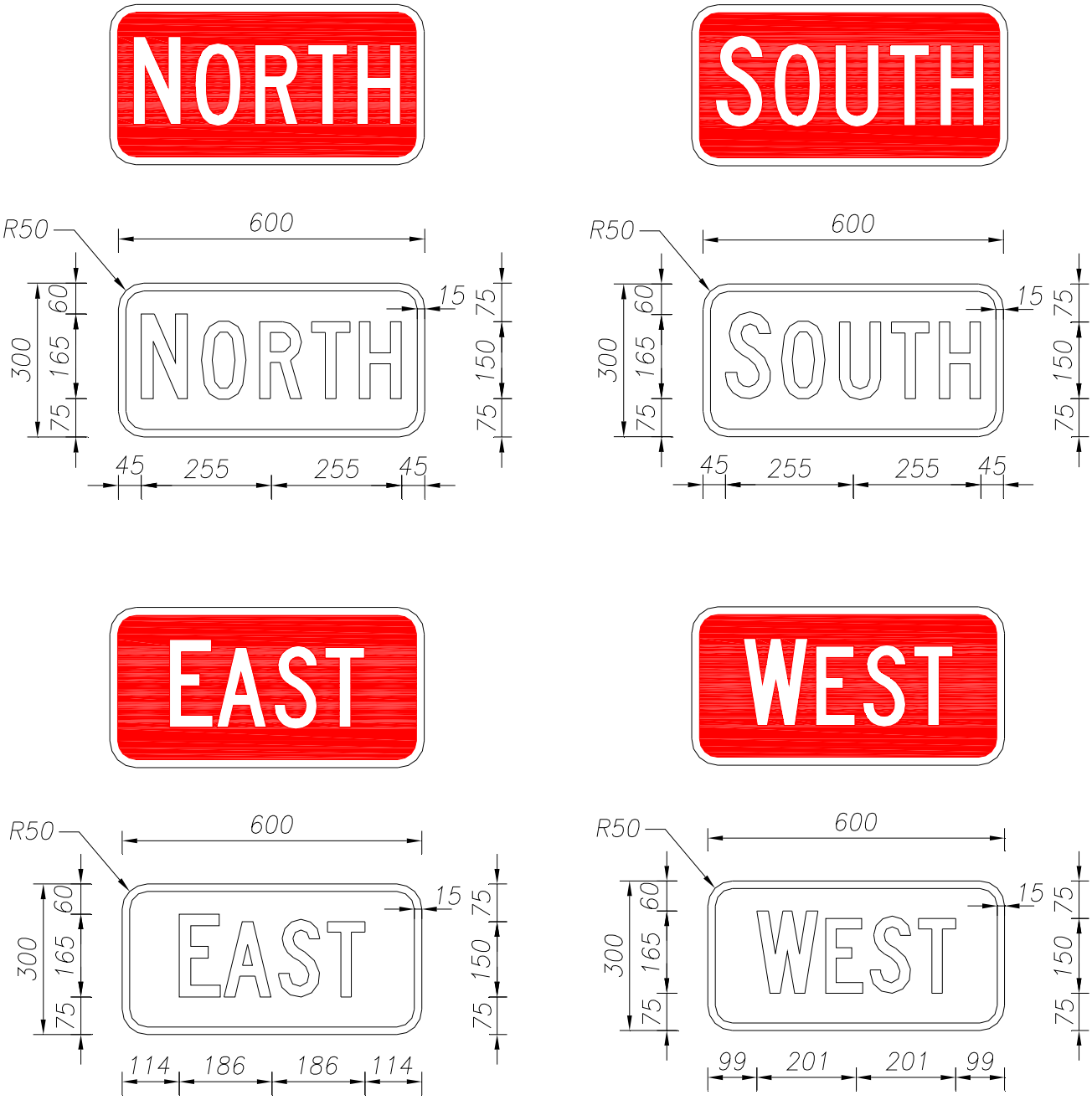


(e) OVERHEAD MOUNTED STATE HIGHWAY ROUTE MARKER (SINGLE DIGIT)



