

Guidelines for the signing and layout of slip lanes

RTS 9

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Preface

In recent years in New Zealand there has been a general lack of consistency in the signing and layout of slip lanes. This inconsistency is apparent not only across local authority boundaries, but also at similar sites in close proximity within local authority boundaries. This conflicting information has resulted in a lack of understanding by the motorist, particularly of the meaning of the 'free turn' sign. By signing slip lanes consistently nationwide, motorists should become more aware of their obligations when using slip lanes. The result should be a reduction in accident rates.

It is important that road controlling authorities implement the recommendations contained within this guideline to achieve national consistency and the appropriate signing and layout of slip lanes.

I would like to take this opportunity to thank all those people who have been involved in and have made contributions to putting together this guideline.

Alan Wilcox
Director, Land Transport Safety

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1. Introduction

These guidelines are for road controlling authorities requiring technical guidance and further information when determining the road marking and signing requirements for slip lanes.

These guidelines were produced initially to address slip lane controls at signalised intersections, but have been extended to also address non-signalised intersections. They are not intended to cover the design of islands which are outlined in NAASRA [1].

There is a wide variation in current practice for signing slip lanes throughout New Zealand, evident from a survey of slip lanes at signalised intersections. The inconsistent use of the 'free turn' sign has resulted in misunderstanding by motorists of the meaning of the sign as defined in *The Road Code* [2].

These guidelines are intended to eliminate the lack of consistency in the signing and layout of slip lanes.

A working group comprising members of the traffic engineering profession and the New Zealand Police was formed to prepare this document (refer Section 12).

These guidelines are an amalgam of the following:

- results of a questionnaire sent to 29 local authorities, i.e. those with traffic signal installations, on current and preferred practice for the signing and layout of slip lanes
- the opinion of the working group
- overseas practice
- feedback on drafts of the guideline.

2. Summary

The use of these guidelines will result in the selection of the most appropriate signing and markings for slip lanes, and ensure compliance with legal requirements.

Main features of the guidelines are:

- The specifications for island design have been adopted from NAASRA [1].
- The Australian Standard sign 'turn left at any time with care' as outlined in SAA [3] is adopted to replace the existing 'free turn' sign in the *Manual of Traffic Signs and Markings* [4]. This sign should only be used at signalised intersections with a free flow left turn slip lane, and is not to be used at a high entry angle slip lane which is to be controlled by an RG-5 'Stop', RG-6 'Give Way' or traffic signals.
- The PW-5 'Diverge' sign should be located close to the nose of all raised splitter islands. The nose is the kerbed edge, facing, and closest to traffic approaching the slip lane.
- Painted islands are not appropriate to define a left turn slip lane at a signalised intersection.
- Three distinct situations are covered in this document:
 1. free flow slip lane.
 2. high entry angle slip lane with 'Give Way' control,
 3. high entry angle slip lane with traffic signal control.
- Pedestrian zebra crossings should only be marked if the pedestrian crossing warrant is met.
- Pedestrian crosswalk lines should be installed only when a pedestrian phase is provided on a traffic signal controlled left turn slip lane.
- Dropped kerb crossings should always be provided where pedestrians are intended to cross a left turn slip lane.
- Left Turn Treatments for urban and rural signalised intersections are specifically included in this guideline. For non-signalised intersections, the sign 'turn left at any time with care' should not be used in any circumstances.

3. Slip lane types

The two slip lane types outlined in detail in NAASRA [1], namely the free flow slip lane and the high entry angle slip lane are the basis of the recommendations given in Sections 4 and 5. Each type is briefly discussed below. It is recognised that many existing slip lanes do not conform to the design of either the free flow slip lane type or the high entry angle type, and guidance is given as to which slip lane type is considered appropriate in Sections 4 and 5.

3.1 Free flow slip lane

The free flow slip lane is characterised by an exclusive merge/acceleration lane. Refer to Figure 5.14, Figure 5.30 and Table 5.4 in NAASRA [1] for design details. Refer to Section 4 of this document.

