

***Traffic Standards and Guidelines***  
1996/97 Survey

**Advisory Speed Signs**



**February 1998**



## Survey of Traffic Standards and Guidelines

The Land Transport Safety Authority is a stand-alone authority responsible for promoting safety in Land Transport at reasonable cost. Part of its function defined in statute is to “monitor adherence to safety standards within the land transport system”.

For a number of years the regional engineering sections of the Land Transport Safety Authority have had a programme to survey the implementation of various safety standards by road-controlling authorities.

The purpose of the surveys is to:

- assist and advise road controlling authorities on the implementation of selected traffic standards and guidelines that affect traffic safety;
- measure the uptake of standards and guidelines by road controlling authorities;
- provide a national summary of the uptake and compliance with standards and guidelines and report findings to road controlling authorities and other interested parties; and
- identify changes to improve standards, guidelines or traffic rules.

The surveys are usually carried out in two parts:

- Part 1 uses a questionnaire to look at the systems and procedures a road controlling authority has in place to deliver on the standard.
- Part 2 uses a field survey to measure where possible the actual delivery from the users viewpoint. It essentially provides a snapshot of delivery at the date of the survey.

This report presents the national results of one of those surveys. They have previously been presented to the Traffic Management Workshop. I hope you find the information of value and can use it to further the interests of road safety in New Zealand.

Please contact the Regional Engineer at the LTSA’s Auckland, Wellington or Christchurch Office if you would like further information or assistance with implementing traffic standards or guidelines.

Joan Smith,  
Group Manager, Regions



## Executive Summary

### Introduction

- This report details the results of surveys of Advisory Speed Signing in New Zealand carried out by the Land Transport Safety Authority (LTSA) in May/June 1997.
- Interview surveys were conducted at a sample of 32 road controlling authorities to investigate criteria, procedures and programmes used for installing advisory speed signs on curves.
- Field surveys were also done at a sample of sites to obtain a “snapshot” of the on-road situation relative to the standards, verify responses to the interview and to discuss problems/successes on-site with road controlling authority staff.

### Results

- The consistency of the speed values on advisory speed signs is not satisfactory – only 53% were “correct” and 82% accurate to within 10km/h of the measured speed.
- Over 50% of advisory speed signs were smaller than recommended by the Manual of Traffic Signs and Markings.
- Over 80% of signs were located closer to the curve than recommended. Variations in this distance appear unrelated to the speed criteria specified in the Manual.
- Approximately 20% of the advisory speed signs were erected on curves where they could not be warranted.

### Recommendations

- Advisory speed signs should be erected only on the basis of a side thrust gauge survey as outlined in Appendix 3 of the Manual of Traffic Signs and Markings.
- Vehicles used for advisory speed surveys must have their speedometers calibrated so that the survey results are based on true speeds.

- Any advisory speed signs that have not been re-surveyed since 1992 when the Manual was changed should be re-surveyed now.
- The side thrust criteria specified in Appendix 3 of the Manual of Traffic Signs and Markings should be used. Use of the Australian standard AS 1742.2 – 1994 or RGDAS can give slightly different speed values.
- Audits of the consistency of signing should be regularly carried out by Road Controlling Authorities.
- In view of the divergence between practice and policy, Appendix A3 of the Manual of Traffic Signs and Markings should be reviewed. In particular the review could examine the sections on sign size and the recommended minimum distance between the curve and the sign.

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## 1. Introduction

This report details the results of surveys of Advisory Speed Signing in New Zealand carried out by the Land Transport Safety Authority (LTSA) in May/June 1997.

The standard N.Z. curve warning sign indicates the direction a curve takes and the total amount of curvature but does not generally indicate the severity of the curve. Advisory speed signs were introduced to provide this information. Their purpose was to give an indication of the maximum speed at which a curve can be driven to provide reasonable levels of comfort for vehicle passengers. This criterion was expressed as a range of acceptable side thrust forces that vary according to speed.

