

***Traffic Standards and Guidelines***  
1999/2000 Survey

***RSS 13***

**No Passing Lines**



**November 2000**



## Survey of Traffic Standards and Guidelines

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

To support this objective the regional engineering sections of the Land Transport Safety Authority undertake a survey programme that assesses the implementation of various safety standards by road-controlling authorities.

The purpose of these 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 road safety delivery at the date of the survey.

This report presents the national results of the latest of these surveys.

I believe you will find the information of value and will be able to use it to improve 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.



William McCook,  
General Manager, Operations



## Executive Summary

### Introduction

- Interview surveys were conducted during April and May 2000 with 33 road controlling authorities (RCAs) to investigate procedures and programmes for two safety areas – no passing lines and roundabouts.
- Field surveys were conducted at a sample of sites to obtain a 'snapshot' of the on-road situation relative to standards and practices, verify responses to the interview and to discuss problems or successes with RCA staff.
- This report details the results of surveys of no passing lines (NPLs). A companion report details the results of the surveys of roundabouts.
- Rural NPLs at vertical curves were measured for compliance with the Manual of Traffic Signs and Markings Part 2, Section 2.05 (MOTSAM) and the Traffic Regulations 1976.

### Interview Findings

Forty two percent of RCAs interviewed considered the current MOTSAM guidelines to be inadequate, the most common areas of concern being:

- The policy allows too much individual RCA discretion whether or not to install NPLs, which leads to an inconsistent approach throughout the country
- The policy does not allow sufficient choice of operating speeds when determining the length and location of NPLs
- Horizontal curves are not catered for in the policy
- Target eye and object heights may not reflect the current vehicle fleet nor adequately consider night-time visibility needs

These concerns suggest a review of the MOTSAM guidelines could be justified.

### Field Survey Results

The field surveys confirmed RCA suspicions expressed during the interviews that NPLs are marked inconsistently:

- Only 2% of NPLs surveyed were installed accurately
- Over a third (38%) of NPLs started late, and 7% finished early. These results reveal a lower margin of safety than the standards provide as

they indicate to motorists it is safe to complete or commence overtaking manoeuvres when it is not

- Almost a third (30%) of lines started early and finished late. While this would not generally be a cause for safety concerns, any lines that are too long unduly restrict overtaking opportunities, and could lead to disrespect for NPL markings.
- Almost a third (29%) of routes surveyed were marked inconsistently.

There is pressure from RCAs for the development of guidelines for marking NPLs on horizontal curves, and for other changes to existing criteria. The poor level of consistency and compliance with existing policy and standards may be partly a reflection of this desire for change, but also demonstrates a poor understanding of the existing criteria and its application.

Broadening the scope for marking NPLs to cover other situations of limited visibility on roads may be justified in terms of providing positive guidance to motorists. However if the criteria are widened and applied as inconsistently as existing standards, there will be significantly reduced legal opportunities to pass, likely increases in non-compliance and potentially reduced safety benefits.

### Recommendations

- RCAs should review their NPLs identified as “unsafe” (that is, starting late or finishing early) as soon as practicable to ensure compliance with current standards. Any review should include checks to ensure that marking along routes is consistent.
- LTSA should convene a working party, representative of interested parties, to consider issues raised by this survey, and in particular to report on:
  - ◆ Whether the existing criteria should be amended to provide a range of sight distance values based on operating speeds
  - ◆ Any justification for adjustment to eye and target heights
  - ◆ Whether NPLs should be marked at horizontal curves and, if so, what criteria should be used
  - ◆ The need for a standard methodology for surveying and setting out NPLs and, if so, what method should be used and how should it be documented
  - ◆ Safety and compliance issues

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## **1. Introduction**

During April and May 2000 the Regional Offices of the Land Transport Safety Authority (LTSA) conducted surveys of two safety areas in 33 road controlling authorities (RCAs). The 33 RCAs included four regional offices of Transit New Zealand (TNZ) and 29 territorial local authorities (TLAs).

The two safety areas surveyed were:

- no passing lines (NPLs)
- roundabouts

This report describes the procedures for the NPL surveys and presents the results.

