

NZTA Standards and Guidelines

Bob Gibson

Principal Engineer, Network Standards and Safety, New Zealand Transport Agency (NZTA) has for many years worked in the Government sector. In recent years his work has included the development of the Road User and Traffic Control Devices Rules, the NZTA *Manual of traffic control devices* and he is New Zealand's representative on the panel which oversees the development of the Austroads Guide to Traffic Management.

Abstract

This paper considers standards and guidelines relating to road marking from the regulator, traffic management or road user perspective rather than in terms of technical specifications. The paper briefly describes the legislative framework within which road marking plays a part. It also describes how a range of standards and guidelines in relation to where and how marking is installed has evolved and continues to do so with particular emphasis on the New Zealand and Australian setting. It concludes with an outline of a proposed register of standards and guidelines being developed by NZTA for inclusion in its future website.

Introduction

Road markings in many situations supplement and enhance the messages of other traffic control devices such as traffic signs and signals. Sometimes, however, markings may be the only effective way of providing positive guidance or communicating certain regulations or other messages. Because markings are located on the roadway directly in line with the travel path, they can be more prominently visible than other devices and drivers do not have to take their eyes off the road to view them.

Markings should desirably communicate their messages through a uniform system of colors, patterns, widths, symbols, and words. Uniformity of these features makes it possible for drivers to quickly recognize the meaning and react appropriately thereby enabling them to travel safely and efficiently along the road.

This paper provides a brief case study identify why standards can matter and describes the documents that have been used and those that will be used in defining standard markings and developing guidelines for their use.

Do marking standards matter?

A case study - continuity lines at merges

In the *Land Transport Rule: Traffic Control Devices* (TCD Rule) a continuity line is described as one style of edge line and the TCD Rule also includes the following definitions.

edgeline means a marking used indicate the far left or far right side of the roadway
roadway means that portion of the road used or reasonably useable for the time being for vehicular traffic in general.

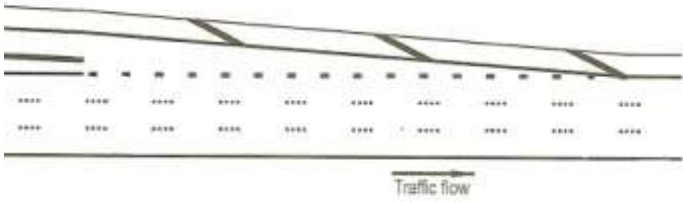
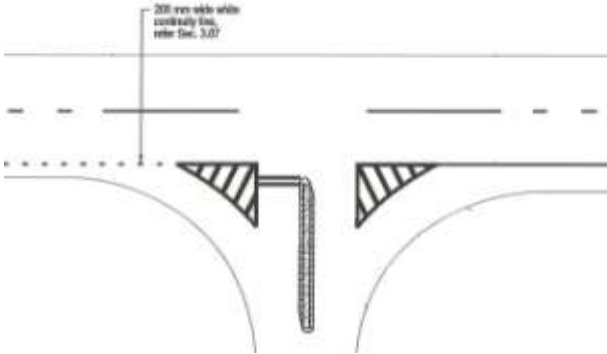
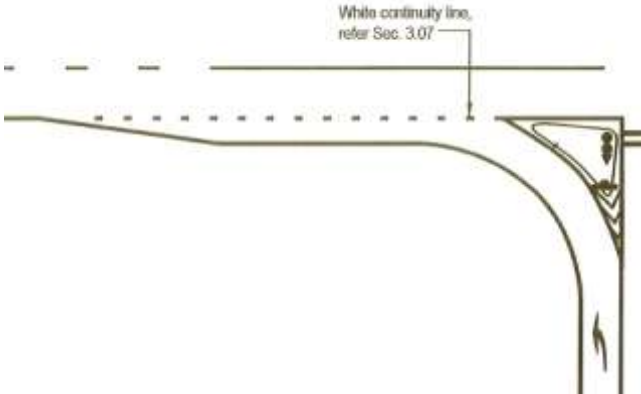
lane