3.2 High entry angle slip lane

The high entry angle slip lane is characterised by the lack of an exclusive merge/acceleration lane. Refer to Figure 5.18, Figure 5.29 and Table 5.5 in NAASRA [1] for design details. Refer to Section 5 of this document.

4. Free flow slip lanes

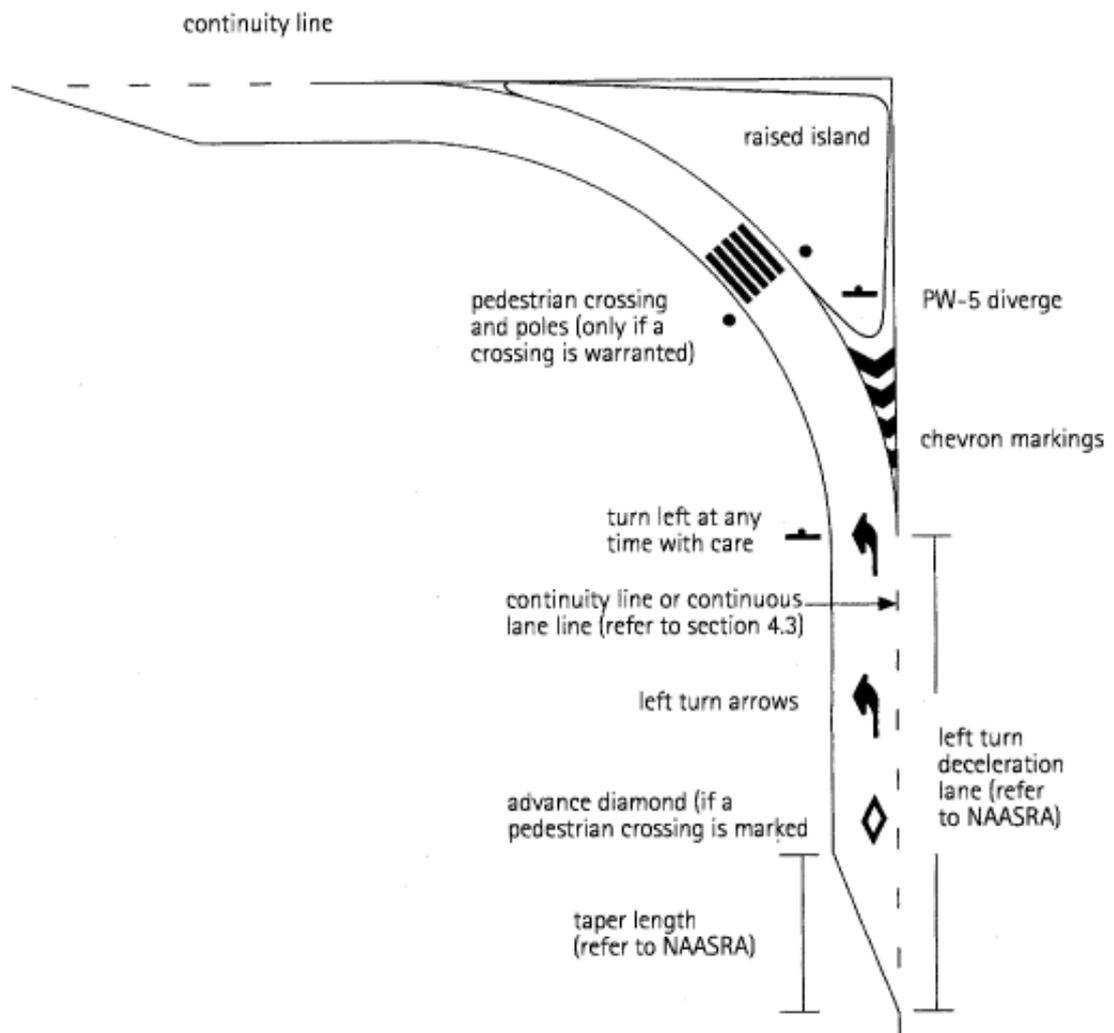
The free flow left turn slip lane signing as outlined below should only be used when the slip lane design meets the acceleration/merge lane criteria outlined in NAASRA [1].