Advisory Speed Signs were first used in New Zealand in 1956 as part of the experimental highway project between Wanganui and Wellington. In 1956/57 their use quickly spread to the rest of the country. Accident studies carried out at the time found reductions in accidents at the more severe curves and this was attributed to the Advisory Speed Signs.

The criteria for installing advisory speed signs remained relatively unchanged until 1992 when a change to the format of the curve warning signs allowed the opportunity for a review.

In 1992 an updated criteria was published in the "Manual of Traffic Signs and Markings" Part 1, Appendix 3. The new criteria was based on the current New South Wales standard and provided a slightly less conservative advisory speed value and a signing policy which better targeted curves according to risk. (see Jackett, M.J., "On which curves do accidents occur?" IPENZ proceedings 1992.)

## 2. Purpose of the Survey

The purpose of the LTSA survey was to determine:

- What standards and methods were being used to set advisory speed sign values, sizes and locations?
- What systems were in place to ensure consistency
- How the current set of signs installed matched up to the criteria specified in Appendix 3 of the Signs and Markings Manual
- The need to review any part of the current standard.

## 3.0 Methodology

### 3.1 Sample Selection

A sample of 32 road controlling authorities was chosen for the surveys. The selection process was weighted towards those authorities which had not been included in previous LTSA surveys of this type.

### 3.2 Interview Surveys

Interviews were conducted with representatives in each road controlling authority. A questionnaire was sent to each authority in advance to allow time to research answers if necessary. This was followed by a visit and interview by an LTSA engineer(s). Questions examined the programmes, procedures and criteria used for installing advisory speed signs. The results are summarised in Section 4 below.

### 3.3 Field Surveys

Up to 10 curves (20 advisory speed signs) were surveyed for each road controlling authority according to the criteria in Appendix 3 of the Manual of Traffic Signs and Markings. The field survey examined the speed value, the size of the sign, and its distance from the curve. The surveys were carried out in vehicles with calibrated speedometers and fitted with a side thrust gauge. The distance between the sign and the start of curve was measured using a laser distance-measuring device.

In total 397 signs were measured and the results analysed on an Excel spreadsheet. The results are given in Section 5 below.

## 4. Results

### 4.1 Interview Surveys

#### 4.1.1 Programmes for Determining Advisory Speed Signing Needs

The majority of authorities (76%) reported no programme to systematically review curves requiring advisory speed signing. New curves would be signed where attention to them was highlighted by:

- a complaint,
- a blackspot study, or
- some other indication that there was a problem.

The 24% of authorities that did have a systematic programme to review curves for advisory speed signs typically employed a consultant to carry out an audit of the network.

#### 4.1.2 Inventories of Advisory Speed Sign Details

The majority of Authorities (66%) used RAMM in some form. However the records of signs in RAMM were usually not in a form to be useful as a signs inventory. In particular the specific location and speed value of the sign was often not included in the database. Without this information the database can provide little assistance when it comes to replacing signs which have been damaged or removed.

In general signs databases in New Zealand are not at a high level of sophistication and most authorities saw scope for improvement within their own authority. There was evidence of the development of more comprehensive sign inventories through RAMM, stand alone databases, and the new Eggplant video technology.

#### 4.1.3 Criteria Used to Determine Sign Value and Location

All but 4 (13%) authorities stated that they used the Manual of Traffic Signs and Markings to determine the value and location of advisory speed signs. The four who did not use the Manual usually relied on the judgement of an individual to determine the correct speed value.

The most common modifications to the criteria in the Manual were:

- the use of additional chevrons,
- utilising local “political input”, and
- applying “local consistency”.

#### 4.1.4 Equipment Used to Determine Advisory Speed Values

Most (74%) authorities used the side thrust gauge. One authority used RGDAS and another the Terra trip meter as well.

Six authorities (19%) did not have access to a side thrust gauge.

Twelve authorities would be interested in obtaining a side thrust gauge if the cost was reasonable.

#### 4.1.5 Audit Systems to Ensure Advisory Speed Sign Consistency

The majority of authorities had no formal audit programme but 9 authorities reported drive over or similar constancy checks.