The NPLs (all at vertical curves in rural areas) were measured for compliance with TNZ/LTSA's Manual of Traffic Signs and Markings Part 2, Section 2.05 (MOTSAM) and the Traffic Regulations 1976.

## **2. Purpose of the Surveys**

The purpose of the surveys was to:

- Establish what standards and guidelines RCAs used
- Measure performance against current standards and guidelines
- Provide a national summary of results and report to interested parties
- Identify any justifiable changes to standards, guidelines, or traffic rules

## **3. Methodology**

### 3.1 Sample Selection

A sample of 33 RCAs was chosen for inclusion in the NPL surveys. Two RCAs had no NPLs in rural areas and have not been included further in this report. The remaining 31 RCAs included 27 TLAs and four regional offices of TNZ. The sample was weighted towards authorities not included in the LTSA's surveys the previous year.

Appendix 1 lists the 31 RCAs included in the surveys and the number of NPLs surveyed in each.

### 3.2 Interview Surveys

Interview surveys were conducted with representatives in each authority. Survey forms were sent in advance to allow time to research answers if necessary. Questions centred on the standards and guidelines used for marking NPLs.

A copy of the NPL Questionnaire used in the interview surveys is shown in Appendix 2.

### 3.3 Field Surveys

Up to three randomly selected rural routes where NPLs had been marked for vertical curvature were surveyed for each RCA. Staff from the RCA were invited to take part. The purposes of the field surveys were:

- To measure the accuracy of existing markings against the criteria set out in MOTSAM Part 2 and the Traffic Regulations 1976
- To gauge the consistency of marking along each route

The survey technique used was the "traditional two person method". Two surveyors walked along the road at the required distance apart carrying target sights, and recorded the points where visibility was lost and regained in each direction. The correct start point and length of each line was then calculated and compared to existing NPLs.

A copy of the NPL Survey Form used for the field surveys is attached as Appendix 3.

## **4. Results**

### 4.1 Interview Surveys

#### 4.1.1 Person Defining the Standards to be used for Marking NPLs

In most (70%) TLAs the decision on which standard to use for marking NPLs is made by a senior manager involved in roading, such as the Asset Manager Roothing, Roothing Manager, or District Roothing Engineer. In the remaining TLAs the decision is made either by consultants, the Council, the roading staff team or the safety audit team.

Three of the four TNZ regional offices answered that their Policy Division in Head Office made the decision, while the fourth replied that their Network Manager was responsible.

#### 4.1.2 Standards Used by RCAs for Marking NPLs

- 24 (77%) used MOTSAM on its own
- 3 (10%) used MOTSAM in conjunction with Ministry of Transport/TNZ RTS 5 "Guidelines for Rural Road Marking and Delineation"
- 2 (6%) used MOTSAM in conjunction with Austroads Guide to Traffic Engineering Practice Part 8 "Traffic Control Devices" (Austroads Part 8)

Of the remaining two RCAs, one used Austroads Part 8 in conjunction with RTS 5, and the other used Austroads Part 8 on its own

#### 4.1.3 Situations where NPLs are Used

RCAs gave the following responses when asked where they installed NPLs.

**TABLE 1: SITUATIONS WHERE NPLs ARE MARKED**

Situation	NPLs Marked			
	Yes	Sometimes	No	N.A.*
(a) On approaches to raised traffic islands separating opposing flows	16 (52%)	7 (23%)	5 (16%)	3 (10%)
(b) On approaches to hazards or obstructions separating opposing flows	8 (26%)	7 (23%)	7 (23%)	9 (28%)
(c) On approaches to railway level crossings	14 (45%)	5 (16%)	9 (28%)	3 (10%)
(d) As centre lines on 4 lane rural roads	5 (16%)	0 (0%)	2 (6%)	24 (77%)
(e) At vertical curves where restricted visibility makes overtaking unsafe	25 (81%)	4 (13%)	1 (3%)	1 (3%)
(f) As remedial measures on road lengths with overtaking crashes	10 (32%)	7 (23%)	9 (28%)	5 (16%)
(g) As centre lines on multi lane undivided urban roads	5 (16%)	2 (6%)	4 (13%)	20 (65%)
(h) As centre lines at right turn bays	15 (48%)	4 (13%)	8 (26%)	4 (13%)
(i) At horizontal curves where restricted visibility makes overtaking unsafe	3 (10%)	15 (48%)	12 (39%)	1 (3%)
(j) Alongside flush medians	0 (0%)	5 (16%)	18 (58%)	8 (26%)