It is recognised that many existing left turn slip lanes in New Zealand do not conform to the design of the free flow slip lane type or the high entry angle type. If the acceleration/merge lane meets or exceeds the requirements for a free flow left turn slip lane, the free flow slip lane signing should be used. Otherwise, the high entry angle signing should be used. Refer to NAASRA [1].

4.1 General layout of free flow slip lanes

The details outlined below refer to a separate slip lane at a signalled intersection. For non-signalled intersections refer to section 6.

Figure 1: Typical layout of a free flow slip lane



4.2 Signing for free flow slip lanes

A PW-5 'Diverge' sign should be located close to the approach nose of the raised island where possible. A 'turn left at any time with care' sign should normally be located on the left-hand side of the road, approximately opposite the start of the painted chevron markings but may be located on the right-hand side on the raised island so that it faces only the traffic approaching and using the slip lane.

4.3 Road markings for free flow slip lanes

In accordance with National Roads Board [5], the following should be followed:

- The free flow left turn continues as an acceleration/merge lane on the intersecting road. A continuity line with 1 metre long stripes and a 3 metre spacing should be used to define the left-hand edge of the intersecting road's through traffic lane.
- Where the left turn deceleration lane is less than 50 metres in length, then a continuity line with 1 metre long stripes and a 3 metre spacing should be painted to separate the left turn and through lanes. Continuity lines should have a width of 200 mm in rural areas and between 100 mm and 200 mm in urban areas.
- Where the left turn deceleration lane is greater than 50 metres in length, then a 200 mm wide continuous lane line should be painted from the chevron to the taper and 200 mm wide continuity lines across the taper.
- White chevron markings should be painted as a lead in to raised islands. At least two left turn arrows should be painted on the left turn deceleration lane.
- RRPMS should be used to provide adequate delineation at night and in wet conditions, however, careful consideration of the placement of RPPMs is required to ensure that they are not a hazard to cyclists.

Taper lengths and acceleration and deceleration lane lengths are contained in NAASRA [1]. Refer also to National Roads Board [5] for marking requirements.

4.4 Pedestrian crossings

A painted pedestrian zebra crossing should only be used when the pedestrian crossing warrant requirements are met and should be located across the throat of the island. An advance diamond should be provided. Refer to TR 11 *Recommended Practice for Pedestrian Crossings* [6].

4.5 Island design for free flow slip lanes

The design of the island should conform to the standard outlined by NAASRA [1].

Painted islands should not be used at signalised intersections to separate slip lane traffic.

5. High entry angle slip lanes

The high entry angle slip lane signing as outlined in this section should be used when the slip lane design meets the criteria outlined in NAASRA [1].

It is recognised that many existing left turn slip lanes in New Zealand do not conform to the free flow slip lane type or the high entry angle type. If the acceleration/merge lane length does not meet or exceed the requirements for a free flow left turn slip lane, then the high entry angle slip lane signing should be used. Otherwise, the free flow slip lane signing should be used. Refer to NAASRA [1].

Two separate layouts are recommended for high entry angle slip lanes:

- ‘Give Way’ controlled slip lane
- Traffic signal controlled slip lane.

