

# Traffic control devices manual

## Part 1

## General requirements for traffic signs

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# Preface

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## Introduction

The *Traffic control devices manual* (TCD manual) will provide guidance on industry good practice, including, where necessary, practice mandated by law. The planned structure of the TCD manual comprises 10 parts and is shown in table A.

Each part will be developed under the guidance of a working group of practitioners experienced in, and having specific knowledge about, the subject. The practitioners will also be representative of the intended users of the documents. Interested practitioners and affected organisations will be given the opportunity to comment on drafts and have their input incorporated appropriately in the final document.

The TCD manual will be published electronically only and will be available on the NZ Transport Agency's website.

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## Relationship with other documents

The TCD manual will support and reference:

- New Zealand legislation and, in particular, the Land Transport Act 1998 and rules made pursuant to that act, including the Land Transport (Road User) Rule, the Land Transport Rule: Traffic Control Devices and the Land Transport Rule: Setting of Speed Limits
- general policies contained in Austroads guides (in particular, the guides to traffic management, traffic design and road safety) by providing detailed guidance to meet specific requirements of New Zealand law and practices
- New Zealand and, as appropriate, Australian standards
- codes of practice, guidelines and published standards of various authorities.

Each part will attempt to provide a broad coverage of the subject but avoid duplicating major elements of referenced documents, preferring to direct readers to the source.

The TCD manual will, on completion, replace the joint Transit New Zealand and Land Transport NZ publication *Manual of traffic signs and markings* (MOTSAM).

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## Part 1 General requirements for traffic signs

Part 1 was developed with guidance from a working group representing local government (two members), Road Safety Manufacturers Association (two members) and the NZ Transport Agency (two members from Highway and Network Operations and one member from Network Standards and Safety). They were assisted by the contracted authors (Cherie Urlich, Tim Selby and others) from Opus International Consultants.

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**Table A: Planned structure of the TCD manual**

Part	Title	Outline of content – may vary as the manual develops
	Sign specifications	Detailed descriptions of traffic signs including dimensions, colour and layout
	Signal specification	Detailed descriptions of permitted traffic signal displays and dimensions and colours of signal aspects
	Marking specification	Detailed description of road markings, including dimensions, colours and layout
1	General requirements for traffic signs	Purposes of traffic signs and their legal foundation Materials and construction General design principles – size, lettering, legends Installation – location, mounting heights, etc
2	Direction, service and general guidance signs	Route signing, including state highways, regional roads, bypasses, detours, scenic routes Street name signing, including design and location Services signing policy, application and design Tourist signing General information signs, eg public amenities, features
3	Advertising signs	Design and location principles Policies for billboards and other forms of roadside advertising
4	Traffic control devices for general use – at intersections	Treatments at intersections, including options for traffic control, advance warning, etc
5	Traffic control devices for general use – sections of road	Treatments between intersections, including delineation, curves, passing facilities, steep grades, etc
6	Speed management	Safe system approach to speed Signs and markings for speed limits Temporary and variable speed limits Local area traffic management
7	Parking controls (formerly part 13)	Legal framework – implications and responsibilities Design considerations and elements Linear and zone parking treatments Parking furniture, eg meters, vending machines
8	Temporary traffic management	<i>Code of practice for temporary traffic management</i> and local body supplement
9	Level crossings	Risk assessment (ALCAM) Design considerations, eg facility types, traffic movements, stacking distance, sight distances Types of control – passive or active
10	Motorways and expressways	Specific signing and marking requirements for motorways and expressways
	Definitions	Definitions of terms used throughout the TCD manual
	References	All documents referenced throughout the TCD manual

## Record of amendments

Amendment number	Description of change	Effective date	Updated by





# 1.0 Introduction

## 1.1 Purpose

### What's in this document

Part 1 General requirements for traffic signs, is part of a suite of guidelines within the *Traffic control devices manual* (TCD manual) prepared by the NZ Transport Agency (NZTA or the Agency). The document is intended to provide guidance and indicate best practice to the transport industry and practitioners on the use of traffic signs. In particular, it builds on the specifications for traffic signs, approved or mandated for use in New Zealand, as set down in the *Traffic control devices specifications* (TCD specifications).

It outlines the legal framework and responsibilities for the design and installation of traffic signs, including the general principles behind their use at the time the document was drafted. It should not be used as a substitute for professional advice with respect to compliance with relevant central and local government requirements.

### Terminology – law or good practice

The following terminology is used in the document to describe whether an aspect or statement is a requirement under law or good practice:

- **must** – indicates something that is mandatory or required by law
- **should** – indicates a recommendation
- **may** – indicates something that is optional and may be considered for use.

### Definition of 'traffic sign'

In the Land Transport Rule: Traffic Control Devices 2004 (TCD Rule), a traffic sign is defined as:

'a board, plate, screen or other device, whether or not illuminated, displaying words, figures, symbols or other material intended to instruct, advise, inform or guide traffic on a road; and includes a 'children crossing' flag, a hand-held stop sign, a parking control sign and variable message signs; but does not include a traffic signal.'

## 1.2 Scope

This document seeks to incorporate links to a number of appropriate policies, standards and guidelines and forms a logical link between New Zealand practice and the Austroads *Guide to traffic management*. It should be read in conjunction with:

- legislative requirements, particularly the TCD Rule and the Land Transport (Road User) Rule 2004 (Road User Rule)
- New Zealand and Australian standards, particularly Australian Standard 1744 *Standard alphabets for road signs* (AS1744:1975), Australian/New Zealand Standard 1906.1 *Retroreflective materials and devices for traffic control purposes*, part 1 *Retroreflective sheeting* (AS/NZS 1906.1:2007), and Australian Standard 1742.2 *Manual of uniform traffic control devices*, part 2 *Traffic control devices for general use* (AS1742.2-2009)
- guidelines, such as Austroads *Guide to traffic management* (in particular part 10 Traffic control and communication devices)
- other parts of the TCD manual as appropriate.

## 1.3 Value for money

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The Land Transport Management Act (LTMA) sets a framework for planning, programming and funding land transport activities. It encourages integrated long-term planning and allows funding flexibility to achieve an affordable, integrated, safe, responsive and sustainable land transport system.

The LTMA requires the NZTA and approved organisations which receive payments from the National Land Transport Fund (NLTF) to use this revenue in a manner that seeks value for money. Value for money can be defined in a variety of ways but in general it means selecting the right things to do, implementing them in the right way, at the right time and for the right price.

The NZTA *Planning, programming and funding manual* which describes processes for funding from the NLTF is aimed at strategic and tactical levels. The value for money concept which drives those processes should be applied to every element of the road network, including the use of the traffic control devices described in the TCD manual and, in particular, this part.

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## 1.4 Engineering judgement

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This manual refers to rules and provides standards and guidance on the use of traffic signs. However, practitioners should always apply sound engineering judgement to ensure that the use and installation of traffic signs are effective at a particular site. For instance, the geometry at a site may require some modification to the sign to clearly convey an important message, such as the road alignment. In such instances, engineering judgement must be applied and any departures from recommended practice documented.

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## 2.0 Responsibilities

### 2.1 Road controlling authorities (RCAs)

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As set down in the TCD Rule, the provision, installation and maintenance of traffic signs (with the exception of some vehicle-mounted signs) is typically the responsibility of RCAs or, within the area of a level crossing, rail access providers (see TCD manual, part 9 Level crossings).

In relation to a road, the TCD Rule defines an RCA as:

- '(a) the authority, body or person having control of the road; and
- (b) includes a person acting under and within the terms of a delegation or authorisation given by the controlling authority.'

RCAs therefore include:

- territorial authorities (TAs) and regional councils
- the NZTA and other Crown entities that manage and maintain roads (eg the Department of Conservation)
- private landowners managing roads used by the public, including car parks, shopping centre car parks, hospitals, universities and airports
- other private landowners.

As identified in section 6 of this document, the responsibility for the approval of variable traffic signs rests with the RCA. This includes variable message signs mounted on stationary motor vehicles to provide information pertaining to traffic and road conditions, advice on actions that road users may take or future activity on or near the road that may affect road users.

The TCD Rule states that appropriate warning signs may be installed on motor vehicles engaged in road maintenance while moving along the road, or to inform road users of the presence of a moving hazard such as maintenance vehicles, stock or a parade/event. Responsibility for the approval and monitoring of such temporary warning signs rests with the RCA.

#### Public roads

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In relation to public roads, an RCA or rail access provider has a responsibility to provide approved traffic signs to inform road users of any prevailing legislative rules and bylaws, and to warn of any hazards. As stated in section 2 of the TCD Rule, an RCA must:

- '(a) authorise and, as appropriate, install or operate traffic control devices:
    - (i) if required by or under the TCD Rule or other enactment; or
    - (ii) to instruct road users of a prohibition or requirement that it has made concerning traffic on a road under its control; or
    - (iii) to warn road users of a hazard; and
  - (b) remove a traffic control device if required by or under the TCD Rule or other enactment.'
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**Public roads**

continued

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In addition an RCA:

*'may authorise and, as appropriate, install, operate or remove traffic control devices:*

- (a) if desirable for the guidance of traffic or to draw attention to a requirement that controls traffic; or*
- (b) to provide information to road users.'*

The NZTA's policy with respect to the responsibility and funding of traffic sign installation, maintenance and renewals with respect to state highway and local roads is set down in the NZTA's *Planning, programming and funding manual*.

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**Private landowners**

Owners of roads within private land, such as universities, hospitals, airports and shopping centres are considered RCAs with respect to the TCD Rule. They may establish and provide appropriate traffic controls on land under their direct control for use by general members of the public and are therefore governed by the requirements described in section 2.1 above.

Where a private land owner uses a traffic control device, there is a legal obligation to conform to the TCD Rule, particularly in relation to the general requirements for traffic signs described in section 4.1 of this document. Accordingly, owners of private land such as large car parks at malls and shopping centres, to which large numbers of the general public have access, should consider the guidance contained in this document.

Inconsistent use of traffic signs may lead to misinterpretation by road users and create the potential for risk, conflict or injury. On entering a 'private' site, users should reasonably expect a continuation of the same road rules and a similar standard of signs and markings as those found on public roads.

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## 2.2 Others

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Section 4.1.9 of this document provides guidance on the use of vehicle-mounted signs. The TCD Rule specifically states that school bus operators must ensure that a motor vehicle being used as a school bus must have a School Bus sign displayed at the front and rear of the vehicle.

The TCD Rule requires that the owner or person in charge of stock on a road must take steps to ensure approaching road users are aware of the presence of stock, and if required by an RCA, must ensure that an approved traffic control device has been installed.

In addition to the above, the TCD Rule indicates that members of the NZ Police may, under certain conditions, install, modify, remove or direct the removal of a traffic control device.

Under the TCD Rule, emergency services personnel or workers involved in removing a temporary hazard may also install appropriate temporary signs in the event of a temporary hazard such as a crash, slip or washout.

Similarly, signing of overdimension motor vehicles must comply with relevant provisions within the Land Transport Rule: Vehicle Dimensions and Mass 2002. It is the responsibility of operators of overdimension vehicles and pilot vehicles to ensure that relevant vehicle-mounted signs are displayed.

Most legal obligations and responsibilities of road users are defined in the Road User Rule although other legislation does impose rules for road users.

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## 3.0 Legal framework and implications

### 3.1 Legislation

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This section outlines relevant legislation with respect to traffic signs and their enforcement.

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#### 3.1.1 Statutes

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##### Land Transport Act 1998

This Act is intended to:

- promote vehicle safety and safe road user behaviour
- provide a system of rules for governing road user behaviour, the licensing of drivers and technical aspects of land transport, and to recognise the reciprocal obligations of persons involved
- consolidate and amend various enactments relating to road safety and land transport
- enable New Zealand to implement international agreements relating to road safety and land transport.

Section 152 of the Act relates to traffic control devices, and describes the power of the Minister of Transport to make ordinary rules – in this case, the TCD Rule and Road User Rule, as described in section 3.1.2 below.

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##### Land Transport Management Act 2003

This Act sets out the requirements and processes for local authorities (regional councils and TAs) and other approved organisations, and the state highway and education arms of the NZTA to obtain funding for transport service, maintenance and improvement activities, and for education activities. It also sets out requirements for funding of road enforcement activities by the New Zealand Police.

The Act requires the NZTA to satisfy itself that any activity or combination of activities that it approves for funding contributes to its objective of an affordable, integrated, safe, responsive and sustainable land transport system, that it contributes to the objectives of the Act and that alternatives and options have been considered; in short that the activity represents value for money. The NZTA must also give effect to the current *Government policy statement on land transport funding*.

These requirements form the basis of the processes and guidance contained in the NZTA's *Planning, programming and funding manual*.

The Act was amended in 2008. This amendment, among other things, created the NZTA, formed by the merger of Transit New Zealand and Land Transport NZ.

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**Local Government  
Act 1974 and 2002  
(LGA)**

The LGA provides the general framework and powers under which TAs operate, and is designed to provide a democratic and effective local government that recognises the diversity of New Zealand communities. The legislation promotes local accountability and defines a clear purpose for local government.

In relation to the provision and maintenance of traffic signs, the LGA sets out the general powers of TAs, including the setting of bylaws.

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**Resource  
Management Act  
1991 (RMA)**

The RMA requires the preparation of district, city and regional plans. Such plans document activities that are allowed 'as of right' and the need to obtain resource consent for those activities that may affect the environment. For the purposes of this document, this specifically relates to the placement and type of signs (eg advertising signs) located within the road environment and whether the requirements of the relevant district, city or regional plans are met.

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**Government  
Roading Powers  
Act 1989**

With the establishment of the NZTA on 1 August 2008 and the merging of Land Transport NZ and Transit New Zealand, the Transit New Zealand Act 1989 was amended and renamed the Government Roading Powers Act 1989.

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**Railways Act 2005**

This Act sets out the requirements for the licensing of persons operating a railway in New Zealand. It covers monorails, and both light and heavy railways on track with a gauge of 550mm or greater. It also includes basic safety obligations for operators and the general public when near a railway, and sets out the powers that railway operators have to protect and manage the railway corridor.