\* *Not applicable or no answer given*

**Note:** Due to rounding, the percentages shown in Table 1 will not always add to 100%

Table 1 shows that NPLs are used most frequently by RCAs at vertical curves, but there are widespread variations in their use for other situations.

Most RCAs who used NPLs at horizontal curves did so where there was a known history of overtaking crashes, and one RCA marked them at curves with poor sight distance. MOTSAM makes no provision for their use at horizontal curves, although Austroads Part 8 does.

Five RCAs stated they sometimes used NPLs alongside flush medians, even though LTSA Traffic Note 11 "No Passing Lines Against Flush Medians - Guidelines" recommends against this practice.

Other situations where NPLs are used outside of the MOTSAM guidelines are:

- At some signalised intersections (1 RCA)
- As a transition between multi-lane and 2-lane sections of road eg. used to help reduce head on crashes at the transition from motorway to 2-lane road, (1 RCA.)
- As a "Keep to Left" in one special case in advance of an opposing right turn bay in a flush median (1 RCA)

4.1.4 Situations where Advance Warning Lines are Used

Table 2 below summarises the responses given for all situations where RCAs use, or sometimes use NPLs.

TABLE 2: USE OF ADVANCE WARNING LINES

NPLs Marked		Advance Warning Lines Marked			
	Number	Yes	Sometimes	No	N.A.*
Yes	101	81 (80%)	10 (10%)	3 (3%)	7 (7%)
Sometimes	56	26 (46%)	22 (39%)	1 (2%)	7 (13%)

\* No answer given

In 3 situations (3%) where NPLs were used, the RCA replied that advance warning lines were not marked, and in a further 10 situations (10%) advance lines were only used sometimes. The Traffic Regulations require advance warning lines to be used wherever practicable.

Two of the situations where RCAs did not use advance lines were on multi lane urban roads, and the third was at a horizontal curve that had been marked with an NPL. Half of the situations where RCAs replied they only sometimes used advance warning lines were on approaches to raised traffic islands (3), and on approaches to hazards or obstructions (2).

Where RCAs replied that they sometimes marked NPLs, it is more difficult to establish whether they always or only sometimes marked advance warning lines. An ambiguity in the wording of the questionnaire means that some RCAs may have replied sometimes when they actually meant yes, always. Only 1 RCA replied no, this being on the approach to a raised traffic island.

Several RCAs stated they couldn't see the value in using advance warning lines in urban situations.

4.1.5 Comments on NPL Standards

When asked whether they thought that the NPL standard was adequate, just over half (52%) of authorities replied yes, 42% replied no, and 6% (2) have no answer recorded.

Almost a quarter (23%) were concerned at a perceived lack of consistency around the country, caused partly in their view by MOTSAM allowing too much discretion where lines go. An example of this is at vertical curves where “no passing lines may be used where prohibition of overtaking is considered necessary because drivers may not be aware of visibility restrictions.” Some authorities thought this could be overcome by making it compulsory to mark NPLs, while others wanted better guidance on what “unsafe” meant.

Eight authorities (26%) felt there should be provision to mark NPLs in all situations (including horizontal curves) where restricted visibility occurs on rural roads.

Two RCAs thought speed environment should be better catered for in MOTSAM – at present visibility requirements are based on one rural and one urban operating speed.

Two RCAs believed the standards should require checks to be made at the design stage of shape corrections, reconstructions etc to try and eliminate the need for NPLs. There was also a suggestion that NPLs are still necessary on some projects even when the design visibility standards are met.