(f) OVERHEAD MOUNTED STATE HIGHWAY ROUTE MARKER (TWO DIGIT)

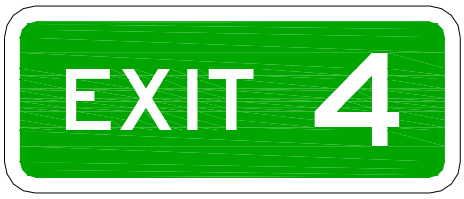
MOTORWAY, EXPRESSWAY AND TOLL ROAD ROUTE MARKER SIGNS — FIGURE 1.3



LEGEND: Reflectorised white
BACKGROUND: Reflectorised red
BORDER: Reflectorised white
LETTERS: Series C 150

NOTE:
1. **Initial capital is 10% higher than balance of text**
2. **Spacing is compressed by 10%**

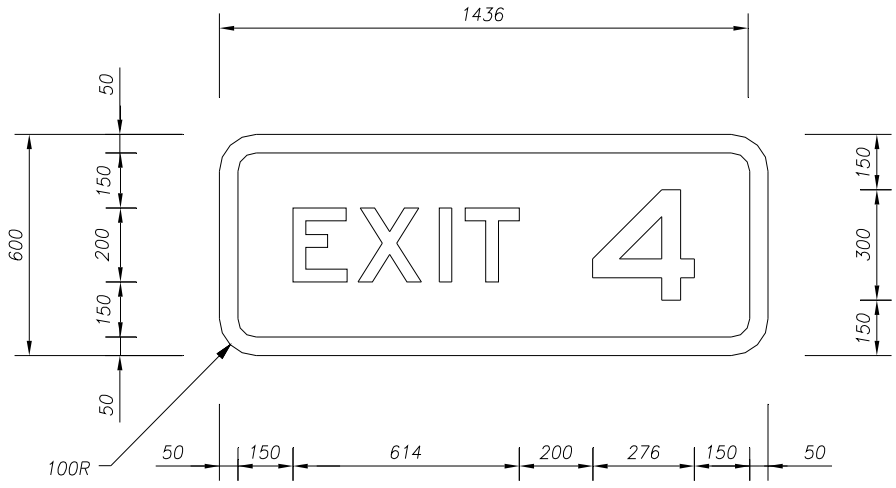
FIGURE 1.4 SUPPLEMENTARY CARDINAL DIRECTION PLATES FOR FREE-STANDING STATE HIGHWAY ROUTE MARKERS



MI - 25.1

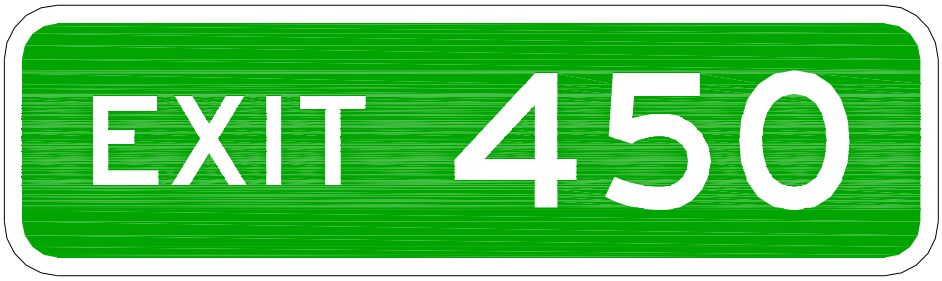
SUPPLEMENTARY EXIT NUMBER PLATE DETAILS

LEGEND:	Reflectorised white
BACKGROUND:	Reflectorised standard green
BORDER:	Reflectorised white
LETTERS:	
'EXIT'	Series E 200
NUMERALS:	
'1', '2' etc	Series E 300
Letter suffix	Series E 300



NOTE: Supplementary exit number plate for use on ground mounted advance exit, exit direction and supplementary destination signs.