#### 4.1.6 Comments on Applying the Policy in the Manual of Traffic Signs and Markings.

Comments from those interviewed were:

- The policy could result in a large number of signs if applied rigorously on minor rural roads.
- More advice would be helpful on how to estimate 85%ile speeds on metal roads.
- Should the environmental or the 85%ile speed be used to determine the need for and size of signs?

#### 4.1.7 Assistance from LTSA

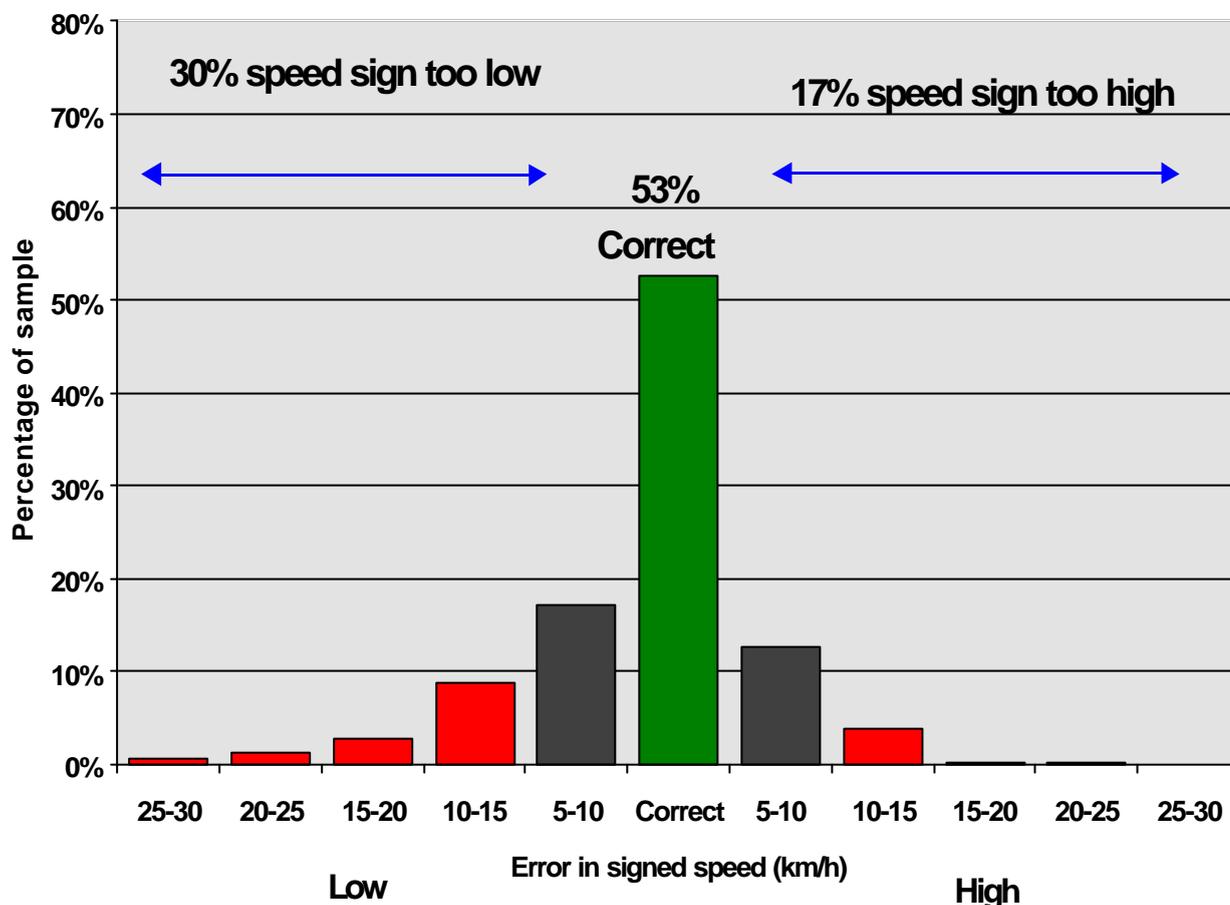
The majority of authorities valued the ongoing contact with LTSA engineers and saw the LTSA's role as carrying out audits and in contributing equipment and expertise when needed.