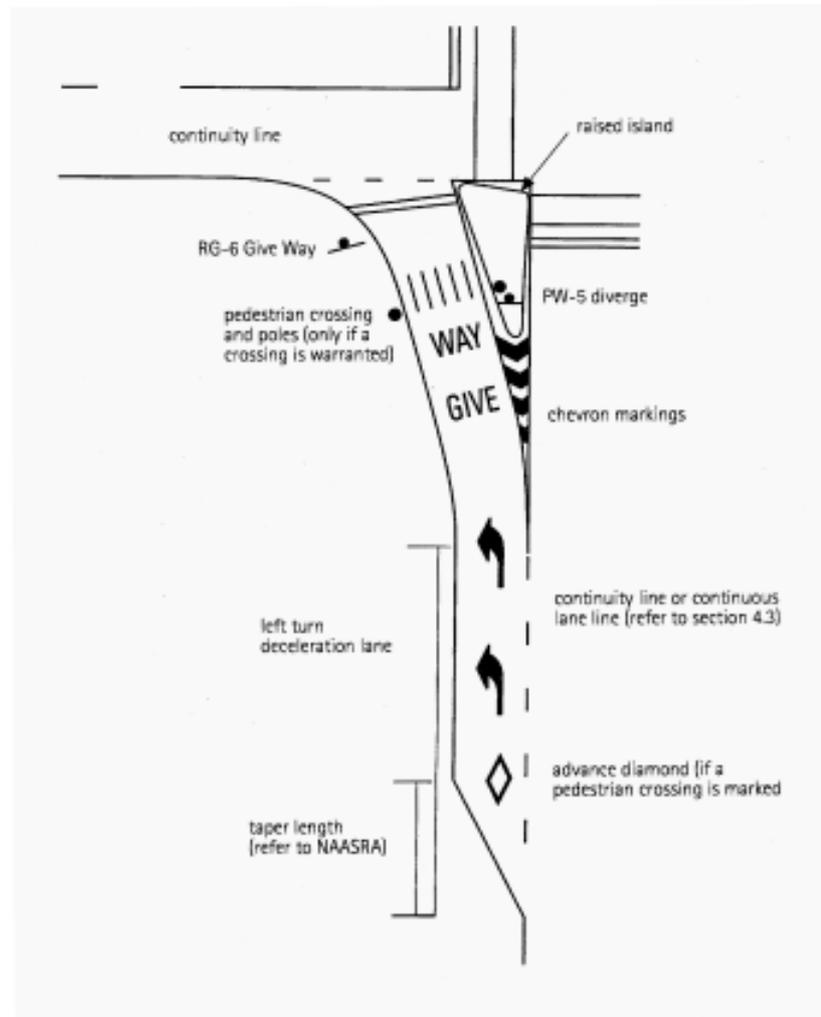
These are outlined in Sections 5.1 and 5.2.

High entry angle slip lanes may be controlled by RG-6 ‘Give Way’, RG-5 ‘Stop’ or traffic signals. RG-6 ‘Give Way’ control should generally be used for high entry angle slip lanes without signal control on the slip lane. When the visibility does not meet the safe approach speed criteria given under RG-5 in the *Manual of Traffic Signs and Markings* [4], then an RG-5 ‘Stop’ control should be used. Finally, traffic signal control of the slip lane as outlined in Section 5.2 may be used if warranted.

5.1 Give Way controlled slip lane

The details outlined below refer to a separate slip lane controlled by an RG-6 'Give Way' or an RG-5 'Stop.'

Figure 2: 'Give Way' controlled high entry angle slip lane



5.1.1 Signing

A PW-5 'Diverge' sign should be located close to the approach nose of the raised island where possible and an RG-6 'Give Way' (or alternatively an RG-5 'Stop') sign should be located on the left hand side of the roadway as near as practicable to the roadway and the painted limit lines. An additional RG-6 (or RG-5) should be erected on the raised island. Refer to the *Manual of Traffic Signs and Markings* [4].

5.1.2 Road markings

In accordance with National Roads Board [5], the following should be followed:

- Standard double white limit lines should be installed in conjunction with the RG-6 'Give Way' sign, or double yellow limit lines in conjunction with an RG-5 'Stop' sign. In urban areas, the width of the line should be 200 mm with a spacing of 400 mm, and in rural areas, the width should be 300 mm with a spacing of 600 mm. Limit lines should be 1.5 metres clear of the nearest lane.
- Where a left turn deceleration lane is less than 50 metres in length, then a continuity line with 1 metre long stripes and a 3 metre spacing should be painted. Continuity lines should have a width of 200 mm in rural areas and between 100 mm and 200 mm in urban areas.
- Where the left turn deceleration lane is greater than 50 metres in length, then a 200 mm wide continuous lane line should be painted from the chevron to the taper and 200 mm wide continuity lines across the taper.
- White chevron markings should be painted as a lead in to raised islands. At least two left turn arrows should be painted on the left turn deceleration lane.
- RRPMs should be used to provide adequate delineation at night and in wet conditions, however, careful consideration of the placement of RRPMs is required to ensure that they are not a hazard to cyclists.