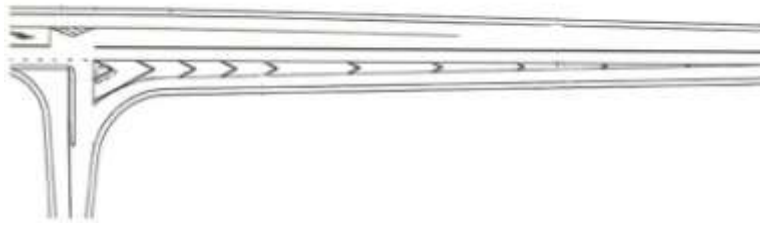
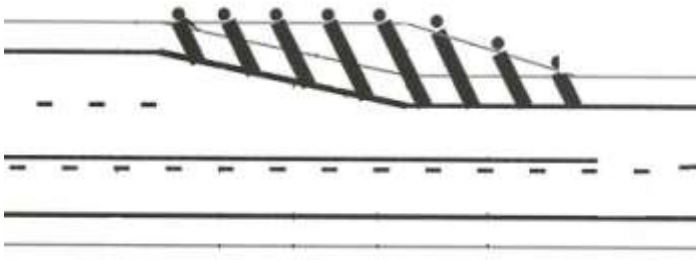
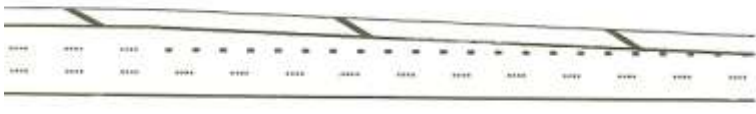
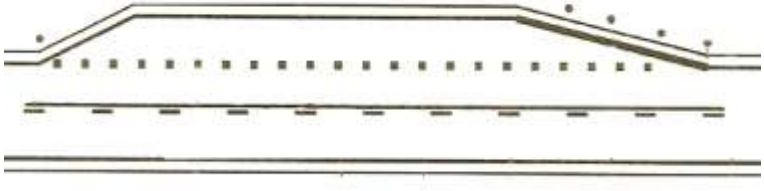
(a) means a longitudinal strip of roadway... separated from other parts of the roadway by a longitudinal line or lines of paint or raised studs; and

- (b) includes:
- (i) a cycle lane; and
 - (ii) a lane for the use of vehicular traffic that is at least 2.5m wide; ‘

In the *Land Transport (Road User) Rule* (road User Rule): ‘a driver, when driving on a road marked in lanes, ... (b) must not move from a lane until he or she has first ascertained that the manoeuvre may be made safely.’

Table: Current policy in MOTSAM

Situation <i>Intersections</i>	Current Policy
motorway on-ramp/entrance lane merge with through lane	continuity line
	
free left turn — to main road	continuity line
	
free left turn — to side road	no line, but varies
give way left turn — to main road	continuity line
give way left turn — to side road	no line, usually
acceleration lane — left side	continuity line
	

<p>acceleration lane — right side (seagull)</p> 	<p>no line</p>
<p>Situation <i>Mid-block</i></p>	
<p>termination of passing lane</p> 	<p>no line</p>
<p>termination of an auxiliary lane / slow vehicle lane</p> 	<p>continuity line</p>
<p>termination of a slow vehicle bay</p> 	<p>continuity line</p>
<p>merge beyond an intersection</p>	<p>no line</p>
<p>merge at an arterial 2 to 1 lane reduction</p>	<p>no line</p>
<p>merge within an on-ramp</p>	<p>no line</p>

There seems to be no consistent logic in how these various merging situations are currently marked. New Zealand drivers do not always exhibit high levels of skill or cooperation when merging (compared with their peers overseas). Perhaps our inconsistency of marking policy has not provided the desirable uniformity which makes it possible for drivers to quickly recognize the meaning and react appropriately.