### 4.2 Field Surveys

#### 4.2.1 "Signed" Advisory Speed Values

The "measured" advisory speed value on a curve is a continuous variable representing the exact advisory speed value of the curve. The "signed" advisory speed value is the value shown on the sign. (It should be noted that while "signed" advisory speed values end in a 5 they increment in steps of 10km/h.) The difference between the "measured" advisory speed value  $V_m$  (averaged over 2 or 3 readings) and the "signed" advisory speed value  $V_s$  represents the error shown in Figure 1 on the next page. Features of Figure 1 are:

- 53% of signs had the correct speed value signed.
- 30% of signs had values lower than the policy recommended. While this displays a cautionary message at the site concerned overall it has the effect of diminishing the credibility of the signs. Drivers can then be caught unawares at other sites where the value is more realistic.
- 17% of signs had values higher than the policy recommended. These signs could compromise the safety of the sites, particularly those at the



**Figure 1: Accuracy of the signed speed value in advisory speed signing**

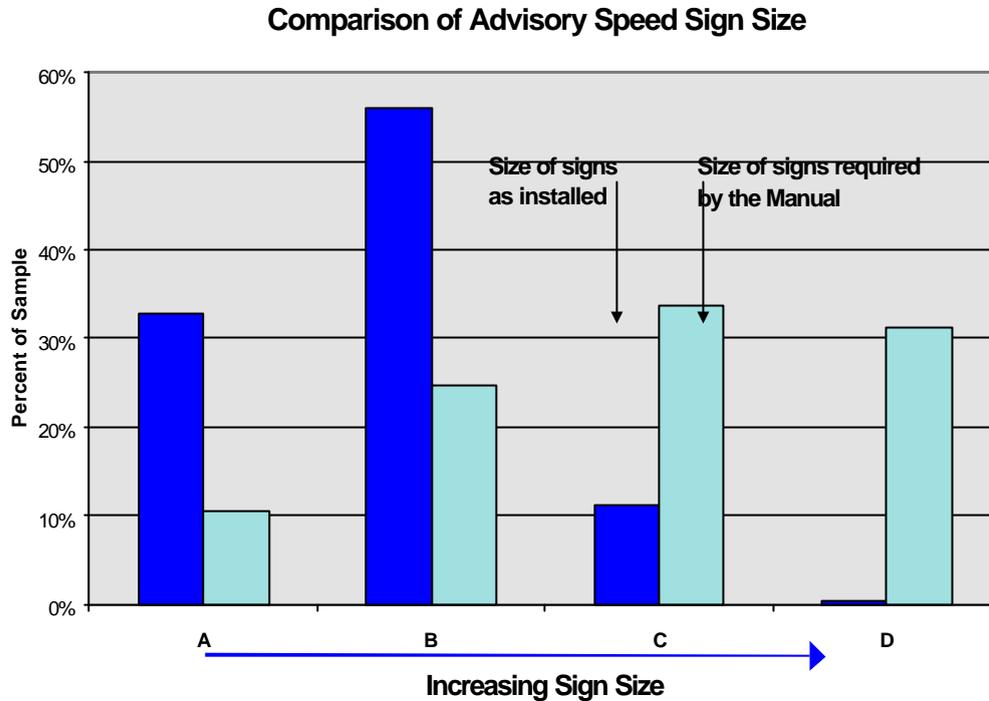
upper end of this group where the signed speed is in excess of what is comfortable for the curve.

The variation in accuracy of signing between Road Controlling Authorities is shown in Table 1 in the Appendix. It should be noted that the table represents a snapshot of the situation that existed in March 1997 and may not represent the current state of signing.