All level crossings, as defined in the Railways Act 2005, should be protected through the use of appropriate traffic control devices. These devices range from passive through to active types. The type of devices used depends on the crossing type, the density of rail and road traffic, and the physical attributes of the crossing and its surrounds.

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**Building Act 2004**

The Act aims to improve the control of, and encourage better practices in building design and construction. In respect to this document, this may have an impact on large signs, such as advertising billboards that are to be installed on a public road. In such circumstances, information should be sought from the TA or RCA on the size of the structure, as a building consent may be required. A TA may also have a sign or traffic bylaw that outlines the requirements and conditions for the use of signs.

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### 3.1.2 Land transport rules

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**TCD Rule**

The TCD Rule describes the requirements for the design, construction, installation, operation and maintenance of traffic control devices. It sets out and details the responsibilities of RCAs in the provision of traffic control devices.

RCAs must follow the requirements set down in the TCD Rule. In particular, subclause 13.1(1) states 'a road controlling authority must comply with this rule when providing, installing, modifying or maintaining a traffic control device', such as a traffic sign.

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**Road User Rule**

The Road User Rule applies to all road users and stipulates how traffic must operate on the road. In particular, 'if traffic at any place is controlled by a traffic control device, a person (including a pedestrian) using the road at that place must comply with the instructions given by that traffic control device that apply to them' (subclause 3.1(1)).

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**Land Transport  
Rule: Setting of  
Speed Limits 2003**

The Rule establishes procedures for RCAs to set enforceable speed limits. The rule specifies where speed limit signs must be installed.

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**Land Transport  
Rule: Vehicle  
Dimensions and  
Mass 2002**

The Rule specifies the requirements for dimension and mass limits for vehicles operating on roads within New Zealand. The Rule provides a regulatory regime to help ensure that vehicles are operated in a safe manner. In relation to traffic control devices, it sets out specific requirements for the use of vehicle-mounted signs. These include the dimension, colour and retroreflective requirements for hazard warning flags and panels. It also sets out the responsibilities for ensuring compliance with the Rule.

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## 3.2 Legal obligations to install signs

The decision to install a traffic sign (with the exception of some vehicle-mounted signs) is determined by an RCA or, within the area of a level crossing, rail access providers (guidance on the use of signs at level crossings can be found in part 9 of the TCD manual).

Where an RCA has exercised its powers under statutory authority (eg under the Land Transport Act 1998 or the LGA) either directly or through the making of a bylaw, resolution or by some other means, the RCA is required by the TCD Rule to notify road users of their obligations.

Private landowners such as airports and universities are considered to be RCAs and therefore where traffic signs are installed, the signs must comply with the requirements of the TCD Rule. This ensures consistency of interpretation and behaviour by road users on both public and private roads.

The legal requirements concerning the installation of signs are set down below while further technical guidance is contained in section 7.

### Regulatory signs

Subclause 4.2(2) of the TCD Rule states:

‘A road controlling authority must install regulatory signs in accordance with [the TCD Rule] to draw attention to a requirement, restriction or prohibition on road users when:

- (a) the RCA has made the requirement, restriction or prohibition by bylaw (or other instrument) on a road under its control; or
- (b) [the TCD Rule] or any other enactment requires the installation of a regulatory sign to draw attention to the requirement, restriction or prohibition; or
- (c) [the TCD Rule] or any other enactment does not require the installation of a regulatory sign, but the RCA consider it desirable that a sign be installed.’

Subclause 4.2(3) of the TCD Rule states:

‘Regulatory signs must be installed to instruct road users of a requirement, restriction or prohibition on traffic:

- (a) at each point where the requirement, restriction or prohibition applies; or
- (b) where the requirement, restriction or prohibition applies to a length of road:
  - (i) at the start; and
  - (ii) after each intersection along its length; and
  - (iii) at the end; and
  - (iv) at intervals along its length, as specified in the Rule or other enactments (ie clearway)
- (c) where the requirement, restriction or prohibition applies to a zone restriction at:
  - (i) each entry point to the zone; and
  - (ii) intervals within the zone, as specified in the Rule; and
  - (iii) each exit point from the zone.’

In addition, under subclause 4.2(1), where a speed limit changes and at intervals within the speed limit area, as specified in section 8 of Land Transport Rule: Setting of Speed Limits 2003, an RCA must provide a regulatory sign to instruct road users of the maximum speed at which they may travel.



**Warning signs**


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Subclause 4.2(4) of the TCD Rule states:

'A road controlling authority must install a permanent warning sign at any place where it considers special care or reduced speed is appropriate, and in particular, must consider its appropriateness near the entrance to a school, kindergarten, pre-school centre or hospital.'

As indicated in section 3.1 of this document, the Land Transport Rule: Vehicle Dimensions and Mass 2002 specifies particular requirements for the use of vehicle-mounted warning signs on vehicles exceeding specific dimension and mass limits, and the responsibility for ensuring that the signs are displayed.

The TCD Rule states that a motor vehicle that is being used as a school bus must display a School Bus warning sign at the front and rear of the vehicle when the vehicle is operating and being used as a school bus.

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**Temporary warning signs**

Subclause 4.2(5) of the TCD Rule requires an RCA to 'install temporary warning signs if it considers there is, or is likely to arise at any place on a road, a temporary risk of:

- (a) damage to the public or to road workers; or
- (b) damage to the road.'

In addition, subclause 4.2(6) of the TCD Rule states 'for a temporary hazard, such a disabled vehicle on the road, an accident, a slip, a washout or a broken transmission line, an appropriate temporary warning sign may be erected by:

- (a) emergency services personnel; or
- (b) a worker involved in removing the temporary hazard, or in making the hazard area safe.'

As set down in section 2 of this document, appropriate temporary warning signs may also be mounted on vehicles.

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**Advisory signs**

Subclause 4.2(10) of the TCD Rule states:

'A road controlling authority must install and maintain signs, as it considers necessary or desirable, to inform road users of destinations, routes, street names, distances, the names of localities or other information of value to road users.'

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**3.3 Enforcement**


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There are many different forms of enforcement for compliance with traffic signs, in particular those regulatory signs that require, restrict or prohibit specific actions by road users. The primary aim of enforcement of any type of control is to effectively manage the use of the road and provide a safer environment for road users.

The New Zealand Police may enforce compliance with regulatory traffic signs on public and private roads as part of their general enforcement powers primarily under the Land Transport Act 1998.

TAs and regional councils have the right to set bylaws under the Land Transport Act 1998 and the LGA. They may, for example, in relation to parking controls, appoint parking wardens or special vehicle lane enforcement officers.

Private RCAs have more limited mechanisms available to enforce compliance with regulatory signs but do have powers under their common law rights to control the activities of the public on their land.

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## 4.0 General use

### 4.1 Principles

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Traffic signs are an essential element of the road system. They are provided to aid the safe and orderly movement of traffic. When using traffic signs, RCAs must abide by the general requirements for all traffic control devices set down in clause 3.1 of the TCD Rule:

'Traffic control devices, whether used singly or in combination, must contribute to the safe and effective control of traffic and must:

- (a) be safe and appropriate for the road, its environment or the use of the road; and
- (b) not dazzle, distract or mislead road users; and
- (c) convey a clear and consistent message to road users; and
- (d) be placed so as to:
  - (i) be visible to road users; and
  - (ii) be legible to road users, if of a type that includes written words or symbols; and
  - (iii) allow adequate time for the intended response from road users; and
- (e) comply with the relevant requirements in Schedules 1, 2 and 3 [of the TCD Rule], and
- (f) be maintained in good repair.'

In addition to the requirements of the TCD Rule, some general principles for using signs are described in part 10 of *Austroads Guide to traffic management*. Traffic signs should:

- be coordinated with the geometric road layout so that they are conspicuous in both day and night-time conditions, and not used to 'solve problems caused by poor and confusing road geometry'
- be installed according to design guides and warrants (however, a device should not necessarily be installed simply because a guide or warrant is met – engineering judgement must still be applied when deciding the most appropriate traffic sign, or alternative measure)
- be properly located and of adequate size so that road users can read and act on the message
- provide adequate advance warning of hazard or decision points, notwithstanding that the hazard or decision point itself should be adequately delineated.

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#### Older road users

Research has also indicated the need to consider the design of traffic signs when catering for older road users. *Austroads Road environment and design for older drivers: Stage II Volume 2 – Handbook of suggestions for road design change* states that 'currently, the design, legibility and placement of signs is determined by the average driver with normal vision and quick reactions. However, many older drivers have declining eyesight and slower decision making capabilities'.

Where there is a large proportion of older road users on a road network, signs need to be more conspicuous. Larger traffic signs, with proportionally increased letter heights and symbol sizes, may be required. The type of sign materials must also be considered, as some may provide excessive brightness or glare to the road user and reduce the legibility of signs.

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### 4.1.1 Route consistency and signing schemes

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It is important that road users travelling through different RCA areas receive consistent messages concerning the road environment. This consistency is assisted by the application of legislation, policies and guidelines that specify the safe and efficient use of traffic signs, markings and other traffic control devices.

Sign schemes can be a beneficial element in maintaining a safe, consistent and manageable road network. Signs and markings are often installed individually for a specific purpose, but they should be considered as part of an overall signing and marking or traffic management scheme. Designers not only have to ensure the correct devices are used for particular purposes but also that the devices relate logically to each other and do not provide contradictory information.

Further detailed information and general advice on the need for whole-of-route signing schemes is provided in part 10 of the Austroads *Guide to traffic management*.

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### 4.1.2 Overuse of signs versus self-explaining roads

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In some instances, an excessive number of signs may have been installed in an attempt to address deficiencies in road geometry, environmental conditions or road safety concerns. Although they may be used to address such issues, traffic signs are unlikely to be an effective long-term solution for problems caused by road geometry inadequacies.

It is important that signs can be easily understood and are sufficiently spaced to allow enough time for the message to be interpreted and acted on. Where there are too many signs, the most important message may be lost among the clutter. In instances where an excessive number of signs are installed, their use should be reviewed and rationalised. However, the preferable alternative is for geometric improvements to be undertaken.

Self-explaining roads are those whose nature can be readily understood through features such as buildings, structures, terrain or vegetation. These provide road users with visual cues to enable them to assess risks and anticipate events. As a result, the need for signs is reduced. Where possible, transport practitioners should focus on providing self-explaining roads rather than relying on signs and other traffic control devices to reduce risk.

In addition, an excessive number of traffic signs may have a negative impact upon streetscapes and the prevailing character of the surrounding environment. While legal requirements for traffic signs must be followed, consideration should be given to elements of the New Zealand Urban Design Protocol when installing signs.

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### 4.1.3 Basic legal requirements

The basic legal requirements for traffic signs are described in subclauses 4.4(1)–(5) of the TCD Rule, which state:














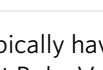
- (a) a traffic sign, and the details on the sign, must comply with the minimum dimensions specified in schedule 1 of the Rule, however
- (b) the dimensions of a traffic sign may be increased provided that the dimension of each letter, numeral, symbol or other detail on the sign are kept in approximate proportion to the dimensions of the other details on the sign, and
- (c) a traffic sign may display only words or symbols that are allowed by the TCD Rule except:
  - (i) where the Agency has authorised the installation or maintenance of a non-conforming sign
  - (ii) for other than regulatory signs, the display of one monogram or logo of a specified maximum size on a traffic sign.

### 4.1.4 Sign shape and symbol comprehension

#### Shapes

Sign shape provides an indication of the type of sign that is being used. Normally, this is identified in conjunction with the colour used. Table 4.1 identifies some examples of basic sign shapes and colours.

**Table 4.1 Examples of common shapes and colours of signs**

Type of sign	Common sign shape
Regulatory signs	     
Warning signs	 
Guide signs	 
Tourist signs	 
Service signs	 

**Note:** Vehicle-mounted signs typically have a range of shapes and sizes – refer to the TCD Rule and the Land Transport Rule: Vehicle Dimension and Mass 2002. In addition, warning signs may be combined with rectangular supplementary plates in the same colour as the warning sign.

#### Symbols

Symbols on signs can usually be seen, ‘read’ and interpreted at a greater distance ahead of a decision-making point than a similar message conveyed by words. In addition, when they conform to internationally accepted formats, symbols can convey messages more clearly and quickly to road users whose English may be limited.



It is important only standard symbols are used. Experience has shown it is necessary to properly assess road users’ understanding of symbols. Approved symbols are detailed in schedule 1 of the TCD Rule and specifications are detailed at [www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications).

### 4.1.5 Trials and use of non-standard signs

A significant number of traffic signs are available to address the wide range of road and environment situations that road users need to be informed of. In some relatively rare cases, there may not be any existing approved sign which adequately relates to an identified hazard. The use of a non-standard sign (ie one not identified by the TCD Rule) to warn road users about a specific hazard may need to be considered.

Where the use of a non-standard or non-conforming sign is necessary, the NZTA's approval is required. Depending on the nature of the proposed sign:

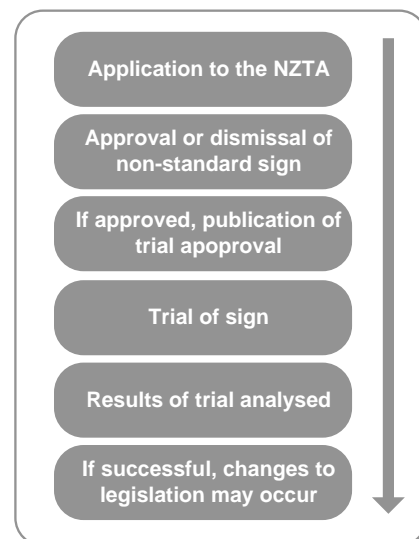
- the sign may be approved by the NZTA under subclause 4.4(4) of the TCD Rule, or
- a trial of the sign, in terms of clause 3.4 of the TCD Rule, may be required.

As part of a trial process, the RCA must submit an application to the NZTA that provides sufficient information to allow an informed decision to be made.

The required information should include:

- the issue to be addressed (objectives of trial)
- background (existing situation)
- technical analysis (description of trial)
- impacts and risks assessment
- expected safety and efficiency gains
- consultation to be undertaken or proposed
- assessment method.

An outline of the process is illustrated in figure 4.1. A full description is included in traffic note 10 which can be found at [www.nzta.govt.nz/resources/traffic-notes](http://www.nzta.govt.nz/resources/traffic-notes).