Other comments included:

- The use of signs to indicate the start of NPLs (as in Europe) should be considered
- More positive messages on “can pass” and “can’t pass” situations could be provided by following Australian practice and marking a solid white line wherever passing is not allowed and dotted lines where it is
- To encourage the marking of NPLs on narrow roads, a single solid line should be used to indicate no passing
- A standard is needed for “Keep to the Left” as well as for no passing
- Traffic volumes should not be the main criteria for determining whether or not to mark NPLs. (In RTS 5 it is recommended that NPLs be marked on roads where the traffic volume criteria for centrelines applies)
- There have been situations where the criteria for eye height and target height used in MOTSAM have resulted in a NPL not being warranted, but where concerns continued – as a result revised, lower eye and target heights were used.

#### 4.1.6 Classes of Roads Marked with No Passing Lines

Just over a quarter (29%) of RCAs marked NPLs on all roads with visibility restrictions caused by vertical curvature, while the remainder (71%) did not.

Authorities that did not mark all roads were asked what criteria they applied to determine which roads to mark. Most used several criteria chosen from the following:

- 5 RCAs marked NPLs on all roads classified as strategic, arterial or major in their road hierarchy.
- 6 had a systematic approach based on traffic volumes, road width and road hierarchy, while 5 had an ad hoc approach using the same criteria
- 2 marked lines only where visibility restrictions were subtle and where motorists were likely to get caught out.
- 8 used crash history or crash reduction study findings.
- 7 relied on public complaint or staff observation.
- 1 authority was conducting a safety audit of all roads against the criteria set out in RTS 5.

4.1.7 Policies on Marking NPLs in Other Situations

Thirteen authorities (42%) said they had no set policy on marking NPLs in places where there was no vertical visibility restriction, seven (23%) were governed by the criteria in MOTSAM, nine (29%) responded to situations in an ad hoc way, and two (6%) gave no answer.

Authorities gave a wide range of responses when asked what criteria they used to decide whether or not to mark NPLs, indicating a lack of consistency in approach. Some respond solely to public complaint, others are governed by crash history, some rely on the experience of their own staff, while others leave it up to the discretion of their consultants.

The responses given in Table 1 also highlight the inconsistency in marking NPLs.

4.1.8 Identifying Potential Sites for NPLs

Over half (58%) of authorities reported they had a systematic approach to identifying sites, based on regular drive overs or safety inspections by staff or contractors, or regular safety audit of roads.

Often more than one method of identifying potential sites is used. Additional methods to those identified above are as follows:

- Complaints from ratepayers, public, Police etc
- Crash reduction studies or crash histories
- Use of RGDAS (although this requires on site confirmation)
- Checking process during design of new seal extensions, alignments etc
- As part of a general review of road markings

Two authorities mentioned they did nothing to identify sites.

4.1.9 Systems to Ensure Roads are Marked in a Consistent Manner

Seventeen authorities (55%) had no systems in place to check the consistency of markings along routes. However, of these, three were hoping to soon adopt safety management systems, two had reviews in the pipeline, and one believed local knowledge of its roads was sufficient.

Those authorities that had systems or carried out some form of checking used a variety of techniques including:

- regular inspection of roads,
- safety audits,
- periodic network review of existing sites compared with MOTSAM requirements,
- a policy of marking all routes in their entirety, or
- checking all existing sites during repainting.

One authority had a consistent policy of not marking NPLs on its roads.

#### 4.1.10 Reinstating NPLs Correctly After Re seals or Road Works

Twenty four authorities (77%) replied that it was a contract requirement for all road markings to be correctly reinstated after road works. Of these seven mentioned that they relied on the contractor's quality systems for accuracy of reinstated lines, and seven said that no formal checks or measurements of accuracy were made.

A number of methods are used to keep track of where road markings should be placed. These include:

- tagging the lines on site before road works,
- taking photos or videos of lines before work commences,
- periodic aerial photos of the road network, and
- checking NPL positions against RAMM data or a network maintenance register.