Options to consider:

- do nothing;
- mark all merge situations the same way regardless of location;
- divide all merge situations into two more logical sets, based on driver responsibility or on geometric arrangement or on something else and then mark one set with continuity lines and the other set without. A continuity line dictates priority (crossing it means a driver is changing lanes) and its use should be consistent with that message in each of the situations we use it. There are two broad classifications above:
 - intersections where one driver is turning or changing roadways and must therefore give way to other traffic; and
 - mid-block situations where drivers travelling parallel to each other must merge into one stream.

This would suggest in all situations:

- where giving way is required (i.e. intersections generally) continuity lines should be marked except, perhaps, where, limit lines have already or alternatively are marked; and
- where a merge is required (i.e. mid-blocks generally) continuity lines should not be marked.

The main effect of this would be the deletion of continuity lines at the termination of auxiliary and slow vehicle lanes and at the termination of slow vehicle bays.

What processes then do we have to consider such possible changes to guidelines or standards? And, how would we ensure practitioners have access to them?

Legislation

Historical

My brief, and not rigorous, search of earlier New Zealand legislation which dealt with road marking unearthed the following.

The *Traffic Regulations 1936* contained a number of references to marking including:

- Regulation 4(3) which provided rules for drivers at safety zones (including pedestrian crossings) “**marked out** or constructed”;
- Regulation 7 which required drivers “not to stop, stand or park where a notice, sign **or marking** had been installed by a local authority”; and
- Regulation 14(2) which required drivers to “keep left of **any longitudinal line or lines marked** at corners, bends or turnings by a local authority”.

Apart from the safety zones the method of marking and its form was not specified. Schedule 2 of the regulations provided a diagram detailing the form a pedestrian crossing (a specific type of safety zone) was required to take. This was simply two parallel, 6 inch (150 mm) wide lines at least 6 feet (1.8 m) apart and at the mid-point of the crossing (measured from kerb to kerb) a 6 inch wide line marked at right angles to the parallel lines.

The *Pedestrian-crossing and Safety Zone Regulations 1939* introduced some new forms of pedestrian crossing markings that road controlling authorities could mark

as soon as possible. However, there was clearly a recognition, even then, that markings take time to install and existing markings are not as simple to remove as other traffic control devices such as traffic signs. The regulations permitted the continued marking of the form previously described in the 1936 regulations.

Over the next forty years various regulations were promulgated and each time an increasing number of markings were permitted with a commensurate increase in the degree of specification in relation to form. These included:

- the ability, subject to the Commissioner of Transport's approval, to install no passing lines (1940);
- requirements to install double limit lines and the word STOP when an intersection was controlled by a stop sign (Dec 1953);
- specifications of 'zebra' markings at pedestrians crossings (1956);
- definition of a middle line (a marked centre line) and the use of lane markings implicit in the wording of driver responsibilities (1956);
- the form and dimensions of arrows for lanes at intersections (1967).

By the time the *Traffic Regulations 1976* were promulgated a clear pattern had developed for specifying markings that had a critical impact on drivers' legal responsibilities. Also, by that time, the *Manual of Traffic Signs and Markings (MOTSAM) Part 2 Markings* had been published (1974) by the National Roads Board. This had been preceded by a Ministry of Transport publication, prepared in their Auckland office in the late 1960s, which pulled together a range of guidance and practice which had been developed within New Zealand by various road controlling authorities.

Land Transport Act 1998

The Land Transport Act 1998 (the Act) replaced many of the provisions previously contained in the Transport Act 1962. More importantly, in this context, the Act introduced Land Transport Rules which were to replace the range of transport regulations. The process for developing and promulgating rules was modelled on similar provisions in the United States and had been used for developing aviation and maritime law in New Zealand.