Taper lengths and acceleration and deceleration lane lengths are contained in NAASRA [1]. Refer also to National Roads Board [5] for marking requirements.

5.1.3 Pedestrian crossings

A painted pedestrian zebra crossing should only be used when the pedestrian crossing warrant requirements are met and should be located in advance of the limit lines and across the throat of the island. An advance diamond should also be provided. Refer to TR 11 *Recommended Practice for Pedestrian Crossings* [6].

5.1.4 Island design

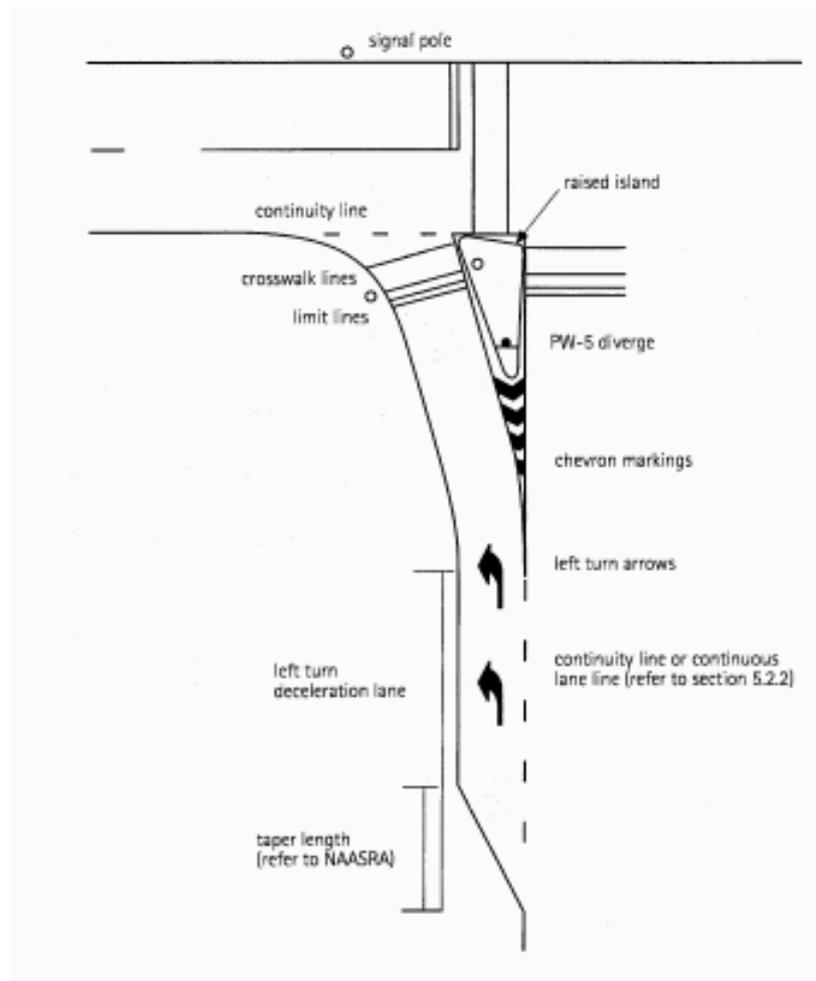
The design of the island should conform to the specifications in NAASRA [1].

Painted islands should not be used at signalised intersections to separate slip lane traffic.

5.2 Traffic signal controlled slip lane

The layout shown below should be used at slip lanes with traffic signal control.

Figure 3: Traffic signal controlled high entry angle slip lane



5.2.1 Signing

A PW-5 'Diverge' sign should be located close to the approach nose of the raised island where possible.

5.2.2 Road markings

In accordance with National Roads Board [51], the following should be followed:

- Standard double white limit lines are required, perpendicular to the approach traffic. In urban areas, the width of the line should be 200 mm with a spacing of 400 mm, and in rural areas, the width should be 300 mm with a spacing of 600 mm. Limit lines should be 1 metre from the nearest crosswalk line if these are included or 1.5 metres clear of the nearest lane.
- Where the left turn deceleration lane is less than 50 metres in length, then a continuity line with 1 metre long stripes and a 3 metre spacing should be painted. Continuity lines should have a

width of 200 mm in rural areas and between 100mm and 200mm in urban areas.