#### 4.1.11 Eliminating the Need for NPLs When Roads are Upgraded or Constructed

Eight authorities (26%) replied that checking at the design stage to eliminate the need for NPLs wasn't an issue within their jurisdiction, and three (10%) did not make specific checks for potential NPL sites during the design of road upgrades or new construction.

The remaining 20 authorities (65%) all believed that potential NPL sites were being screened at the design stage of projects. However:

- eight mentioned that economic constraints did not always allow the best vertical geometry to be implemented,
- one authority's design brief allowed for either definite passing opportunities, or clear cut areas where passing could not be achieved, and
- four authorities believed the standards used by their consultants would adequately assess overtaking visibility requirements, but were not sure whether NPLs would still be needed.

Authorities were also asked whether a road was checked after it was upgraded, to assess whether or not NPLs were still appropriate:

- Twelve (39%) replied yes, the road was specifically checked
- Six (19%) relied on safety audit or regular road inspection to pick up any problems
- One checked sometimes
- Eight (26%) replied that it wasn't an issue
- Three (10%) didn't check
- One wasn't sure

4.1.12 Methodology for Surveying and Setting Out NPLs

Four authorities had no method for surveying and setting out NPLs, five were unable to specify any particular method, and two replied that it wasn't an issue.

Of the remainder, most (13) used the "traditional two person method," using either measuring wheels or a string line to keep the required distance apart. Some authorities had developed "in house" methods as described below:

- Three surveyed and marked the site by eye, relying solely on the surveyors' judgement, usually backed up with one or two drive-overs to confirm the results.
- Three conducted the surveys by car using methods such as: 2 cars driven 330 metres apart with lines marked on the windscreens as target heights; or following a car in the traffic stream and recording visibility restrictions using centre line markings to judge distances.
- One RCA conducted Total Station Surveys.

Authorities were also asked what provisions were made for the safety of workers carrying out the surveys. Most (19) didn't answer this question, but amongst those that did, the majority cited compliance with safety plan provisions in "Working on the Road" or TNZ's G/1 Specification or Draft Code of Practice for Working on High Capacity Highways. Several authorities relied on survey signs at each end of the site, and/or used a vehicle with a flashing amber light.

A number of authorities described problems associated with these surveys, including:

- difficulties interpreting the requirements in MOTSAM,
- dangers to surveyors, particularly in high traffic volumes,
- very time consuming; particularly using the traditional method, and
- suspected inconsistencies in survey results.

4.1.13 General Comments

Many of the comments and suggestions from RCAs reiterated points mentioned in earlier parts of the questionnaire. The most common suggestions and concerns were:

- Greater consistency of application of NPLs is required. Many suggested that lack of consistency could lead to possible confusion and non-compliance
- The "correct" or standard methodology for surveying and installing NPLs should be published
- Speed environment should be taken into account when assessing the need for NPLs
- Debate is required and a decision made on the issue of whether or not NPLs should be used at horizontal curves
- Are NPLs necessary in urban areas, or on minor rural roads?



- Night-time can be a problem with car headlights lower than the 1.15 metre object height used in the standards. The target height for surveys may require revision
- NPLs are sometimes used to reinforce the "don't overtake" message at flush medians as the public doesn't understand correct usage of flush medians. Better education is required

## 4.2 Field Surveys

A total of 131 NPLs at vertical curves were surveyed along 51 rural routes. The lines were then screened to eliminate any that were not marked strictly for vertical curvature or where unusual circumstances prevailed, such as the length of NPL being extended at intersections. The remaining 106 NPLs were used in the following analysis.

### 4.2.1 Accuracy of Existing NPLs

MOTSAM indicates that NPLs at vertical curves on rural roads may be marked where visibility on the centre line of the road is less than 330 metres at the required eye and object heights of 1.15 metres, and subject to the conditions shown in Table 3 below.