**Figure 4.1** Trial process

### 4.1.6 Inappropriate use of signs

To provide a safe environment for road users, it is important to select the most appropriate sign for traffic control purposes and the provision of information. The inappropriate use of signs can occur when:

- standard traffic signs are used to convey the wrong message or provide inconsistent information, eg sign symbols that don't reflect the road geometry (photo 4.1)
- non-standard traffic signs (such as advertising signs) are made to look like a standard sign (photo 4.2).

**Photo 4.1** Signs showing two different road layout symbols



**Photo 4.2** Advertising sign resembling a traffic sign



Subclause 3.2(5) of the TCD Rule states:

'A person must not install on a road, or in or on a place visible from a road, a sign, device, or object that is not a traffic control device, but that:

- (a) may be mistaken for a traffic control device; or
- (b) may prevent the traffic control device from complying [with the general safety requirements for traffic control devices as described within the TCD Rule clause 3.1].'

#### 4.1.7 Multiple and combination signs

Subclause 4.5(1) of the TCD Rule requires that, except in specific circumstances (see below), 'a traffic sign must not be installed with another sign on the same pole or in the same location on the same building, wall or fence ...'

The specific circumstances where a combination of signs is permitted are:

- if each sign is installed so that its message/face can only be seen by road users for which the message is intended; and the shape, size or orientation of the sign does not obscure the sign or mislead and distract road users from the sign intended to be seen by road users travelling in a different direction
- at level crossings, where signs may include assemblies such as:
  - Stop or Give Way, crossbuck, Look For Trains signs, and
  - where traffic signals are installed, combinations of a crossbuck, Stop On Red signal, and
  - where appropriate, a [number of] Tracks sign (TCD Rule subclauses 9.4(7) and (8))
- where an intersection is controlled by traffic signals, combinations of the following:
  - Keep Left
  - turning traffic give way to pedestrians
  - turn left at any time with care
  - a sign either prohibiting road users from moving in a specific direction or requiring road users to move in a specific direction
  - a specific pedestrian sign not visible to an approaching vehicle
  - a street name sign (TCD Rule subclause 10.5(2))

- a combination of signs that relate to cyclists and pedestrians (TCD Rule subclause 11.4(3))
- not more than two parking signs, or three parking signs, provided one of them is a Clearway or special vehicle lane sign (see part 7 of the TCD manual)
- a combination of one parking sign and one pedestrian sign, which may be installed on the same pole or in the same location on the same building, wall or fence (TCD Rule subclause 12.6(4))
- where service, tourist and guide/route or general information signs are used and the following principles apply:
  - tourist and service information may, under certain conditions, be combined with guide signing
  - general information signs should not be used to sign services and tourist features and facilities.

Specific details on the provision and location of combinations of service, tourist and guide/route or general information signs can be found in part 2 of the TCD manual (under development)

- supplementary information in the form of scheduled public transport timetables are not considered traffic signs, and may be attached to sign supports (eg bus stop signs) subject to RCA approval (see section 4.1.10).

Supplementary sign plates providing information such as distances, advisory speeds or general information are not considered as separate signs (ie the main sign and its supplementary plate are considered as a single sign).

#### 4.1.8 Backing boards

A backing board is a larger surrounding panel or board on which a standard traffic sign (or combination of traffic signs) is placed, creating a larger visual target to enhance its conspicuity. In general, increasing the size of the standard sign is the preferred, and often necessary, option. However, in some locations, the environment (often low or high levels of light), background contrast and competing or distracting roadside features may justify the use of backing boards.

Backing boards are typically used:

- on temporary traffic signs for level 2 and 3 roads (figure 4.2)
- on urban or rural speed threshold sites (figure 4.3) where the backing board also contributes significantly to the 'gating' effect being sought
- when other normal treatments have been tried (eg larger signs and upgraded delineation) but a higher-than-expected crash rate is still experienced (figure 4.4).

**Figure 4.2** Temporary traffic sign



**Figure 4.3** Speed threshold sign



**Figure 4.4** Sites with high crash rates





## Colours

The following colours may be used for backing boards:

- white (non-reflective sheeting)
- wrey (non-reflective sheeting) ('Aircraft Grey' No 693 (PMS 431) of the British Standard BS381C *Specification for colours for identification, coding and special purposes* or similar). This colour is primarily used for the reverse of a sign where a smaller sign is mounted on the reverse, eg a standard '100km/h speed limit' sign on the reverse of a speed threshold sign
- black - matt
- green - dark, matt
- green retroreflective (only for use on a speed threshold sign - normally state highways) (figure 4.3)
- blue retroreflective (only for use on a speed threshold sign).

The following colours should not be used on backing boards:

- red - this colour is reserved for specific signs, such as Wrong Way and crossbuck level crossing signs and should not be used elsewhere
- yellow or yellow-green, whether reflectorised or fluorescent (especially where a permanent warning sign is being used) - some use has been made of fluorescent yellow as a backing board for Give Way signs at roundabouts (immediately beyond roundabout metering signals) but general use as a backing board is not recommended

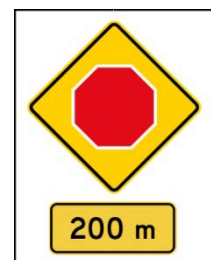
The following principles must be considered when using backing boards:

- a. The backing board colour should provide a contrast between the sign and the environment (eg it would not be desirable to use a green backing board where there is a significant area of similarly coloured vegetation located behind the traffic sign).
- b. Bright, conspicuous backing boards should be used sparingly to indicate high crash risk sites.
- c. Backing boards should not be fully retroreflective, reflective or fluorescent unless otherwise specified in the appropriate part of the TCD manual.

## Shape

It is recommended that backing boards are rectangular or square. A single rectangular or square backing board makes it much easier to install combinations of traffic signs, such as a speed limit and locality name.

Further to the guidance in section 4.1.7 on the use of multiple and combination signs, a backing board can be used for a combination of approved signs if each sign is installed so the message is seen only by the traffic for which the message is intended. Consideration should also be given to whether a road user approaching from the opposite direction to the sign face has a need to distinguish the shape of the traffic sign. For example, this may have particular relevance for Give Way and Stop signs at intersections where road users need to know who should give way. In this instance, rectangular backing boards should not be used. Where there is a risk to road users at these sites, consideration may be given to providing an advance warning sign for the intersection with, if necessary, a rectangular backing board (figure 4.5).



**Figure 4.5** Advance warning of stop sign with backing board

## 4.1.9 Vehicle-mounted signs

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Subclause 4.4(13) of the TCD Rule states that a traffic sign must not be displayed on a vehicle unless:

- it is a motor vehicle being used as a school bus
  - it is a motor vehicle required by the Land Transport Rule: Vehicle Dimensions and Mass 2002 to display a vehicle-mounted sign complying with the relevant provisions of that Rule
  - it is a variable traffic sign which complies with Rule requirements on variable traffic signs and the vehicle remains stationary in a safe position on the roadside
  - the display complies with schedule 1 of the TCD Rule, including signs covered by temporary traffic management requirements, eg mower or grader.
- 

## 4.1.10 Use of logos and monograms

### General

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Logos and monograms are defined as being graphic symbols or designs that are used to represent a company, organisation or concept. This can also include a 'punched' logo or monogram.

Subclause 4.4(5) of the TCD Rule states that a traffic sign, other than a regulatory sign, may display one monogram or one logo on:

- a street name sign that identifies the RCA or locality within an RCA's area, provided the monogram or logo does not detract from the legibility of the street name sign
- a sign other than a street name sign, provided that:
  - on a sign less than 1m<sup>2</sup> in area, the monogram or logo is not larger than 30cm<sup>2</sup>
  - on a sign 1m<sup>2</sup> or greater in area, the monogram or logo is not larger than 100cm<sup>2</sup>.

A monogram must not be displayed on the reverse side of a traffic sign or on a pole on which an RCA has installed a traffic sign. However, a non-reflective sticker, label or other device may be used if it is no more than 100cm<sup>2</sup> and displays ownership details, information that uniquely identifies the sign manufacturer, or installation or maintenance information (see section 5.1.2 of this document).

Subclauses 7.3(14) and 7.3(15) of the Land Transport Rule: Vehicle Dimensions and Mass 2002 state that the front doors of a Class 1 pilot vehicles must each clearly display a pilot logo approved by the Agency, while Class 2 pilot vehicles may display an Agency-approved pilot logo on each of the front doors.

### Sign support

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In general, written material (other than a supplementary notice relating to a passenger transport service) or a monogram/logo must not be displayed on any sign supports on which an RCA has installed a traffic sign.

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### 4.1.11 Temporary masking of signs

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Some situations (such as roadworks, the presence of temporary hazards or special events) require the temporary masking of traffic signs. The type or quality of some masking techniques (particularly systems applied directly to the sign face) may affect:

- the traffic sign's retroreflective material, therefore voiding the manufacturer's warranty
- the night-time reflectivity of the sign
- road user behaviour, where inferior or incomplete masking enables the underlying traffic sign message to be seen and therefore creates uncertainty and potentially leads to unsafe road user behaviour, eg travelling at the masked speed restriction may be unsafe for the road user or any workers in the affected area.

RCAs should ensure that any temporary masking is effective. This means:

- any masking applied to the sign face will not affect any product warranties
  - while masked, the sign cannot be read or, if only partial covering of the sign is required, the remaining message is not open to misinterpretation
  - the covering material is fixed securely and preferably without using any form of adhesive or other means likely to damage the sign
  - when removed, there is no detrimental effect on the performance of the sign.
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## 4.2 Types of signs

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Traffic signs have been classified by function into six main groups:

- regulatory (including general, parking and road user restrictions)
- warning (including temporary and permanent)
- guide and route (including street name and community facilities)
- tourist
- service
- general information.

Specific information can be sourced at [www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications).

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## 4.2.1 Regulatory signs

Regulatory signs (including speed limit and parking signs) are those covered by legislation that governs road user behaviour by requiring or prohibiting specific actions (TCD Rule clause 4.1). The TCD Rule makes RCAs responsible for ensuring every regulatory sign fully complies with the legal requirements regarding minimum dimension, shape, colour, reflectorisation, location and authority for installation.

To facilitate traffic law enforcement, it is necessary for RCAs to institute formal authorisation procedures for regulatory and parking signs. For these types of signs, the RCA must record when and where the signs are installed and the authority (rule, bylaw or other legal instrument) under which they have been installed.

Regulatory signs have legal significance and must be readily distinguishable from all other signs. It is not practical to standardise regulatory signs by shape alone. Therefore, distinction is made by using specific combinations of shape and colour. Where standard signs do not adequately describe the specific legal provision, a general regulatory sign with a red border may be required.

There are two types of regulatory signs:

- **prohibitory** – those indicating an action a road user must not take, eg no right turn
- **mandatory** – those indicating an action a road user must take, eg turn left.



## 4.2.2 Warning signs

### Permanent warning

Warning signs inform road users of unusual or hazardous conditions on the road ahead.

These signs generally have a black legend on a retroreflective or fluorescent retroreflective, diamond-shaped yellow background.



Some permanent warning signs do not conform to this general shape, eg Truck advisory speed and the Look For Trains sign.

Further detailed information on the types of permanent warning signs can be found in the appropriate parts of the TCD Manual. Detailed specifications can be found at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

### Temporary warning

These signs generally have a black legend on a retroreflectorised, diamond-shaped orange background. Some temporary warning signs are also required to be fluorescent, while others may be mounted on a white rectangular backing board. In addition, some temporary signs are rectangular.

Further detailed information on the use of these temporary warning signs can be found in part 8 of the TCD manual.

### 4.2.3 Guide and route signs

#### Guide signs

Guide signs inform road users of the direction and distances to places on the road ahead or on intersecting roads. These include advance direction signs, intersection direction signs and confirmation direction signs. These guide or route signs should give road users a clear direction message at the correct location.

Further detailed information on the use of these signs can be found in part 2 of the TCD manual and at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

These types of signs may also include route markers to help road users identify routes and to supplement directional text information.



**Figure 4.6** Map style advance direction sign with route indicators

#### Route signs

Route signs inform road users of the types of routes by using logos. Routes include the Pacific Coast Highway, the Thermal Highway and wine trails, etc.

Further detailed information on the use of these signs can be found in part 2 of the TCD manual and at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

#### Street name signs

Street name signs are generally used to provide information to road users at intersections. They may be used alone or in combination with guide or route signs on arterial or collector routes.

Further detailed information on the use of these signs can be found in part 2 of the TCD manual and at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

### 4.2.4 Tourist signs

Tourist signs are used to indicate the location of tourist facilities that are not obvious to passing road users.

Further detailed information on the use of these signs can be found in part 2 of the TCD manual and at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

### 4.2.5 Service signs

Service signs are used to identify locations or facilities that are commonly provided for travellers. They can identify various forms of service areas, from simple rest areas in rural locations to larger service centres with a variety of facilities. The signs generally contain internationally recognised symbols, such as fuel pumps and information signs.

Further detailed information on the use of these signs can be found in part 2 of the TCD manual and at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

Service signs are not intended to guide road users through the road system and should only be used to indicate services that are not obvious.

## 4.2.6 General information signs

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General information signs are used to provide road users with information of general interest, such as the names of rivers and streams, local authority boundaries, advice on road conditions, land features and other areas of interest. They can be differentiated from tourist signs (section 4.2.5 above), which direct road users to a geographical feature, enterprise or scenic route that is mainly of interest to tourists.

Further detailed information on the use of these signs can be found in part 2 of the TCD manual and at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

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## 5.0 General design principles

### 5.1 Panel details

#### 5.1.1 Sign or panel face

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Sign face details must comply with descriptions in the TCD Rule, which are shown in the TCD specifications, and the Land Transport Rule: Vehicle Dimensions and Mass 2002.

Subclause 4.4(7) of the TCD Rule requires a traffic sign that must be reflectorised (in part or whole) to be comprised of:

- reflectorised material approved by the Agency by notice in the New Zealand Gazette, or
- be internally or externally illuminated so as to be visible when illuminated.

Further information relating to sign reflectorisation and illumination is included in section 8 of this document.