4.2.2 Sizes of Advisory Speed Signs

Figure A3.2 of the Manual of Traffic Signs and Markings specifies that the size of the sign should vary according to the 85<sup>th</sup>ile approach speed and the advisory speed of the curve.

Figure 2 illustrates the difference between the manual’s recommendations and the size of signs as installed.



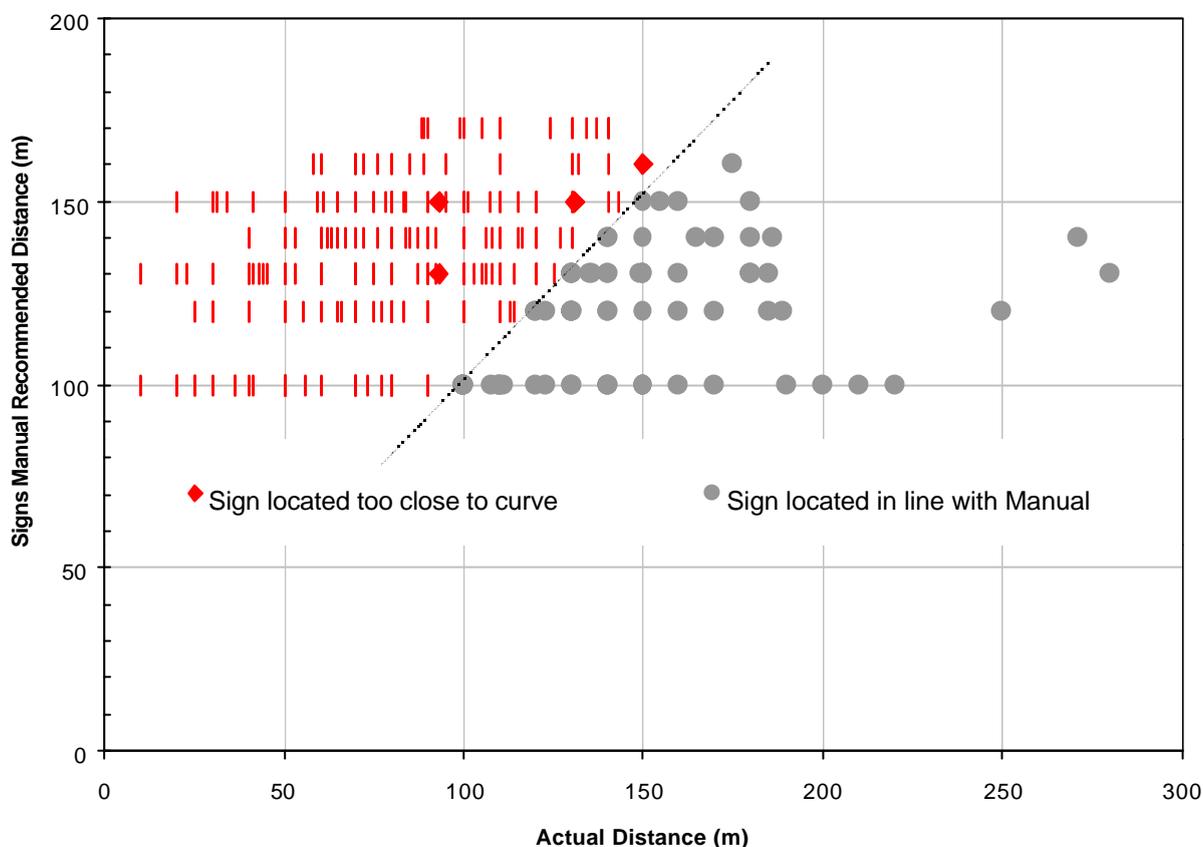
**Figure 2 Comparison of the size of the Advisory Speed Sign (all signs)**

*Note that the smaller signs sizes (A and B) are over represented compared to Manual recommendations while the larger signs (C and D) are under represented.*

4.2.3 Location of Advisory Speed Signs Relative to the Curves

Table A3.2 of the Manual of Traffic Signs and Markings specifies the minimum distance the advisory speed sign should be located from the curve. This ranges from 100m to 170m depending on the difference between approach speeds and the advisory speed for the curve.