The major change from regulation was the legal requirement for consultation and, in the early rules, a need to ensure 'safety at reasonable cost' was embodied in any changes. 'International circumstances in respect of land transport safety' also had to be considered so while overseas practices had been taken into account in framing regulations this was now mandated for rules.

Land Transport Rule: Traffic Control Devices 2004 (TCD Rule)

The objective of the TCD Rule "*is to contribute to a safe and efficient roading environment for all road users by ensuring that traffic is controlled by means of traffic control devices that are safe, appropriate, effective, uniform and consistently applied*" [clause 1.3]. The rule is structured to provide general principles for devices; requirements for individual component devices (i.e. signs, marking and signals); and, then how these components may be used individually or in combination to channel traffic, provide for pedestrians, level crossings, intersections, special vehicle facilities and parking. Schedules define specific requirements including Schedule 2 Markings.

In developing the TCD Rule, the Land Transport Safety Authority (now embodied in NZTA) convened an industry consultative group. This group included road

controlling authorities (territorial authorities and Transit NZ), professional institutions (e.g. IPENZ), users (e.g. NZ Automobile Association) and industry (e.g. NZ Roadmarkers Federation). Input from this group was extremely helpful in defining and supporting useful changes.

A draft rule was published for consultation and submissions from individuals and organisations were considered and incorporated, as appropriate, in the final rule. Subsequent minor changes including corrections have followed a similar pattern on an almost annual basis through what are called 'Omnibus Rules' (which cover a number of rules requiring minor change). More significant changes are managed through amendment rules and the TCD Amendment Rule 2010 is being developed.

Overseas practices

As indicated above, in making a rule it is necessary to consider overseas practice. In 1926 a League of Nations conference in Geneva produced a first attempt at standardising traffic signs and, to some degree, road markings. During 1940 or thereabouts the Americas (North and South) agreed to move to a standard form of signs and, again to some degree, road marking. As one would expect the European and American models differed.

In 1949 the United Nations Convention on Road Traffic was signed and came into force in 1952. This Convention covered a wide range of issues relating to road traffic including efforts to provide uniform road rules, agreements in relation to driver licensing and motor vehicle registration and signs and markings. As with many international agreements of this type allowances had to be given for the existing practices of countries involved. In terms of warning signs, for example, both the triangular form of Europe and the diamond form of the Americas were provided. [Why New Zealand and Australia moved to the American form of sign is not clear.]

New Zealand became a signatory, with some exceptions, of the 1949 Convention in 1959. In 1989, New Zealand adopted the international symbols for traffic signs.

In regard to marking it could be said there is some degree of consistency with the major forms. For example:

- centre lines may be continuous or dashed although the ratio of dash and gap will vary but they may be yellow (e.g. US and Canada) or white;
- no passing lines for one direction are frequently, but not uniformly, a solid line parallel to the centre line or where passing is banned in both directions a pair of parallel continuous lines, but these may be yellow (as in New Zealand) or white (Australia) [but they may have slightly different meanings in different countries];
- arrows, although taking many forms, still look like arrows.

However, there are also considerable variances. For example;

- limit lines where marked, at signals are often a continuous line but for Give Way or Yield signs they may be dashed, single or double continuous lines or, in some cases, a pattern of triangular markings.

With the increasing number of visiting drivers it is important critical markings adopted in New Zealand (and in any other country) conform to a general international norm. If there are variations between a country and such norms it is extremely desirable the practice is applied uniformly throughout the country and will

be, as much as possible, self explaining. Before creating any new marking it is critical international practices are considered.

In New Zealand, we attempt to conform to international practice where it exists. In addition we study the standards and guidelines of the United Kingdom / Europe, United States / Canada and, of course, our neighbour Australia. Over recent years the relationship between New Zealand and Australia in regard to road practices has become closer through our membership of Austroads.