In deciding which materials to approve for use on signs the Agency considers AS/NZS 1906.1:2007.

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#### 5.1.2 Panel reverse

##### Traffic signs

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The colour of the panel reverse should normally be 'Aircraft Grey' No 693 (PMS 431) of the British Standard BS381C *Specification for colours for identification, coding and special purposes*. The finish should be semi-gloss or matte to reduce specular glare. Other colours may be used, depending on the environment or other factors, eg any sign that could interfere with any pedestrian or cycle movement may be better coloured white, while a matte dark green or black may be more appropriate in a scenic reserve (providing the sign does not then constitute a hazard for road users).

The panel reverse should only be used for specific items. This may include another traffic sign, remembering that subparagraph 4.5(1)(b)(ii) of the TCD Rule requires 'the shape, size or orientation of any sign [not to] obscure another sign, or mislead or distract road user from the sign intended to be seen by traffic moving in another direction'. See also sections 4.1.7 and 4.1.8 of this document.

The panel reverse is also the most common location for production, installation or other information relating to the sign. Paragraph 4.4(6) (b) of the TCD Rule states that a non-reflective sticker, label or other device, no more than 100cm<sup>2</sup> may be installed on the reverse side of a traffic sign. This label may provide details about the sign's:

- ownership
  - unique identification
  - manufacture, installation or maintenance.
-

## Traffic signs continued

In some circumstances, generally where the panel reverse is not readily seen (ie because of back-to-back signs or the sign is mounted against a structure such as a wall), the label may be installed on the sign support or adjacent to the sign. It must not be placed on the panel face.



**Figure 5.1** Example panel reverse sticker

Figure 5.1 shows an example panel reverse sticker. This includes the manufacturer's name and contact details and the month and year of manufacture. (Reproduced at approximately 60 percent of a typical size.)

## Other signs – billboards and advertising signs

Where signs are used for advertising purposes, the panel reverse can either be blank or show another advertising sign, a logo or a message, such as the reverse panel for a sign at a construction site (see figure 5.2).



**Figure 5.2** An example of a reverse panel of a sign at a construction site

However, clause 4.7 of the TCD Rule states that the panel face or panel reverse must not contain:

- '(a) reflective material, if it is likely to reflect the light from the lamps of any vehicle on the road
- (b) fluorescent or phosphorescent material if it is likely to mislead or distract drivers from traffic signs installed in the vicinity or mask those signs.'

Further information on the use of advertising signs, including billboards, can be found in part 3 of the TCD manual.

## 5.2 Sign specification

Specifications relating to the dimensions, colour and layout requirements of all traffic signs are contained in schedule 1 of the TCD Rule (available at [www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications)).

In addition, the NZTA is collating the specifications into 'format enabling images' that can be integrated directly into sign manufacturing software or as images that can be used when preparing sign schemes or other documents. The sign specifications can be viewed at [www.nzta.govt.nz/resources/traffic-control-devices-manual/index](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/index).

### 5.2.1 Size selection

Generally, the size of a traffic sign, its symbols, text and other elements must conform to minima defined in the TCD Rule. Site-specific one-off signs, such as guide, route or service signs, must meet the minima defined in the rule, but clearly it is not possible or appropriate to specify the content of all such signs. In situations where the rule does not address the specific design criteria for a particular sign, design principles set down in the rule and relevant parts of the TCD manual should be adhered to.



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The sign size used for a particular circumstance should be determined by a range of factors, including:

- the speed environment
- the type of sign
- whether the road is in an urban or rural location
- whether it is a two-lane or multi-lane road
- the lateral offset from a driver's position to the sign
- the crash history of the site
- competing visual stimuli.

If a standard-sized sign is installed but a problem persists, an option might be to increase the sign size. However, consideration should be given to a staged process of increasing the size of the sign rather than installing a maximum-sized sign as a first step. The next stage, after a period of monitoring, might be to consider an even larger sign, the use of backing boards (see section 4.1.8 of this document) or an active sign, if this is appropriate (see section 6.1 of this document).

It is important to consider sign size consistency along a route. For example, a series of permanent warning signs of varying sizes along a route may impact on a road user's perception of relative risk between sites.

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## 5.2.2 Specific sign size

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The appropriate size for the following signs should be determined in the manner described below.

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### Stop, Give Way and Give Way at Roundabout signs

Sizes are defined in the detailed specifications for each sign.

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### Circular disc regulatory signs

*In urban areas:*

- the minimum allowable size is 400mm in diameter, which can only be used where:
  - the sign is not primarily intended for motorists, eg No Pedestrians
  - the sign is illuminated and used in conjunction with a traffic signal
  - the physical restrictions of a site do not allow the use of a larger sign
- the normal sign size where 85<sup>th</sup> percentile operating speeds are 50km/h or less is 600mm in diameter (the only exception is when the Keep Left sign is used as part of two identical vertically stacked 300mm discs)
- where signs are to be installed on a median-divided road and where vehicle operating speeds are in excess of 65km/h, signs 750mm in diameter or larger should be considered.

*In rural areas,* the normal size is 750mm in diameter. However, where signs are to be installed on median-divided roads and where operating speeds are high (generally >90km/h), signs 900mm in diameter or larger should be considered.

Large signs (1200mm in diameter or larger) should be considered for motorways, other high-speed expressways, critical locations where there is a speed limit change and the leading ends of median islands.

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**Permanent warning signs** (except curve warning and curve advisory speed signs)

In *urban areas*:

- the normal sign size is 600mm × 600mm (measured along the edge of the sign)
- where signs are to be installed on a median-divided road and where 85<sup>th</sup> percentile operating speeds exceed 50km/h, 750mm × 750mm or larger signs should be used.

In *rural areas*:

- the normal sign size is 750mm × 750mm, but, where the 85<sup>th</sup> percentile approach speed is less than 65km/h, 600mm × 600mm size signs may be considered
- where signs are to be installed on a median-divided road, on motorways and where operating speeds are high (generally >90km/h), 900mm × 900mm signs or larger signs should be used.

The size requirements for warning signs and panels for vehicle-mounted signs associated with overdimension or overweight loads are set down in the Land Transport Rule: Vehicle Dimensions and Mass 2002.

**Permanent curve warning and curve advisory speed signs**

The size of permanent curve warning and curve advisory signs is determined generally by the degree of the hazard, ie their size is generally larger as the differential between the operating speed of the curve and the approach roads increases, or the severity of the roadside hazard increases.

**Guide, service, tourist and general interest signs**

Sign size is determined by the content and design rules for each type of sign. These include:

- the number of lines of text permitted
- the symbols required or permitted
- clearances between the legend and edges of the sign
- border widths.

Design size and layout requirements for these signs are covered in part 2 of the TCD manual.

### 5.2.3 Reduced sign sizes

In some situations, a legal minimum-sized sign may not fit without encroaching into the minimum lateral clearance space and thus creating a hazard to road users (eg where there is only a narrow central median). In such circumstances, a smaller sign may be installed to duplicate an existing legal-sized sign on the opposite side of the roadway.

In other situations, a practitioner may consider that the environment (eg speed) or the target audience (eg pedestrians or cyclists) indicates that a smaller than legal-minimum sign size may be appropriate. However, such signs are not currently legally permitted, nor are they desirable for typical locations. Therefore they must not be used.

## 5.3 Lettering

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Any lettering and numerals used on traffic signs must conform to the TCD Rule, in particular those specified in schedule 1 (available at [www.nzta.govt.nz/resources/rules/traffic-control-devices-index](http://www.nzta.govt.nz/resources/rules/traffic-control-devices-index)).

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### 5.3.1 Letter size and style

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Two alphabet styles are used for letters on signs:

- Standard alphabets based on US standards are sourced from AS1744:1975 (known as Standard alphabets for road signs). The standard describes eight different forms and sizes of letters and numerals, ranging from series A (narrow letters) to series F (broader letters) and includes modified series E and lower-case forms. In New Zealand, series A, B C, D, E and modified E lower case are the fonts of this style used on signs, other than as described in the bullet point below.
- Transport Medium NZ font should only be used for:
  - text on parking signs
  - abbreviations for metric symbols, including kilometres (km), metres (m), kilometres per hour (km/h) and kilograms (kg).

The legibility of signs is significantly affected by the type of lettering and the retroreflectivity of the materials used. The stroke width needs to increase (by moving from the Series A font through to the Series E font) as the retroreflective performance of the background material increases. It is also important to recognise that a larger letter size is likely to improve legibility for older road users. Part 10 of the *Austrroads Guide to traffic management* recommends that:

‘at locations where the background and surroundings to the sign have a large amount of material that would make the sign difficult to see (eg urban areas with illuminated advertising signs, shop fronts or other lights), a larger legend and sign may be used at the discretion of the designer.’

Further information on legibility principles and formulae to determine legibility distances are also provided in part 10 of the *Austrroads Guide to traffic management*.

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### 5.3.2 Specific letter size and style requirements

#### Regulatory and warning signs

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Letter size and style is defined in the TCD Rule according to letter height and stroke width, while the TCD specifications website ([www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications)) describes letter heights and fonts for each type of sign.

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## Guide and route signs

The minimum letter size is specified for each road class in part 2 of the TCD manual. The actual letter size required may vary, depending on the size of the sign.

Guide signs use modified Series E for lower case and Series D or E for upper case.

The modified Series E lower case alphabet is only used for destination or stage names. Series D or E upper case are used for all additional information shown on guide signs, eg directional or road user information, street names.

The letter size for a guide sign is determined by the following factors:

- The speed of vehicles approaching the sign.
- The number of lines of text on the sign.
- The type of font to be used on the sign.
- The lateral and vertical position of the sign in relation to approaching road users.

The requirements for guide sign lettering, alphabet style, legend, layout and typical sign examples are given in part 2 of the TCD manual and specified on the traffic sign specifications website [www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications).

## Service and tourist signs

Part 2 of the TCD manual gives the general layout requirements for the lettering on service signs and tourist signs, as well as typical examples.

Letter size is determined by sign type and road classification. Letter style used is Series D or E upper case with medium spacing. The 'feature' described on tourist signs may, however, use modified series E lower case alphabet.

## General information signs

The general layout requirements for general information sign lettering, as well as typical examples, are given in part 2 of the TCD manual and specified on the traffic sign specifications website [www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications).

# 5.4 Legends

A legend is defined as the text and symbols used on traffic signs. As previously stated, any text, numbers or symbols used on traffic signs must conform to the TCD Rule, particularly the specifications listed in schedule 1 (available at [www.nzta.govt.nz/resources/rules/traffic-control-devices-index](http://www.nzta.govt.nz/resources/rules/traffic-control-devices-index)).

## Regulatory and warnings signs

The legends for these signs are fully defined in the individual sign details on the NZTA sign specification website ([www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications](http://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications)).

## Guide and route signs

The detailed design rules specify the text and symbols that may be shown on each particular type of guide sign. Further information on guide and route signs is provided in part 2 of the TCD manual (under development).

Stage and destination names adopted for use on guide signs on state highways have been chosen on the basis that the places are likely to be known to many road users and are shown prominently on most road maps. Only names approved by the New Zealand Geographical Board (NZGB) can be used on state highways. These names can be found in part 2 of the TCD manual. The appropriate name must feature on all guide signs between the first placement and the destination.

Guide and route signs continued

Guide signs must be approved by the relevant RCA. Design rules for guide signs limit the number of lines of text on each type of sign. Including minor or intermediate place names in addition to the approved stage or destination name could create too many words and lines on a sign. Therefore, place names should be introduced on a 'sequential, distance from sign basis', up to the maximum allowed, ie when the first minor or intermediate place is reached, it is replaced with the next place name in the sequence, and so on.

Distances

Table 5.1 illustrates how distances should be shown on sign legends.

Table 5.1 Distances shown on sign legends

Distance	Increment	Shown as
Up to 949 metres	Nearest 100 metre	'xxx m'
950 metres or more	Nearest kilometre	'xx km'

5.5 Dual name signs

Dual name places and features are those where two official names (a primary and a secondary) are used. Only those dual names recognised by the NZGB should be shown on guide, route, tourist and general information signs. Typical dual name signs are illustrated in figures 5.3, 5.4 and 5.5.

5.5.1 Dual name conventions

The NZGB convention for dual names is to separate the primary name from the secondary name with a '/' character, ie Primary Name/Secondary Name.

This sequence of primary and secondary names is set by the NZGB and cannot be changed to accommodate a traffic sign size. However, it is generally not possible to use a single line format to show dual names on traffic signs, even for two short names.

The method adopted for state highways is to:

- show the primary name in the standard manner and lettering style generally used for the type of sign
- show the secondary name in italic capital lettering three-quarters the size of the initial capitals used for the primary name
- centre the secondary name immediately beneath the primary name.

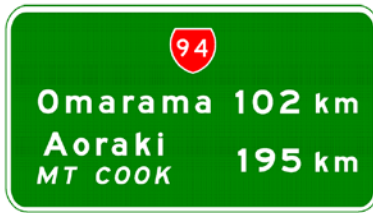


Figure 5.3 Example dual name sign for Aoraki (Mount Cook)

The principles adopted for state highways should also be followed on local roads to provide a nationally consistent approach for dual name signing.

Additional information on dual name signs on guide, route, tourist and general interest signs can be found in part 2 of the TCD manual.

## 5.5.2 Māori names

Māori names can be either the primary (figure 5.3) or secondary (figures 5.4 and 5.5) names and may use macrons to indicate long vowels in Māori (figure 5.5).

It is advisable to check the correct wording with:

- the Māori organisation that has mana whenua status in the area, and
- the NZGB for correct presentation.



**Figure 5.4** Example dual name sign



**Figure 5.5** Example dual name sign with macron

Additional information on Māori names on guide, route, tourist and general interest signs can be found in part 2 of the TCD manual.

## 6.0 Variable traffic signs

### 6.1 Background

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A variable traffic sign is defined in subclause 4.3(2) of the TCD Rule as a sign capable of displaying a different message to meet traffic management needs at different times. It may be either a permanent sign or a temporary sign. Variable traffic signs are often also referred to as dynamic message signs.

Variable traffic signs may:

- display two or more different fixed messages
- display an infinite range of messages, restricted only by the size of the sign and the capability of the technology
- combine elements of both of the above forms.