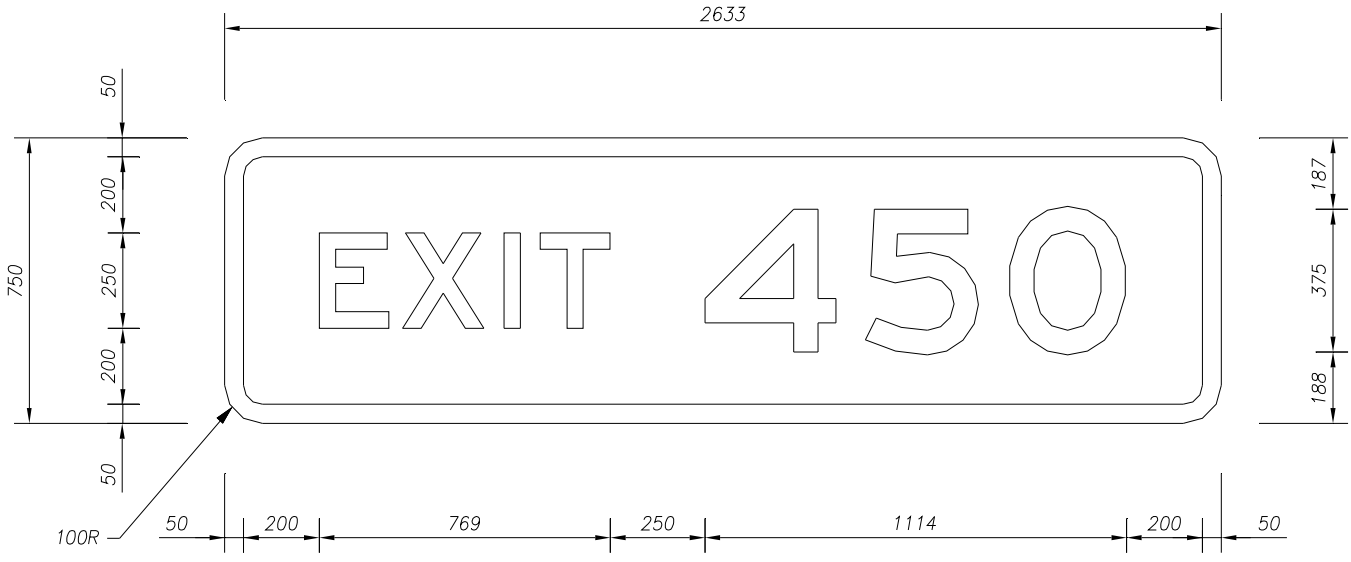
MI - 25.1 SUPPLEMENTARY EXIT NUMBER PLATE FOR GROUND MOUNTED SIGNS FIGURE 1.5



MI - 25.2

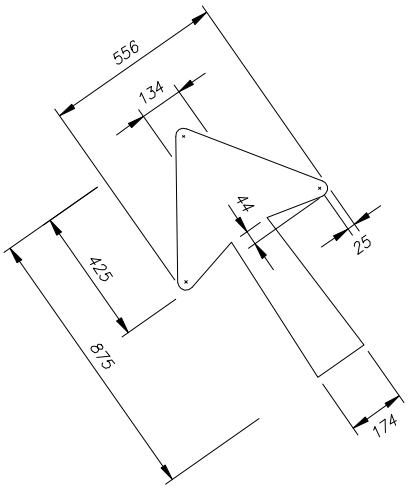
SUPPLEMENTARY EXIT NUMBER PLATE DETAILS

LEGEND:	Reflectorised white
BACKGROUND:	Reflectorised standard green
BORDER:	Reflectorised white
LETTERS:	
'EXIT'	Series E 250
NUMERALS:	
'1', '2' etc	Series E 375
Letter suffix	Series E 375