Austroads Guides

Austroads is the association of Australian and New Zealand road transport and traffic authorities whose purpose is “to contribute to the achievement of improved Australian and New Zealand road transport outcomes. It does this through strategic research and communication of the outcomes, promoting improved practices that avoid duplication, and the production of publications which assist road agencies in the planning, design, construction, maintenance, operation and stewardship of roads.” [Murray Kidnie, Executive Director, Austroads]

During the last five years Austroads has been preparing a comprehensive set of technical guides comprising 96 separate parts in 10 subject areas. Each of the parts has been developed under the guidance of representatives from all Austroads members including New Zealand. The aim was to ensure the guides will provide over-arching frameworks and guidance for all jurisdictions in Australasia. The subject areas of most relevance to this paper are Road Safety, Road Design and Traffic Management.

Throughout the guides reference is made to specific standards and guidelines relevant to either Australia or New Zealand. In the Guides to Traffic Management the most commonly referenced document for Australia is *AS1742 Manual of uniform traffic control devices* (AS1742 MUTCD). This standard, comprised of 15 parts, in terms of content and effect parallels the two New Zealand referenced documents the TCD Rule and MOTSAM.

Starting in 2007, MOTSAM is to be progressively replaced by a new document, the *Manual of traffic control devices* (TCD Manual).

Manual for traffic control devices

The TCD Manual is being developed by the NZTA under the overall guidance of a Traffic Control Devices Steering Group. This group is made up of representatives of road controlling authorities (including the Highways and Network Operations group of NZTA) industry representatives (NZ Road Safety Manufacturers Association and NZ Roadmarkers Federation) and convened and managed by the Network Standards and Safety team of NZTA of which the author forms part.

The aim of TCD Manual is to provide guidance on industry good practice including, where necessary, practice mandated by law. The planned structure of the TCD Manual comprises 22 parts and is shown in Table A. This structure has been deliberately modelled on AS1742 MUTCD. To date Parts 9 *Level crossings* and Part 13 *Parking control* have been published and Parts 1 *General requirements for traffic signs*, 2 *Direction, service and general guidance signs* and 3 *Advertising signs* have been out for consultation. Sign specifications have been progressively published on the Land Transport website since 2006.

Each part is to 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 their input incorporated appropriately in the final document.

The TCD Manual will only be published electronically and be available on the NZTA web site.

The TCD Manual will support and reference:

- New Zealand legislation and, in particular, the *Land Transport Act* and rules made pursuant to that act including the Road User Rule, TCD Rule and *Land Transport Rule: Setting of Speed Limits*;
- The detailed descriptions of devices contained in the companion document *Traffic control devices specifications* (TCD Specifications);
- general polices 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 and TCD Specification will, on completion, replace MOTSAM.

In relation to marking the obvious parts are:

- Part 4 General requirements for markings which aims to cover the purposes of markings and their legal foundation; materials and some general application issues; and, general design principles e.g. size, lettering, legends; and
- Part 20 Marking specifications.

These parts are currently planned for progressing in 2010/11. The marking working group has yet to be established but it seems likely it will, as one would expect, include representatives from the NZ Roadmarkers Federation and road controlling authorities.

NZTA standards and guidelines register

The TCD Manual and other standards or guidelines will be required, in due course, to be entered into the *NZTA Standards and guidelines register* (Register) currently under development.

The prime purpose of the Register will be “*to contribute to the development of a consistent, fit for purpose land transport network*”. Two key goals are;

- to provide, in one place, a definitive list of all relevant NZTA funding policy and commonly adopted manuals and technical documents for land transport network related activities;.
- to provide a simple, easy to access and manipulate, repository of land transport network reference documents for approved organisations, staff, consultants, contractors and other users.

Each reference document listed in the Register will be given a status in terms of NZTA funding policy, state highway or road controlling authority as one of 'standard', 'guideline' or 'other reference' document. The 'other reference' documents are included to assist users of the register. Their inclusion will not imply endorsement by NZTA.

The status of 'standard', 'guideline', 'other reference' document will determine how the document is used (from the funding, state highway or local authority perspective) and how any variations to the requirements of the document are controlled. The required variation processes will be detailed in the *Process manual for network standards and guidelines register* (Process manual).