The responsibility for approval of a variable traffic sign rests with the RCA.

Clause 4.6 of the TCD Rule states:

'A variable traffic sign must:

- (a) in changing from one traffic sign to another, conform to a protocol approved by the road controlling authority; and
- (b) display only traffic signs that comply with Schedule 1 [of the Rule] and that are approved by the road controlling authority.'

Variable traffic signs can contribute to a safer driving environment, better distribution of traffic flows, and provide en-route opportunities to advise travellers of road conditions, hazard delays, parking guidance, incidents and detours.

Variable traffic signs may be activated either manually or automatically:

- From a central controller to provide appropriate real-time information – for instance to indicate current traffic conditions/delays or a change in speed limit, the presence of livestock, curve, truck, pedestrian, cyclist or equestrian hazards over certain times of the day.
- By the use of detectors to identify the presence of a vehicle or road user which actuates a particular message or warning to provide feedback to an approaching road user – for instance to highlight a particular hazard or risk as a result of their speed or a command to change their speed.

Variable traffic signs should be considered on the basis of both strategic and local needs:

- Their strategic use relates primarily to an overall network impact involving a systematic approach as part of an advanced traffic management system (ATMS). These types of signs are generally used on main arterial roads to provide information to road users at critical decision points, such as major intersections.
  - Local variable traffic signs (relating to local issues such as hazardous conditions at local sites) can be used to provide specific route information where there are no alternatives for the road users to make route changes.
-

The US *Manual of uniform traffic control devices* (MUTCD) suggests that effective variable traffic signs need to meet the following basic requirements:

- **Fulfil a need:** Messages must only be posted on signs when there is a real need. If messages are perceived to be unnecessary, road users may disregard other messages.
- **Command attention and respect:** This can be achieved through the size of the sign or the content of the message, and by the displayed information being accurate and timely.
- **Convey a clear, simple meaning:** At typical speeds, drivers have only a few seconds to notice, read and interpret messages. Composition, formatting and consistency of signage is important for quick comprehension by road users.
- **Give adequate time for a proper response:** Messages that are poorly composed and contain too much information may be difficult for road users to read and act upon within the available time.

Further detailed information on the use of variable traffic signs with ATMS, local, urban and rural applications, and design principles can be found in part 10 of the *Austrroads Guide to traffic management*.

The types of variable traffic signs in use include:

- active signs
- variable message signs
- changeable message signs.

## 6.2 Active signs

Active signs (those that incorporate flashing lights or light emitting diode (LED) components) display messages only when relevant. These types of signs enhance road user awareness of the specific risk applicable when the signs are operating.

In addition to regulatory 40km/h speed limit school zone signs, the use of active warning signs are currently formally restricted to:

- School Zone signs
- speed indicator devices
- traffic signals/roundabout queue warning signs
- livestock, curve, truck, pedestrian, cyclist and equestrian hazards
- vehicle-mounted school bus – children signs
- temporary traffic signs, such as person working, exclamation mark (!), car skidding, person holding flag and lane change ahead.

The use of these types of signs is often effective in situations of high risk, such as the beginning and end of the school day, the movement of stock and during roadworks. Active components of a sign should therefore only be displayed on when the hazard is present.





However, both permanent and temporary active warning sign installations should only be used or approved by an RCA when all other options for using standard reflective signs are considered inadequate and that road users need additional warning. Accordingly, prior to their use, consideration should be given to:

- the use of a standard warning sign
- the use of a larger sized sign of the same type
- dual or gated signs (ie an additional sign on the right-hand side of the road, or mounted above the roadway (taking overdimension loads and routes into account)
- an extra warning sign in advance of the standard warning sign
- the use of an NZTA-approved special permanent message supplementary sign to indicate a hazard that cannot be satisfactorily conveyed using any of the existing approved standard warning symbols – to be located beneath a general warning sign (W19-1).

When installed, active warning signs may be used to:

- to replace a standard reflective warning sign at the same position in advance of the hazard
- as an advanced warning sign located prior to a standard warning sign
- at the same position in advance of a hazard with a standard warning sign relocated to provide advanced warning.

Further information and guidance on the use of specific types of active signs and the associated specifications can be found in:

- Traffic note 23: Speed indicator devices
- Traffic note 37: 40km/h variable speed limits in school zones
- Traffic note 56: Active school warning signs
- Traffic note 57: Active warning signs – not at schools.

The above traffic notes are available at [www.nzta.govt.nz/resources/traffic-notes/traffic-notes](http://www.nzta.govt.nz/resources/traffic-notes/traffic-notes).

Specific guidance on the use of variable traffic signs to influence vehicle speeds will be provided in part 6 of the TCD manual while parts 4 and 5 of the TCD manual will include comment on the use of variable traffic signs at intersections and along mid-block sections of road.

## 6.3 Variable message signs

A variable message sign (VMS) is an electronic sign in which the message can be changed in form, shape, layout and colour (photo 6.1). Such signs may be illuminated. VMS can be either permanently located or portable, such as those used with temporary traffic management trucks, or on trailers where the message is not always required to be in a set location.



**Photo 6.1** Variable message sign

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A VMS can be used to:

- actively manage traffic flows
- complement a changeable message sign (CMS) to enhance travel information measures
- warn road users of unusual conditions that may affect traffic operations on the roading network such as ice or slips
- provide real-time travel information to road users
- complement the fixed warning signs for temporary traffic control.

Information and guidance relating to VMS consistency across regional boundaries can be found in part 10 of the Austroads *Guide to traffic management* and the NZTA's *VMS sign guidelines and reference manual* (under development), which should be used as the basis for all VMS.

As indicated in section 6.2 of this document, part 6 of the TCD manual will provide specific guidance on the use of variable speed limit signs.

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### 6.3.1 VMS matrix types

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Message options are limited by the type of VMS used and its display space configuration or matrix. There are three typical types of matrix displays: character, line and full.

- **Character matrix:** A separate display space is made available for each letter of the text message. For example, a character matrix of 12 horizontal by three vertical has 36 display spaces available.
- **Line matrix:** There is no physical separation between the characters in a single line of text. However, there is separation between different lines of text.
- **Full matrix:** No physical separation exists between individual characters or lines in the message. A message can be shown at any size and location as long as it is within the display space. This is the preferred option for state highways.



### 6.3.2 Location

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As stated in subclause 4.4(9) of the TCD Rule, a traffic sign, including a VMS, must be positioned above or to the left of approaching road users. In almost all situations, it is inappropriate to position a VMS on the right-hand side of approaching traffic. However, the sign may be placed in a different position where it would be safer eg a traffic sign may be placed on the right-hand side where geometry may restrict a road user's line of sight to a sign on the left-hand side of the road, or in temporary traffic management situations.

If the VMS is intended to advise a route diversion, the sign should be located sufficiently in advance of the alternate route intersection to allow road users to assimilate the message and respond accordingly, including lane changes if necessary. Table 6.1 shows suggested distances for the placement of VMS in advance of intersections.

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## Clear sight distance

Visibility and impact, and sign size in proportion to the environmental context, are particularly important when selecting a site. High-volume urban roads and high-speed rural roads (>90km/h) require sites that allow road users clear sight distance to the sign of at least 375m for a 300mm character height, and at least 250m for a 200mm character height. In lower-speed environments, the distances can be reduced proportionally.

Further information on these types of requirements is included in the NZTA's *VMS sign guideline and reference manual* (under development).

**Table 6.1 Suggested distance for placement of VMS from intersections** (Source: NZTA's *VMS sign guideline and reference manual*)

Road environment	Placement of VMS
Motorway	Minimum distance of 1500m prior to an access/diversion point
Urban and arterial roads	The distance may vary, depending on issues such as speed limits, local factors and right-of-way constraints
Rural single lane	With no need to change lanes, but acknowledging the complexity of some decisions and the route choices, a distance equating to at least 1000m in a 100km/h zone, or a proportionally reduced distance in a lower-speed zone
Rural (AADT <2000)	May display a message advising road users to turn back. Consideration should be given to choosing a site that has a suitable pull-over/turning area just after and within view of the sign for map reading/turning around
Rural (AADT >2000)	With higher volumes and a high-speed environment, a level is reached where pulling over or turning around is unsafe. Professional judgement should be used to determine where or if pull-over/turning areas are appropriate

## 6.3.3 The message

### Priority of incidents

Where more than one VMS is used, consideration will need to be given to prioritising the VMS message, depending on the incident.

### Message content

VMS messages should consist of the elements or statements shown in table 6.2.

**Table 6.2 Elements of VMS signs**

Element	Purpose	Requirement
Problem statement	Conveys the type and location of the incident	Mandatory
Effect statement	Conveys the consequence of the incident	Desirable
Attention statement	Conveys a message for an intended group of road users	Desirable where applicable
Action statement	Conveys the course of action to be taken by road users	Mandatory

When signs are used on higher-volume roads, it may be necessary to provide more elements and therefore more information to road users than is mandatory.

The content of a VMS message must provide clear and concise guidance to road users. Further information on message content can be found in the NZTA's *VMS sign guidelines and reference manual* and part 10 of the *Austrroads Guide to traffic management*.

## 6.3.4 Message display

### Display size

The minimum display size is dictated by the maximum message size that needs to be shown on the VMS. This in turn is dictated by the intended intelligent transport system (ITS) application. Table 6.3 shows the recommended VMS display sizes and types.

**Table 6.3 Recommended VMS display sizes and types** (Source: NZTA's *VMS sign guideline and reference manual*)

Application	Number of lines		Number of pixels* across		Type
	Minimum	Ideal	Minimum	Standard	
ATMS motorway	3	4	98		Full matrix
High-volume urban	2	4	72	96-100	Full matrix
Rural	2	2 or 4	72	96-100	Full matrix

\* Note: a pixel is defined as a single point in a graphic image. In the context of this document, a pixel consists of four or more closely grouped LEDs that present a single point of light at a normal viewing distance.

Once the display height (the total height of sign) has been determined, the appropriate character height must be considered. The minimum character height is determined by visibility and the ability of road users to read and comprehend the message. This is a function of:

- total message size
- local speed environment
- lateral position of the VMS
- sign role.

The NZTA's *VMS sign guidelines and reference manual* provides more detailed information on display size.

### Display colour and font

For message/text display, the pixels must be an amber/yellow colour and the following specifications must apply to display fonts and text layout:

- character height – 7 pixels
- character width – 5 pixels (other variations are included in the NZTA's *VMS sign guidelines and reference manual*)
- character spacing – equal to or greater than the width of the down stroke (pitch)
- word spacing – 5 pixels
- line spacing – 4 pixels.

Where applicable, the VMS must also be able to generate the following fonts:

- double stroke (pitch)
- double height (14 pixels)
- triple height (21 pixels).

The VMS must be capable of displaying any combination of text and numerals, including standard punctuation and arrow display.

## 6.4 Changeable message sign

A CMS combines elements of static and variable or alternate information mechanically and electronically. The variable information relates to specific real-time information. They are used for special or targeted purposes for simple, repetitive messages, such as available parking (photo 6.3). A CMS is particularly suitable for situations where the more extensive functions and flexibility offered by VMS are not required on a regular basis.



**Photo 6.3** Changeable message sign

Static information set down on the signs must comply with the requirements of the TCD Rule while the variable elements of the sign should comply with the VMS requirements of section 6.2 of this document.

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## 7.0 Installation

### 7.1 General principles

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Subclause 4.4(9) of the TCD Rule states that other than vehicle-mounted, signs must be installed on the left-hand side of a road user approaching the sign, except for situations where a different position would be safer and more effective or is specified in any enactment.

An example where it may be inappropriate to install a sign on the left-hand side could include a time-restricted bus lane not adjacent to the kerb (ie in the central lane). In this instance, an overhead sign may need to be used in addition to a sign on the right-hand side of the road, traffic island or the central median (as appropriate).

In addition:

- signs should always be positioned so they do not obscure other signs or restrict road users' vision (particularly at intersections) and so they do not compromise accessibility
- signs should not normally be installed on medians unless they specifically refer to traffic travelling in the median lane (ie the lane adjacent to median)
- at channelised intersections, some signs may need to be placed on traffic signal poles or the right-hand side of some roadways (such as Keep Left signs)
- in general, only one type of sign should be mounted on each post, except where:
  - another sign of the same size and shape is mounted on the reverse side and is intended to be seen by opposing traffic
  - one sign supplements the other
  - they are route, direction, service or tourist signs that can be combined in certain situations (see section 4.1.7 of this document)
- where a sign is located in an exposed position (ie within the clear zone), frangible support posts should be used. Alternatively, where no other option is available, the installation of some form of protection for road users (eg guardrail or barrier). Further information on these types of sign supports and guidance on their use in both urban and rural environments is given section 7.2.2 of this document
- consideration should be given as to whether the sign is to be located on an overdimension route (see section 7.3.3 of this document)
- environmental and aesthetic requirements, site layouts and sign size should be considered, especially regarding the location. Departures from standard sign positioning rules should be formally justified when determining the placement of a sign.

Specific requirements relating to the design, manufacture, installation, maintenance and compliance for non-vehicle mounted traffic signs are included in the RSMA *Compliance standard for traffic signs*.

Guidance on the positioning of vehicle-mounted signs relating to overdimension and overweight vehicles is available in the Land Transport Rule: Vehicle Dimensions and Mass 2002.

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## 7.2 Sign supports

### 7.2.1 Legislative requirements

#### General

The TCD Rule does not stipulate a particular colour for traffic sign supports other than those located on traffic signals, pedestrian crossing poles or level crossings. At other locations, traffic sign supports must not be the same as the colours used on supports at the above locations. It is recommended that the support should be white unless made of aluminium or galvanised steel – which may be left unpainted.

As identified previously, the TCD Rule states that ‘written material (other than a supplementary notice relating to a passenger transport service) or a monogram/logo must not be displayed on any sign supports on which a road controlling device has installed a traffic sign’.

#### Traffic signal controlled intersections

Under subclause 10.5(2) of the TCD Rule, only specific signs may be located on traffic signal supports (see part 4 of the TCD manual). Traffic signal supports must be painted yellow.