- Where the left turn deceleration lane is greater than 50 metres in length, then a 200 mm wide continuous lane line should be painted from the chevron to the taper and 200mm wide continuity lines across the taper.
- White chevron markings should be painted as a lead in to raised islands. At least two left turn arrows should be painted on the left turn deceleration lane.
- RRPMS should be used to provide adequate delineation at night and in wet conditions, however, careful consideration of the placement of RRPMS is required to ensure that they are not a hazard to cyclists.

Taper lengths and acceleration and deceleration lane lengths are contained in NAASRA [1]. Refer also to National Roads Board [5] for marking requirements.

5.2.3 Crosswalk lines

Crosswalk lines 100 mm in width may be installed for traffic signal controlled slip lanes when a pedestrian phase is included, otherwise only limit lines should be marked. The crosswalk lines should be located at least 1 metre beyond the limit lines, with a minimum width of 1.8 metres. Refer to National Roads Board [5].

5.2.4 Island design

The design of the island should conform to the specifications in NAASRA [1].

Painted islands should not be used at signalised intersections to separate slip lane traffic.

6. Slip lanes at non-signalised intersections

The 'turn left at any time with care' sign should not be used at non-signalised intersections under any circumstances as it is intended only for intersections with traffic signal control and an adjacent free flow slip lane. Otherwise, the layout and signing is identical to each of the situations in Sections 4 and 5.

7. Rural slip lanes

Rural slip lanes should be treated in the same manner as slip lanes in the urban situation except that the merge length, if applicable, and the slip lane design should cater for higher operating speeds. Refer to NAASRA [1] for appropriate design details.

8. Slip lanes with painted islands

Slip lanes with painted islands to separate the through traffic should have no signing with the exception of an RG-6 'Give Way' or an RG-5 'Stop' on the left hand side where applicable. Painted islands should not be used at signalised intersections and are less desirable than raised islands in all other situations.

9. Right turn slip lanes

The signing should be on the opposite sides of the slip lane for the cases mentioned previously with two alterations. The legend should read 'turn right at any time with care', and the RG-6 'Give Way' or RG-5 'Stop' should still be located on the island and on the right hand side. This situation will only arise in the rare circumstance of the intersection of two one way streets.

10. Lighting

Considerable care is required to ensure that traffic islands in rural areas are clearly visible at night. These should generally have street lighting and reflective delineation. In urban areas traffic islands should be lit, with additional lighting and delineation provided as necessary.

11. References

- [1] National Association of Australian State Roading Authorities (NAASRA) (1988) *Guide to Traffic Engineering Practice Part 5, Intersections at Grade.*
- [2] Ministry of Transport (1992) *The Road Code.*
- [3] Standards Association of Australia (SAA) (1986) *Manual of Uniform Traffic Control Devices Part 2 Traffic Control Devices for General Use.*
- [4] Land Transport/Transit New Zealand (1992) *Manual of Traffic Signs and Markings Part I Traffic Signs.*
- [5] National Roads Board (1975) *Manual of Traffic Signs and Markings.*
- [6] Road Research Unit (1988) *Recommended Practice for Pedestrian Crossings* TR 11.

12. Acknowledgements

This guideline was compiled by a working group comprised of:

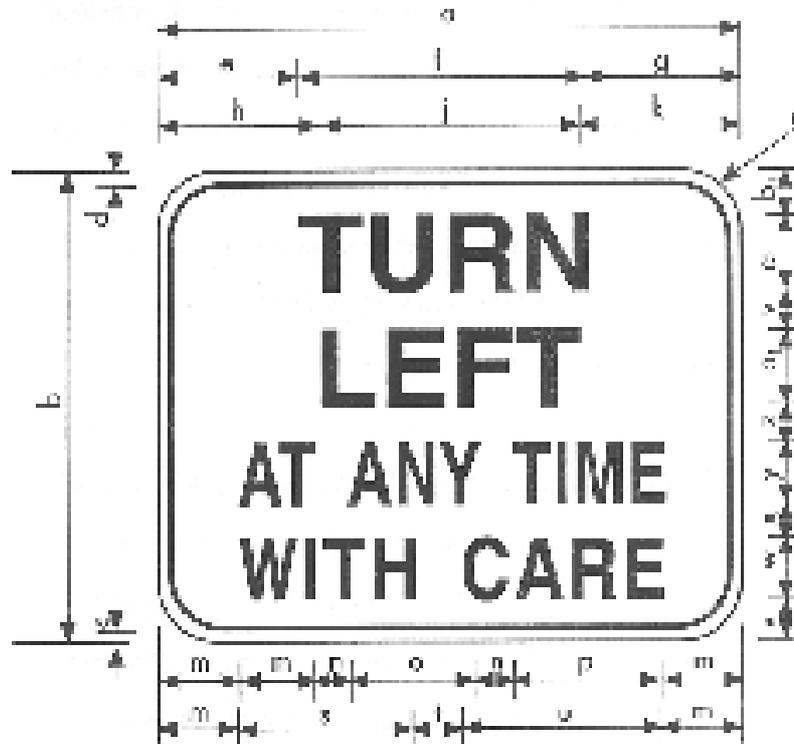
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Inspector Dave Allo	New Zealand Police, Porirua
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Brian Sparey	Hutt City Council
Brian Zemanek	Transit New Zealand, Head Office

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Special thanks also to The Standards Association of Australia for permission to reproduce in part or fully, Section 2.6.3.8 (b) on page 46 of AS 1742.2-1986 and page 34 of AS 1743-1989.

Appendix 1

Design, policy and location of 'turn left at any time with care' sign



R2-16	a	b	c	d	e	f	g	h	j	k	m	n	o
	750	600	6	18	182	375	193	209	342	199	98	50	168
	p	r	s	t	u	v	w	x	y	z	a ₁	b ₁	
	188	75	225	67	262	50	80DN	40	80CN	45	100EN	55	

Policy

The 'turn left at any time with care' sign should only be used at signalised intersections where a free flow left turn slip lane (as defined in NAASRA [1]) is provided for the use of traffic not required to comply with the traffic signals. The slip lane should fall clearly within the boundary of the intersection.

No other sign may be attached to the sign or its support. It should not be used in conjunction with an RG-5 'Stop' or an RG-6 'Give Way' sign or on a traffic signal controlled slip lane.

Location

The sign should be mounted on the left hand side of the roadway at the beginning of, or within, the slip lane. However, the sign may be located on the right hand side on the raised island so that it faces only the traffic approaching and using the slip lane.

Legend: black
 Background: reflectorised white
 Border: black

Road and Traffic Guideline publications

The following Road and Traffic Guidelines are available:

- RTS 1 Guidelines for the implementation of traffic control at crossroads (1990)
- RTS 2 Guidelines for street name signs (1990)
- RTS 3 Guidelines for establishing rural selling places (1992)
- RTS 4 Guidelines for flush medians (1991)
- RTS 5 Guidelines for rural road marking and delineation (1992)
- RTS 6 Guidelines for visibility at driveways (1993)
- RTS 7 Advertising signs and road safety: design and location guidelines (1993)
- RTS 8 Guidelines for safe kerblines protection (1993)
- RTS 9 Guidelines for the signing and layout of slip lanes (1994)
- RTS 11 Urban roadside barriers and alternative treatments (1995)
- RTS 13 Guidelines for service stations (1995)
- RTS 14 Guidelines for installing pedestrian facilities for people with visual impairment (1997)
- RTS 17 Guidelines for setting speed limits (1995)

The Guidelines may be purchased from:

Land Transport Safety Authority, Head Office (PO Box 2840, Wellington) or Regional Offices in:
Auckland, (Private Bag 106 602), Wellington (PO Box 27 249) and Christchurch (PO Box 13 364).