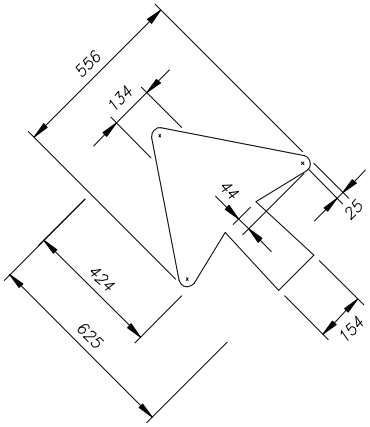


NOTE: Supplementary exit number plate for use on overhead mounted advance exit and exit direction signs

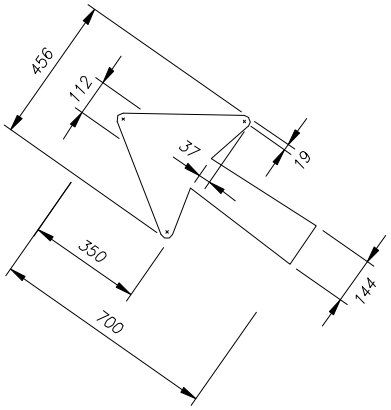
FIGURE 1.6 MI - 25.2 SUPPLEMENTARY EXIT NUMBER PLATE FOR OVERHEAD MOUNTED SIGNS



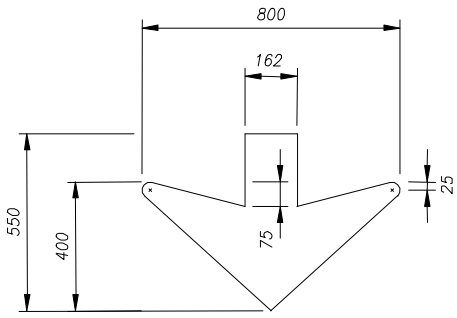
M1



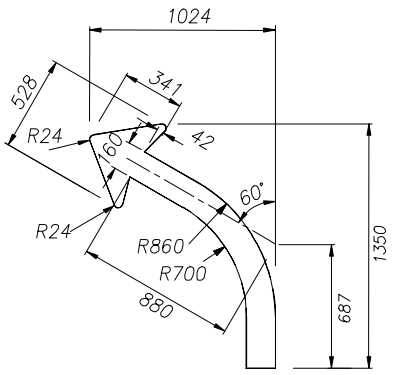
M2



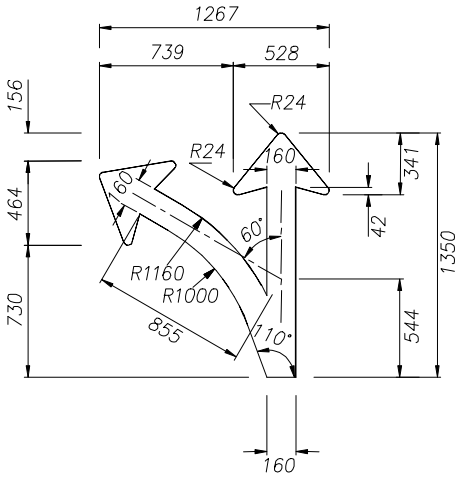
M3



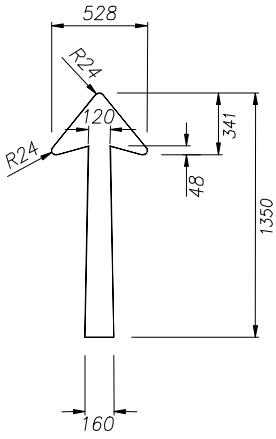
M4



M5



M6



M7

STANDARD ARROWS FIGURE 1.7

(This page is intentionally blank)