#### Pedestrian crossings

The TCD Rule states that an RCA ‘must install, within 2m from each end of a pedestrian crossing and on a traffic island that separates two pedestrian crossings, a pole that is:

- ‘(a) 75mm or more in width and 2m or more in height; and
- (b) marked with alternate parallel bands of black and white, which may be reflectorised, each of which is approximately 300mm wide’.

Traffic signs other than a fluorescent reflectorised orange sign in the form of a disk that is 400mm or more in diameter, must not be attached to the black and white poles.

#### Level crossings

The TCD Rule states that ‘a rail access provider may install, at a level crossing, poles that have reflectorised red and white alternate bands that are at least 300mm wide’. Part 9 of the TCD manual provides detailed guidance on traffic control devices at level crossings.

### 7.2.2 Sign support methods

Signs can be mounted on poles or posts, including telecommunication and power poles, and other existing structures, such as buildings, bridges, walls or fences.

Where a sign is to be installed on anything other than a specific sign post support, approval of the owner of the structure should be sought.

The frangibility of a sign support is important and consideration should be given to providing frangible sign supports where signs are located close to the road and the risk of an errant vehicle colliding with the post or pole is a factor. Specific dimensions and requirements for these types of installations are outlined in section 7.3 and illustrated in figures 7.1–7.10.



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**Post**

Posts used to support either small or larger roadside traffic signs can be made of steel, aluminium, timber and other fit-for-purpose materials, including UV-stabilised plastics. Information on the types and appropriate standards for post materials and their installation can be found in the Road Safety Manufacturers Association (RSMA) *Compliance standard for traffic signs*.

A small sign is defined as a sign with a panel area that is less than or equal to 4.7m<sup>2</sup>. Where the sign is less than 1.3m wide, only one support post is needed. Where the width is greater than 1.3m wide, the sign should have two support posts.

A large sign is defined as sign which has two or more posts, a panel size exceeding 4.7m<sup>2</sup> or sign supports located more than 2.1m apart. Dimensions of large signs and the number of posts required for specific signs can be found in the appropriate parts of the TCD manual and the RSMA *Compliance standard for traffic signs*.

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**Gantries**

Gantries are large sign support structures that allow signs to be positioned above traffic lanes and are typically used where one or more of the following apply:

- on high-volume roads
- on multi-lane roads
- where there are high operating speeds
- where sight visibility for approaching traffic may be restricted
- at locations where space is not available at the roadside
- where the sign needs to refer to a specific traffic lane.

Figures 7.9 and 7.10, and photos 7.1 and 7.2 show typical examples of gantry supports.

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**Existing structures**

The use of existing structures to support a sign may provide a safer environment for road users as this reduces the number of structures on the side of the road. Traffic signs may be placed on existing structures, such as telecommunication poles, buildings, bridges, walls or fences. However, the addition of a sign on an existing pole (eg telecommunication pole or street lighting poles) may compromise the wind loading of the pole, thereby reducing the stability of the pole.

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### 7.2.3 Frangibility and impact performance

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Where signs are placed within the clear zone (ie located close to the edge of the road), they can present a hazard and therefore increase the risk of injury to road users. If a sign cannot be relocated outside of the clear zone, the vertical support post should be frangible. However, in urban areas, the RCA may consider that the risk of injury to pedestrians from breakaway sign posts exceeds that for vehicle occupants. Alternatively, non-frangible signs supports should be located behind a roadside barrier.

Sign supports that comply with impact requirements are detailed in the RSMA *Compliance standard for traffic signs*.

Information relating to impact performance, frangibility and breakaway designs can be found in the NZTA's *Performance based specification for traffic signs* and *State highway geometric design manual*, the RSMA *Compliance standard for traffic signs*, and the Austroads *Guide to traffic management* part 10.

Further information on site-specific requirements are detailed below.

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**State highways**

Where signs and their supports are located in the clear zone on state highways, they must be designed, manufactured, installed and maintained to comply with National Cooperative Highway Research Program (NCHRP) report 350 *Recommended procedures for the safety performance evaluation of highway features for test level 3*.

If they do not comply with NCHRP 350, then signs must not be used in the clear zone unless they are protected by a barrier system or fixed-impact attenuator.

Overhead signs (including cantilevered signs) generally require significant support systems that are unable to be frangible. All overhead sign supports located within the clear zone must be specifically designed to Australian/New Zealand Standard 1170 *Structural design action* (AS/NZS 1170:2002) and be shielded behind an appropriately designed safety barrier.

**Local roads**

Where signs are located within the clear zone on local, high-speed roads, adoption of the state highway requirements should be considered for safety reasons.

On other roads, particularly those in urban areas and low-speed environments, the RCA should develop their own policy on appropriate measures, including whether sign support posts should be frangible. Such decisions should consider the type of environment and associated level of risk, including the risk of injury to pedestrians associated with breakaway sign posts. Examples of sites where breakaway supports may be undesirable are adjacent to bus shelters or in areas with high concentrations of pedestrians.

## 7.3 Location

In addition to the general design principles outlined in section 7.1 of this document and the good practice considerations described in sections 7.2.1 and 7.2.2, there are specific requirements for the placement of signs.

### 7.3.1 Longitudinal position

The longitudinal position refers to a sign's position along the road, ie the distance from a specific point or hazard.

**Regulatory signs**

Subclause 4.2(3) of the TCD Rule indicates that regulatory signs must be installed to instruct road users of a requirement, restriction or prohibition:

- '(a) at each point where the requirement, restriction or prohibition applies; or
- (b) where the requirement, restriction or prohibition applies to a length of road:
  - (i) at the start; and
  - (ii) after each intersection along its length; and
  - (iii) at the end; and
  - (iv) at intervals along its length, as specified in [the TCD Rule] or other enactment; or
- (c) where the requirement, restriction or prohibition applies to a zone restriction at:
  - (i) each entry point to the zone; and
  - (ii) intervals within the zone, as specified in the Rule; and
  - (iii) each exit point from the zone.'

## Regulatory signs continued

Forward visibility for these signs will vary from 30m in urban areas for pedestrians and cyclists to 60–120m in both urban and rural areas, depending on the type of sign. Further information should be obtained from relevant parts of the TCD manual.

Specific legal distance requirements for longitudinal position relate only to the use of speed limit signs, which must comply with the requirements of the Land Transport Rule: Setting of Speed Limits 2003. In summary, it states that a speed limit sign must be placed on the left-hand side (and, in many cases, duplicated on the right-hand side) within 20m of its legally defined position.

## Warning signs

Warning signs should be located sufficiently in advance of an unusual or hazardous situation for a road user to react in an appropriate manner. Longitudinal distances in advance of the hazard are the same for both permanent and temporary warning signs.

The distance between the warning sign and the hazardous situation should be:

- the distance required to reduce (decelerate) the vehicle operating speed from the 85th percentile vehicle speed at the location of the sign to either the speed required at the situation or hazard which depending upon the hazard encountered, may require anything from a small speed reduction (eg a moderate curve) to a significant speed reduction (eg a sharp curve great than 90 degrees), or
- to a stop, eg when the sign is an advance warning of the Stop or Give Way control at the next intersection.

Austrroads *Guide to traffic management* part 10 states that the maximum distance between an advance warning sign and the hazard or decision point should generally not exceed the equivalent of approximately 15 seconds of travel to reflect the short-term memory refractory period. General guidance relating to the location of warning signs contained in part 10 is set out in table 7.1. The range of distances for each road environment reflects the type of speed of reduction deemed necessary and allows some flexibility in sign location.

In addition to the distances set down in table 7.1, table 7.2 provides general guidance on the deceleration distances for light vehicles (such as cars and utilities) on a level grade, to assist with sign placement. For information relating to the deceleration distances required for heavy vehicles, refer to Austrroads *Guide to road design* part 4a.

Designers should be aware of the different braking capabilities of heavy vehicles and this should be taken into account when setting out sign locations, as should the impact of gradients on braking.

**Table 7.1 Longitudinal location of warning signs** (Source: Austrroads *Guide to traffic management* part 10)

Road environment		A (m)	B (m)
Rural	$V_{85} \leq 70\text{km/h}$	80 - 120	50
	$V_{85} > 70 - 90\text{km/h}$	120 - 180	60
	$V_{85} > 90\text{km/h}$	180 - 250	70
Urban	Business and residential roads	30 - 100	30
	Arterial roads	As per rural	As per rural

## Warning signs

continued

### Note:

$V_{85}$  is the 85th percentile speed measured 1.5 to 2 times 'A' in advance of the hazard.

A – distance from sign to hazard.

B – minimum distance between successive signs having different messages.

**Table 7.2 Deceleration distances for light vehicles (cars or utilities)**

85th percentile speed at sign location (km/h)	Deceleration distance (m), between the sign location and the unusual or hazardous situation to achieve a speed of:							
	0	20	30	40	50	60	70	80
50	60	55	45	30	-	-	-	-
60	80	75	65	50	30	-	-	-
70	100	95	80	70	55	35	-	-
80	120	110	105	95	80	65	40	-
90	140	135	125	115	100	90	70	45
100	170	160	155	145	130	120	100	80

Warning signs should also be located where approaching road users have an uninterrupted view of them over a distance of at least 120m in rural areas and at least 60m in urban areas.

## Guide, service, tourist and general interest signs

These signs are positioned according to their function, but in general they can also be located where approaching road users have an uninterrupted view of the sign over a distance of at least 120m in rural areas and at least 60m in urban areas.

Specific location details are given in part 2 of the TCD manual.

## 7.3.2 Lateral clearance

Signs should be positioned away from the edge of the roadway (for both the left-hand side edge of the road and medians), as shown in figures 7.1-7.10 and noted in table 7.3, subject to:

- any maximum and minimum dimensions specified
- whether the location is part of a designated overdimension route
- the sign not being an obstruction to pedestrians and cyclists
- the sign not restricting sight distance along a major road from a side road
- any constraints on visibility due to roadside obstructions.

Lateral clearances must be measured from the edge of the sign nearest to the road to:

- the kerb line, or
- the outer edge of the road shoulder or the nearest lane line, whichever is the critical dimension, or
- the face of the guardrail or the nearest lane line, whichever is the critical dimension.

**Table 7.3 Lateral clearances for traffic signs**

Road and environment type			Lateral clearance	
			Minimum (mm)	Maximum (mm)
Urban	Kerbed	Mountable	500 (where minimum lateral clearance cannot be achieved, the sign mounting height must be increased to at least 4.6m to ensure adequate clearance height for most vehicles)	-
		Non-mountable	300	-
	Un-kerbed (including urban arterial expressways)		600	5000 (from nearest lane/closest edge)
	Kerbed (channelised intersections)		500	-
	Un-kerbed		600 (from outer edge of the road shoulder, line of edge marker posts or face of guardrail)	5000 (from nearest lane/closest edge)

For typical sign lateral clearances and mounting heights for regulatory, warning, guide, service and tourist signs, see figures 7.1–7.10.

## Overdimension routes

Where signs are located on a designated overdimension route, their design and installation should consider the width and height requirements of overdimension vehicles and their loads. Guidance contained in New Zealand Heavy Haulage Association *Road design specifications for overdimension loads* indicates that a clearance envelope should have a minimum overall width of 11.5m and height of 6.5m – this includes sufficient tolerance to clear adjacent obstructions such as signs.

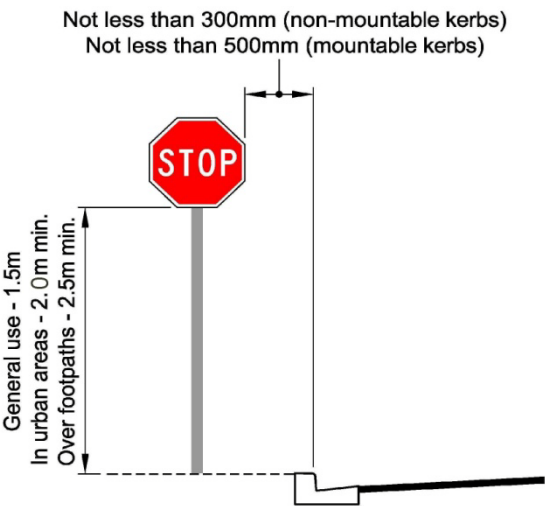
Where traffic signs cannot be located in a permanent position clear of overdimension vehicles, consideration should be given to the use of removable posts or sign supports located in sleeves cast into the ground. Such signs should be bolted or padlocked against the footing sleeve to ensure that they are not inappropriately stolen or removed during the course of their life.

It should be noted that the use of removable signs may require complex procedures to be put in place to ensure the overdimension and pilot vehicles can safely stop and start at each sign to allow the sign to be removed and then replaced. Sign replacements should be undertaken immediately after the overdimension vehicle has passed the sign to ensure that the safety of other road users is not compromised by a missing sign.

## Regulatory and permanent warning signs

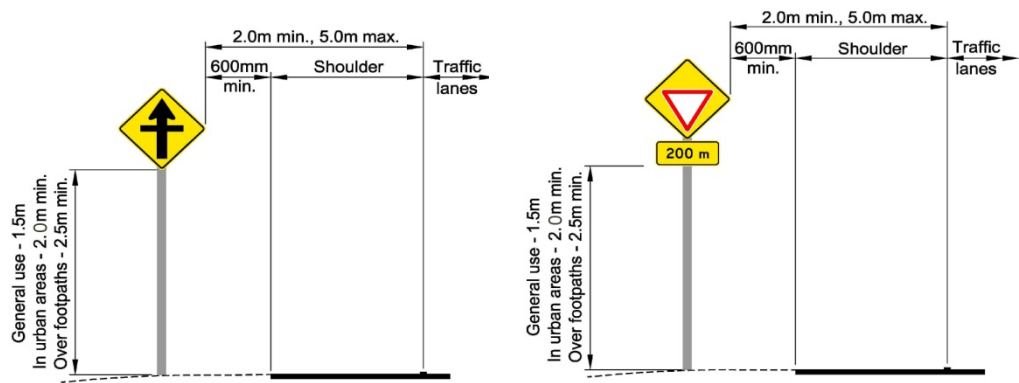
Kerbed roadways (urban and rural)

- Where minimum lateral clearances for kerbed roadways in table 7.2 cannot be provided, the mounting height above the roadway should be increased to at least 4.6m to avoid damage from trucks and vans.