The purpose of the Process manual is to provide procedures for managing additions, changes and variations to reference documents in the Register. The key goals are;

- consistent application of land transport network standard and guideline technical documents.
- to provide clear procedures for ensuring reference documents are fit-for-purpose.
- to contribute to the NZTA obligation under section 101(1) (c) of the *Land Transport Management Amendment Act* to have a "...process for determining and applying design standards to roads".

For the three different types of document: standard, guideline or 'other reference document', the Process manual will provide:

- rules for managing each type of document;
- procedures for allowing variations from the specifications in a document for a particular project; and
- procedures for allowing an organisation to adopt a change to a document.

A document will not be listed in the Register unless it has been subject to the specified change process. The change process will apply to a document which is not in the register and is proposed to be added and any reference document listed in the register when it is to be amended, revised or removed.

The proposer of any new reference document will be asked to provide;

- specified attributes of the document;
- an outline of the proposal explaining why the document should be included in the register and how the subject is not sufficiently covered by existing document's in the register;
- detail of consultation with parties affected by the document showing support for the documents inclusion in the register.

Conclusion

Standards and guidelines used in New Zealand are based on, or informed by, overseas experiences and practices and we are increasing our collaboration with our Australian colleagues. The important aspect is that wherever the standards or guidelines appear, be it legislation or manuals, they are being developed using a consultative process involving practitioners most affected and it is intended they will be readily accessible to all users.

Appendix A

Planned structure of *Manual for traffic control devices*

- 1 General requirements for 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, etc
 - Street name signing including design and location
 - Motorist services signing policy, application and design
 - Tourist signing
 - General information signs e.g. public amenities, features.
- 3 Advertising signs**
 - Design and location principles
 - Policies for billboards and other forms of roadside advertising
- 4 General requirements for markings**
 - Purposes of markings and their legal foundation
 - Materials and some general application issues
 - General design principles – size, lettering, legends
- 5 Traffic signals**
 - Application of New Zealand legal requirements
 - Specific applications – e.g. ramp signals, roundabout signals, etc
- 6 Traffic control devices for general use – at intersections**
 - Treatments at intersections including options for traffic control, advance warning, etc.
- 7 Traffic control devices for general use - sections of road**
 - Treatments between intersections including delineation, curves, passing facilities, steep grades, etc.
- 8 Temporary traffic management**
 - Included for completeness – will link to the *Code of Practice for Temporary Traffic Management* and local body supplement
- 9 Railway level crossings**
 - Risk assessment (ALCAM)
 - Design considerations e.g. facility types, traffic movements, stacking length, sight distances, etc.
 - Types of control – passive or active
- 10 Motorways and expressways**
 - Specific signing and marking requirements for motorways and expressways
- 11 Local area traffic management**
 - Design principles
 - LATM devices in New Zealand legal and environmental context
 - Applications of LATM – reference examples
- 12 Speed**
 - Signs and markings for speed limits
 - Temporary and variable speed limits
 - Advisory speeds

- 13 Parking controls**
 - Legal framework – implications and responsibilities
 - Design considerations and elements
 - Linear and zone parking treatments
 - Parking furniture (e.g. meters, vending machines)
- 14 Special vehicle lanes**
 - Signs, markings and surface treatments
 - Specific applications – bus, transit, truck, cycle and other classes of lanes
- 15 Cycles**
- 16 Pedestrians**
- 17 Heavy motor vehicles**
 - The extent to which issues relating to these specific classes of road user will be covered within other relevant sections of the manual is still to be determined. It is possible none of these parts will be developed.
- 18 Sign specifications**
- 19 Signal specifications**
- 20 Marking specifications**
- 21 Glossary**

Definitions of terms used in the TCD Manual or TCD Specifications
- 22 References**

A list of all references used in the TCD Manual