Figure 3 on the next page illustrates the difference between the Manual’s recommendations and where the signs were actually installed. The majority of signs (80%) were located closer to the curve than the minimums specified in the Manual. Further there was so little correlation between the Manual and the Actual location of the signs that it could be argued that the distance criteria in the Manual is simply not being used.



**Figure 3: Distance from the Curve:**

*This Graph shows all signs in the database with the actual distance the sign was located from the curve plotted against to the minimum distance recommended by Table A3.2 of the Manual.*

*Only those signs to the right of the diagonal line (20%) comply with the minimum requirements of the Manual.*

#### 4.2.4 Need for an Advisory Speed Sign

Table A3.1 of the Manual of Traffic Signs and Markings specifies the warrant for installing an advisory speed sign. The warrant, based on accident risk, represents a compromise between too many signs diluting their impact and too few signs not gaining maximum benefit from them.

For an advisory speed sign to be warranted the drop in speed between the 85<sup>th</sup>ile approach speed and the advisory speed needs to exceed 30%.

The survey indicated that approximately 20% of all signs surveyed did not meet the warrant criteria specified in Table A3.1. Some of these will be located at known hazardous curves and will be serving a useful purpose. Some however were clearly not at critical curves and their presence could be reducing the impact of those that are warranted.

## 5. Conclusions

- The consistency of the speed values on advisory speed signs is not satisfactory – only 53% were “correct” and 82% accurate to within 10km/h of the measured speed.
- Over 50% of advisory speed signs were smaller than recommended by the Manual of Traffic Signs and Markings.
- Over 80% of signs were located closer to the curve than recommended. Variations in this distance appear unrelated to the speed criteria specified in the Manual.
- Approximately 20% of the advisory speed signs were erected on curves where they could not be warranted.

## 6. Recommendations

To improve the quality of Advisory Speed Signing in New Zealand it is recommended that:

- Advisory speed signs should be erected only on the basis of a side thrust gauge survey as outlined in Appendix 3 of the Manual of Traffic Signs and Markings.
- Vehicles used for advisory speed surveys must have their speedometers calibrated so that the survey results are based on true speeds.
- Any advisory speed signs that have not been re-surveyed since 1992 when the Manual was changed should be re-surveyed now.
- The side thrust criteria specified in Appendix 3 of the Manual of Traffic Signs and Markings should be used. Use of the Australian standard AS 1742.2 – 1994 or RGDAS can give slightly different speed values.
- Audits of the consistency of signing should be regularly carried out by Road Controlling Authorities.
- In view of the divergence between practice and policy, Appendix A3 of the Manual of Traffic Signs and Markings should be reviewed. In particular the review could examine the sections on sign size and the recommended minimum distance between the curve and the sign.

## Appendix

**Table 1. Accuracy of Advisory Speed Signing by Road Controlling Authority**

Road Controlling Authority	Number of signs surveyed	Percentage of signs accurate to within 10km/h
Kapiti District	5	100%
Marlborough District	13	100%
Gore District	18	100%
Tasman District	17	100%
Transit NZ Napier	19	95%
Clutha District	18	94%
Selwyn District	17	94%
Transit NZ Hamilton	20	90%
Tararua District	10	90%
Central Otago District	17	88%
Queenstown-Lakes District	17	88%
Transit NZ Canterbury	32	88%
Grey District	8	88%
Waikato District	20	85%
Waimate District	11	82%
Transit NZ Wanganui	16	75%
Rodney District	20	75%
Rangitikei District	18	72%
Waipa District	14	71%
Far North District	17	71%
Buller District	3	67%
Waitaki District	18	67%
Hurunui District	17	65%
Napier City	17	65%
Porirua City	13	54%
Mackenzie District	2	0%
<b>TOTAL</b>	<b>397</b>	<b>82%</b>