**Figure 7.1** Lateral and height clearances for regulatory and warning signs in kerbed roadways

Un-kerbed roadways



**Figure 7.2** Lateral and height clearances for regulatory and warning signs in un-kerbed roadways

7.3.3 Mounting heights

Signs should be located clear of roadside vegetation and be visible to approaching road users in all conditions. To achieve this, the sign mounting height may need to be varied to suit local site conditions. Minimum mounting heights to the bottom of the sign panel are given in table 7.4 and figures 7.1–7.10.

Table 7.4 Minimum desirable mounting heights for traffic signs

Mounting situation			Minimum desirable mounting height (m)
<b>General minimum</b> This is the height the sign must be mounted as a basic minimum requirement. In some situations, heights may be lower, such as chevron boards on roundabouts, curves, etc		1.5	Mounting height must be measured from the underside of the sign, or the lowest sign in an assembly of signs, to the surface of the adjacent road, trafficable shoulder or top of kerb, whichever is the critical dimension
<b>Rural areas</b> (no footpath)	small sign	1.5	
	large sign	2.1	
<b>Urban areas</b> (not over or near a footpath) Mounting heights need to be increased in urban areas to avoid sign visibility problems caused by parked vehicles	small sign	2.0	
	large sign	2.1	
<b>Over or near a footpath if likely to obstruct</b>		2.5	Mounting height must be measured to the ground surface or footpath immediately beneath the sign
<b>Overhead signs</b> Mounting height is important when there is no alternative route for overdimension loads. (An absolute minimum of 5.3m can be used where the sign is located over an emergency shoulder or parking lane)		6.0	Mounting height must be measured to the road surface immediately below the sign

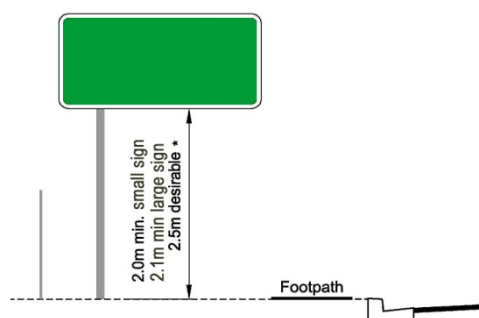


Figure 7.3 Urban location single pole support

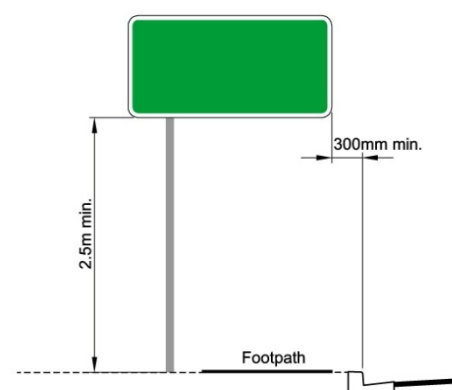
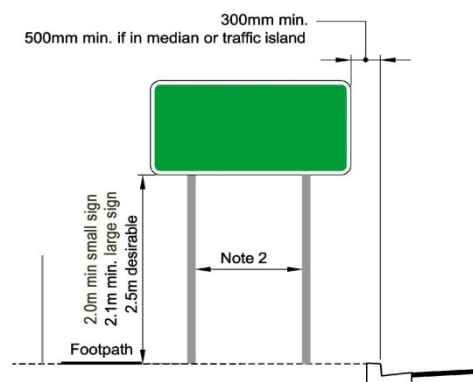


Figure 7.4 Urban location single pole support over a footpath

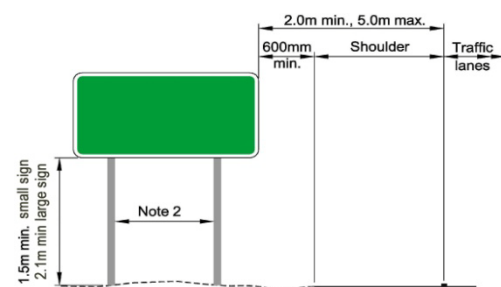
### 7.3.4 Spacing between posts

As a rule:

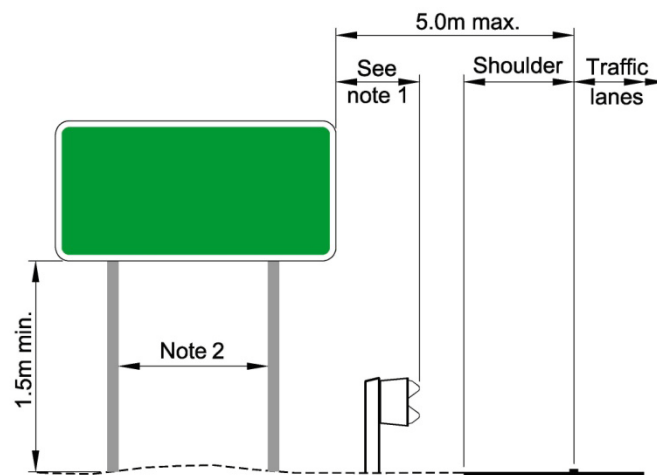
- for signs with two posts, the spacing should be approximately 60 percent of the sign width
- where signs are located on a footpath, consideration needs to be given to pedestrian accessibility around the post and to providing sufficient width to avoid the risk of an errant vehicle striking one or more posts. Further information can be found in the NZTA's *State highway geometric design manual* and the RSMA *Compliance standard for traffic signs*.



**Figure 7.5** Urban location two-pole support



**Figure 7.6** Rural location standard two-pole support

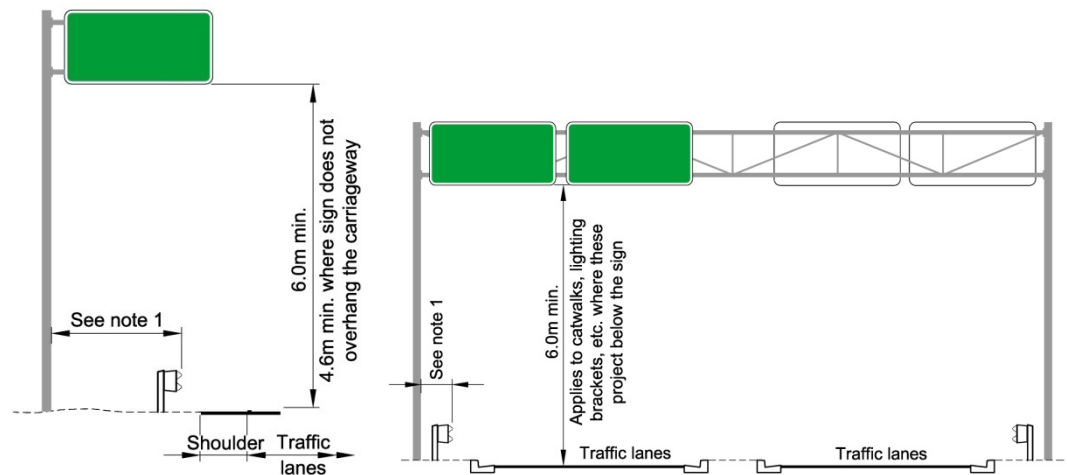


**Figure 7.7** Rural location behind a guardrail

**Note 1:** The offset from the barrier will depend on the type of barrier system, eg rigid, semi-rigid, non-rigid barriers.

**Note 2:** Distance between posts is determined by the width of the sign. Refer to section 7.3.4 of this document.





**Figure 7.8** Cantilever support      **Figure 7.9** Gantry support

**Note 1:** The offset from the barrier will depend on the type of barrier system, eg rigid, semi-rigid, non-rigid barriers.

**Note 2:** Refer also to appendix A3 of the NZTA's *Bridge manual* for further information regarding vertical and horizontal clearances and offsets from different barrier types to signs.

**Note 3:** The absolute minimum height may be reduced to 5.3m where the sign is located over an emergency shoulder or parking lane.



**Photo 7.1** Example of gantry supports

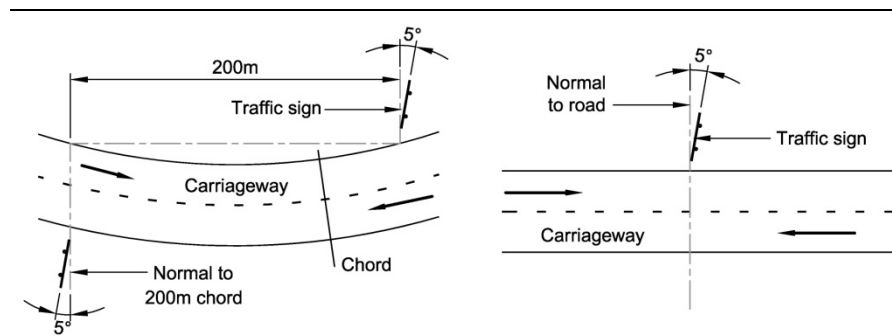


**Photo 7.2** Example of gantry supports

## 7.4 Orientation

The orientation of a traffic sign to oncoming traffic is extremely important. Generally, signs should face the road users' line of sight. When using retroreflectorised sheeting, the sign should be facing five degrees away from the road users' line of sight to reduce possible and undesirable reflection from sign surfaces. Figure 7.10 depicts how to correctly orientate retroreflectorised signs at the side of the road. For gantry signs, the orientation is directed at the road users for whom the message is intended.

The orientation of a sign must also be suitable for the traffic environment. A sign placed at a certain angle, where it can be seen by the target users, must not mislead or distract other road users for whom it is not intended. For example, a traffic sign located adjacent to a slip lane might be seen by road users travelling parallel on the main road. Further specific information on sign sheeting and reflectorisation is included in section 8 of this document.



**Figure 7.10** Methods of avoiding specular reflection from a traffic sign

## 7.5 Construction

Signs (excluding advertising signs) specified in all parts of the TCD manual for the use on all roads should conform to the RSMA *Compliance standard for traffic signs*, in respect of:

- materials
- erection of signs
- methods of construction
- serviceability
- design life.

Further information on these general construction requirements can be found in the NZTA's *Performance based specification for traffic signs* and the RSMA *Compliance standard for traffic signs*.

## 7.6 Inspection and maintenance

Regular inspection and maintenance of traffic signs should be undertaken during both day-time and night-time to ensure all traffic signs are visible and effective in all conditions.

### 7.6.1 Inspection

Inspections should be made under both day and night conditions to ensure:

- signs remain fully effective for the purposes for which they were installed
- maintenance and replacement requirements are regularly assessed.

During inspections, particular attention should be given to the following points:

- a. Does the need for the sign still exist? For example, where there has been a reduction in the posted speed limit, a review should be completed on the need for curve advisory speed signs.
- b. Is the visibility of the sign obscured by vegetation, other signs or other features?
- c. Are the sign and its posts or supports damaged?
- d. Is the sign still legible and correctly orientated?
- e. Are the retroreflective materials effective? Refer to part 10 of the Austroads *Guide to traffic management* for further information.

## 7.6.2 Maintenance

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Clause 3.1 of the TCD Rule outlines the general requirements for traffic signs, including that they must be safe, display clear and consistent messages and be maintained in good repair.

Regular maintenance, including keeping traffic signs clean, legible and with adequate retroreflectivity, is necessary for them to effectively provide messages and visual cues to road users. Where materials such as anti-graffiti and anti-dew sheeting are used, consideration needs to be given to the effects these materials may have on the performance of the signs (see section 8.2.6 of this document).

Detailed information on performance degradation and minimum coefficients of luminous intensity of traffic signs can be found in part 10 of the Austroads *Guide to traffic management*. Reference should also be made to the RSMA *Compliance standard for traffic signs* for detailed information on maintenance of signs, especially with regard to cleaning and repairs.

The frequency of replacement and cleaning of signs, along with the repainting of support posts (where applicable) is dependent on a number of factors including traffic and environmental conditions within a local area. RCAs should develop their own guidelines and policies relating to traffic sign maintenance for their local situation.

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## 8.0 Reflectivity and illumination

### 8.1 Introduction

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Traffic signs are installed to aid the safe and orderly movement of traffic. Therefore, they need to be clear and conspicuous in both day-time and night-time conditions. The level of sign conspicuity can be largely determined through the sign reflectivity (section 8.2 of this document), sheeting type (section 8.3 of this document) and levels of illumination (section 8.4 of this document).

The TCD Rule states that, if a traffic sign needs to be reflectorised (either partly or wholly, as set down in the TCD Rule), then it must:

- use reflectorised material approved by the NZTA by notice in the New Zealand Gazette (see section 8.2.1), or
- be internally or externally illuminated (further guidance on illumination is included in section 8.4).

There are two types of retroreflective material used on signs: retroreflective and fluorescent retroreflective. Fluorescent retroreflective material should be used sparingly and only where:

- a site has been determined as a high safety risk
- a site has challenging environmental conditions, such as areas that receive little or no natural light
- the sign is listed in the TCD Rule as approved for or requiring the use of fluorescent retroreflective sheeting.

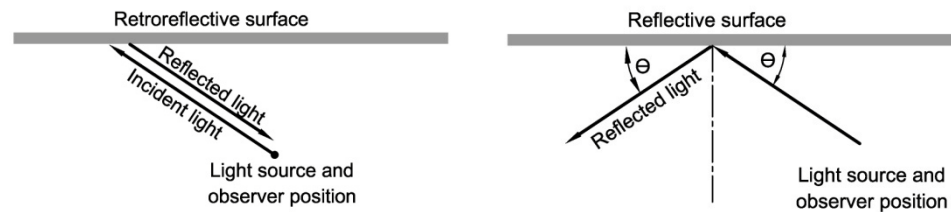
Further information on the use of fluorescent retroreflective sheeting is given in section 8.2.

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## 8.2 Reflectivity

Reflective material (or retroreflective material) is defined in the TCD Rule as being 'any material that is designed to reflect incident light back towards the light source, or in a specific direction, but does not include a reflector'.

The principles of reflective and retroreflective materials are illustrated in figure 8.1.



**Figure 8.1** Definitions of retroreflective and reflective surfacing

The level of reflectivity is not normally specified for signs described in this document, and therefore an RCA should determine an appropriate level for signs on their roads, taking into consideration the:

- conspicuity requirements
- problem or extent of issues the sign is intended to address
- cost-effective service life of different sign face materials
- possible degradation of effectiveness over the life of the sign, due to any specific environmental aspects of the site.

### 8.2.1 Approval process for reflective material

Any retroreflective material used on traffic signs must be approved by the NZTA. In deciding which materials should be used, the NZTA considers AS/NZS 1906.1:2007 and AS/NZS 1906.2:2007. The requirements described in the standards include:

- photometric qualities
- colour (defined by International Commission on Illumination (CIE) chromaticity coordinates)
- rainfall performance
- physical properties, including tensile strength and elongation, bending, impact, scratch resistance, shrinkage, wrinkling, solvent resistance and maintenance
- adhesion, including application, stability and bonding
- durability of the material, including outdoor and indoor accelerated weathering, and resistance to sea salt.

Reflective materials approved for use on traffic signs are listed in the New Zealand Gazette. The current notice can be found at [www.nzta.govt.nz/resources/traffic-notes/docs/tn12-gaz-notice-20060622.pdf](http://www.nzta.govt.nz/resources/traffic-notes/docs/tn12-gaz-notice-20060622.pdf). Approval has been given on the basis of evidence the materials comply with the photometric requirements (ie relating to the measurement of various aspects of light, especially its intensity) and colour performance standards of AS/NZS 1906.1:2007 and 1906.2:2007.

## 8.3 Use of materials

### 8.3.1 Retroreflective materials

#### Sheeting types

The characteristics and use of the various classes of retroreflective sheeting are defined in AS/NZS 1906.1:2007 and AS/NZS 1906.2:2007. The choice of sheeting material should be one of the following types:

- a. **Class 1 sheeting:** Often the most appropriate for general use on permanent urban and rural highway signs that are side mounted and close to the roadway, where the required reading distance (by approaching road users) does not exceed approximately 175m.
- b. **Class 1A sheeting:** Primarily for use on delineators and specified for railway level crossing poles.
- c. **Class 1W sheeting:** May be considered for fully retroreflective signs with lighter-coloured legends where long-distance viewing is necessary or for signs that are substantially offset from a road users' cone of vision (ie overhead signs) or both.
- d. **Class 2 sheeting:** Has a shorter life span than those above, but is acceptable for side-mounted signs close to the roadway, where its moderate photometric performance will not be a problem. It is also suitable sheeting for white background signs where specular reflection (ie light from material with smooth or glossy surfaces) is hard to avoid.

Class 1, 1A and 1W sheeting normally carries a warranty of 10 years or more, but class 2 sheeting has a more limited life expectancy. Additional information on classes of sheeting (including warranty periods and luminous intensity) is included in AS/NZS 1906.1:2007, AS/NZS 1906.2:2007 and part 10 of the *Austrroads Guide to traffic management*.

### 8.3.2 Use of fluorescent retroreflective materials

Fluorescent material has a unique property that absorbs invisible incident ultraviolet (UV) light and re-emits it as visible light. The natural light occurring during dusk, overcast conditions or inclement weather contains a higher proportion of UV light than normal daylight. Therefore, in these conditions, fluorescent sign sheeting material appears brighter than normal sign sheeting.

When assessing visibility requirements for traffic signs, the use of fluorescent retroreflective sheeting may be considered where there is:

- poor visibility, particularly during twilight hours, when heavily overcast or shaded conditions are common, and data indicates an overrepresentation of relevant crash types
- a need for an enhanced level of conspicuity due to contrast issues, such as snow, vegetation or commercial lighting, or where there are high levels of competing demand for road users' attention, such as heavy traffic and commercial activity
- a significant proportion of older drivers and road users travel over the road network (however, in this instance, consideration needs to be given to appropriate forms of reflective sheeting – see section 8.3.8 of this document).

### 8.3.3 Uses of fluorescent retroreflective materials on signs

Specific signs featuring fluorescent retroreflective sheeting have been approved for use by the NZTA.

Note that fluorescent retroreflective yellow-green has been approved for use only on permanent warning signs for vulnerable road users, overdimension vehicles and school bus signs to help highlight particular risks associated with such situations and road users.

#### Temporary traffic control

The NZTA's *Code of practice for temporary traffic management* (CoPTTM) incorporates guidance on the use of temporary traffic control, including the requirements for the use of fluorescent retroreflective orange on a number of critical signs. With the exception of pedestrian belisha discs, fluorescent retroreflective orange has been reserved solely for signs used in terms of CoPTTM.



Further information should be sourced to determine whether the RCA in an area in which temporary works are being undertaken has adopted CoPTTM or whether the RCA has its own temporary traffic management document.

#### Pedestrian crossing Belisha beacon discs

Fluorescent retroreflective orange has been approved for use on Belisha beacon discs at marked pedestrian crossings.



#### Permanent roadside warning signs – vulnerable road users

Retroreflective fluorescent yellow-green has been approved for use on vulnerable road user signs (namely, all pedestrian, cyclist and equestrian permanent warning signage, but excluding motorcyclist specific signs). Note that when using these signs, a consistent approach is needed.



#### Overdimension vehicles

Some vehicles operating with overdimension permits approved by the NZTA are required to mount one or more appropriate signs on their vehicles. Since 1998, these signs have been required to have (at least) fluorescent yellow-green backgrounds if only used in daylight and to have retroreflective fluorescent yellow-green backgrounds if used at night.



#### School buses

School Bus warning signs indicate a school bus route or a school bus turning point may have either a retroreflective yellow or retroreflective fluorescent yellow-green background.



Similarly, vehicle-mounted School Bus signs (with the exception of those with flashing lights) may have either a retroreflective yellow or retroreflective fluorescent yellow-green background. School Bus signs incorporating flashing lights are approved as optional devices for operators and are classed as active signs (see section 6.1 of this document). Such signs have a black background and retroreflective fluorescent yellow-green children symbol.

It is recommended the background material for all new School Bus signs should be retroreflective fluorescent yellow-green. This is considered good practice and is consistent with overdimension vehicle and vulnerable road user signs.



### 8.3.4 Uses of fluorescent (non-retroreflective) materials on signs

Some signs can be fluorescent, but not retroreflective. Therefore, such signs are more suited to day-time rather than night-time conditions.

#### School patrol signs

The circular School Patrol – Stop sign used by authorised and trained school patrols at school crossing points (kea crossings) may be fluorescent red.



#### Children flags

A key component of school crossing points (kea crossings) is the use of a mounted non-retroreflective fluorescent flag when the school patrol is operating. The flag may be red or orange fluorescent material.



### 8.3.5 Fluorescent material as backing boards

Fluorescent material should not be used on backing boards until further research has been undertaken to determine an appropriate material and colour. Additional information on backing boards is given in section 4.1.8 of this document.

### 8.3.6 Graffiti and dew on signs

Graffiti can affect the performance of traffic signs, and in some situations, dew can significantly degrade the retroreflective performance. Overlay materials have been developed that aim to minimise the effects of graffiti and dew.

Anti-graffiti overlay sheeting for use on traffic signs makes it more difficult for graffiti to adhere to the sign surface, and therefore makes it easier to remove.

The overlay provided for the reduction of dew on traffic signs creates a uniform water layer on the sign surface, rather than droplets.

When applied, these overlay materials generally do not change the day-time or night-time colour of a sign.

However, some of the reasons for not using these overlays on traffic signs are:

- the additional initial cost and the possible reduction in the effective design life of the sign. However, this would be counterbalanced by the likelihood that such signs would not otherwise last due to the impact of graffiti and possible degradation from dew retention on the sign face
- the reduction of the retroreflectivity of the sign sheeting
- the ability to apply only one of these products to a sign, not both. The RCA must consider the most likely risk – dew or graffiti – in determining which overlay, if any, should be applied.

Further specific information on the protective qualities of the products should be sourced from the suppliers of the products.

### 8.3.7 Cleaning of sign faces

Materials that meet AS/NSZ 1906.1:2007 and AS/NZS 1906.2:2007 have been tested to withstand a reasonable range of cleaning techniques. However, some cleaning products and methods of cleaning could degrade the performance of the sign. In many cases, such degradation may not be evident during the day-time (generally when the cleaning takes place) but becomes obvious at night.

Where signs have anti-graffiti and anti-dew overlay materials, even greater care is necessary.

Where non-approved solvent-based cleaning products are used on signs, they can destroy the clear coating and therefore reduce the retroreflective properties of the sign sheeting. Use of approved cleaning products and methods is recommended.

Maintenance issues associated with signs are described in 7.6 of this document.

### 8.3.8 Older road users

As people age, they experience loss of visual acuity (ie the sharpness or acuteness of eyesight). Therefore, the ability to read sign messages can become difficult. They are also more likely to become more sensitive to glare or dazzle. Accordingly, the type of sign materials must be considered, as some may provide excessive brightness or glare to road users and reduce the legibility of the signs.

Additional information relating to older road users can be found in section 4.1 of this document.

### 8.3.9 Performance degradation

Performance degradation of signs occurs with normal ageing but varies considerably due to environmental factors. Part 10 of the Austroads *Guide to traffic management* states:

‘Proper maintenance is essential if signs are to remain effective and command the attention and respect of motorists and other road users for the full warranted life of the sign. However, all material will degrade with time and there will come a point at which the external (between the sign and its background environment) and internal (between the legend and sign background material) contrasts of the sign will no longer be sufficient to enable the information to be read. The sign will then be ineffective.’

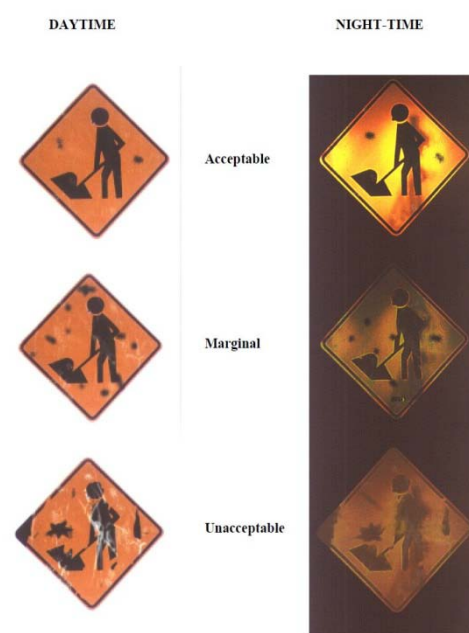


Figure 8.2 Sign reflectivity

Examples of where sign reflectivity is considered acceptable, marginal or unacceptable (ie, requiring replacement) for temporary warning signs are illustrated in figure 8.2.

Where signs are upgraded along a route, consideration should be given to providing consistent reflectivity for the signs. For example, when the reflectivity of one sign on a pole has been improved, the reflectivity of other signs on that pole (eg a supplementary plate) should be similar and therefore its replacement is justified.

Maintenance programmes should be developed to remedy the effects of ageing on traffic sign performance.

## 8.4 Illumination

Illumination, for the purposes of this document, relates to situations where a traffic sign may be made more visible to road users through the use of an artificial light source (not including street or highway lighting).

Part 10 of the Austroads *Guide to traffic management* describes the following situations where illumination of traffic signs should be considered:

- ambient light or background clutter detracts from sign prominence or legibility
- there are other illuminated signs (traffic and other signs) in the proximity of, or within, the field of view
- there is a strong background light level behind the sign (eg emerging from a tunnel and a sign is located at the portal facing into the tunnel)
- Class 1W reflective sheeting is inadequate.

Traffic signs may be illuminated either internally or externally. Note that there is a need to control the brightness of an illuminated sign, as excessively lit signs may create difficulties in a road user's perception of the message. The tendency of the human eye to fixate on bright points in the field of view may also lead to driver distraction.

To avoid excessive brightness, traffic and advertising signs that are internally or externally illuminated should:

- comply with the maximum luminance outlined in table 8.1
- have all floodlights or concealed lighting directed solely on the traffic sign and its surrounds
- have any light source shielded so that glare does not extend beyond the sign.

**Table 8.1 Maximum luminance of illuminated signs** (Source: Institution of Lighting Engineers (1991) *Brightness of illuminated advertisements*)

Illuminated area (m <sup>2</sup> )	Maximum luminance (cd/m <sup>2</sup> )	
	Areas with street lighting	Areas without street lighting
Up to 0.5	2000	1000
0.5-2.0	1600	800
2.0-5.0	1200	600
5.0-10.0	1000	600
Over 10.0	800	400

The maximum luminance described in table 8.1 specifically relates to advertising signs. In the apparent absence of specific information for traffic sign illumination, these values may be used for that purpose.

### 8.4.1 Externally lit

An externally illuminated sign is usually lit by means of a light source directed at the sign. This type of lighting is generally attached directly to the sign or its post or support (eg wall) and designed to direct adequate illumination over the entire face of the sign.

Further information on the practical installation of this type of lighting can be found in part 10 of the *Austrroads Guide to traffic management*.

### 8.4.2 Internally lit

Internally lit signs have a light source (usually fluorescent light or neon tubes) located within the sign structure or placed behind the sign to illuminate the message through a translucent face (photo 8.1). Internally illuminated signs can include direction signs in tunnels, street name signs (not widely used in New Zealand) and various advertising signs.



They are used in some circumstances as 'active signs' where, for example, a part-time ban on a turn at signals is activated.

**Photo 8.1** Internally illuminated sign  
(Source: [www.signalcontrol.com](http://www.signalcontrol.com))

Internally illuminated signs are likely to be used instead of externally lit signs where there is limited room for external lighting to be installed.

### 8.4.3 LED and other directly lit systems

LED signs are generally reserved for high-risk/high-profile sites where a message needs additional conspicuity. Typically, LED signs tend to be used intermittently, eg as part of a temporary sign indicating a traffic incident or for a speed indicator device. Some examples of signs that use LEDs are shown in photos 8.2-8.3.



LED signs can also be used for advertising purposes. However, their use in some situations may confuse road users and will need to be assessed. Further information on the use of advertising signs is included in part 3 of the TCD manual.

There is limited experience in New Zealand in using LED signs. However, it is acknowledged that more guidance is desirable and the NZTA is currently working to develop standards for their use.



**Photo 8.2** 40km/h LED display with standard school speed zone supplementary sign



**Photo 8.3** Variable message sign with LED display