TABLE 3: LENGTH OF NPL

<b>Measured Length of Restricted Visibility</b>	<b>Action Taken</b>
Less than 80 metres	NPL shall not be marked
80 metres to 160 metres	80m of continuous NPL to be marked measured back from the point where visibility is regained
Greater than 160 metres	NPL marked from 80m beyond the point where visibility is lost to the point where visibility is regained

The differences between the calculated start and end points of NPLs, as determined by the LTSA surveys, and existing lines are shown in Figures 1 and 2. The differences are displayed in bins of 10 metre intervals. A negative value indicates the line started or finished earlier than the calculated point.

If the correct survey procedure was used to determine the NPL start and end points when the lines were installed, most should be accurate to within plus or minus 10 metres of the points calculated in the LTSA's surveys.

Figure 1 shows widespread variations between existing and calculated start points. Only 19% of existing NPLs started within plus or minus 10 metres of the correct start point, 51% were accurate to within plus or minus 50 metres, and 16% were outside plus or minus 100 metres. Almost as many lines started late as early.

Figure 2 shows a much tighter grouping of results. Here, most of the existing NPLs finished later than necessary. Only 16% of lines finished within plus or minus 10 metres of the calculated finish points, 67% were within plus or minus 50 metres, and 3% were more than 100 metres beyond the calculated end points.

FIGURE 1:

All Regions: distance between start of marked line and calculated line (metres)

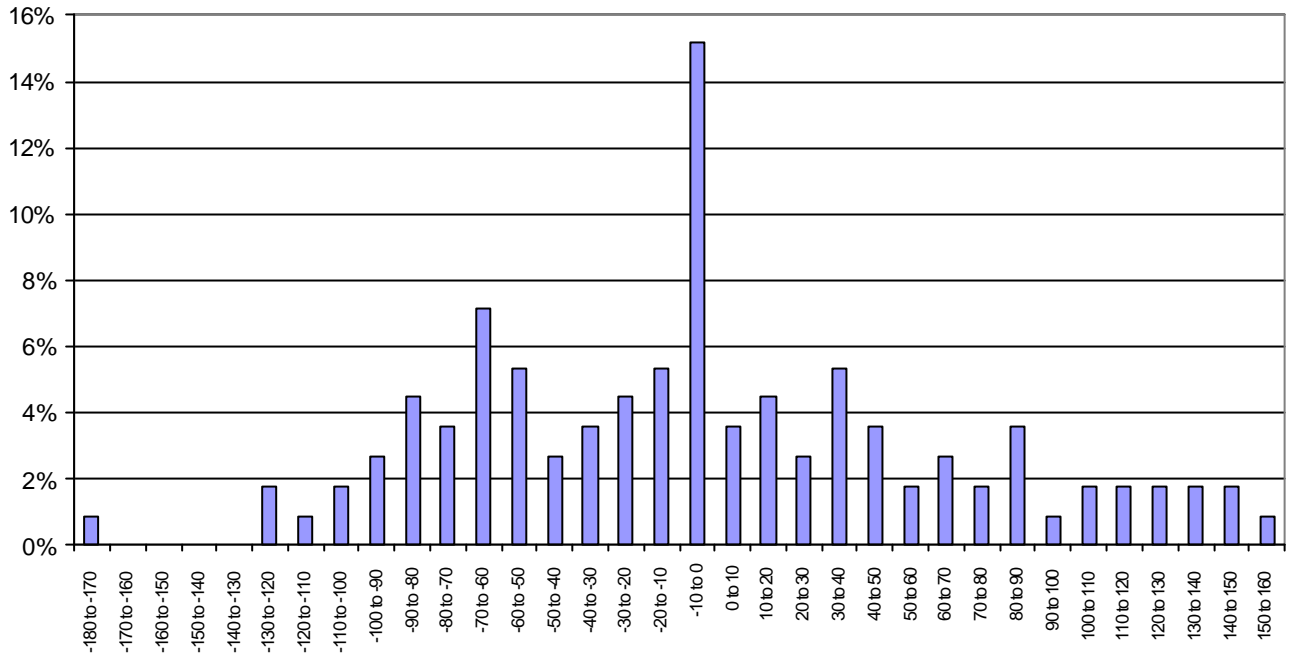


FIGURE 2:

All Regions: distance between end of marked line and calculated line (metres)

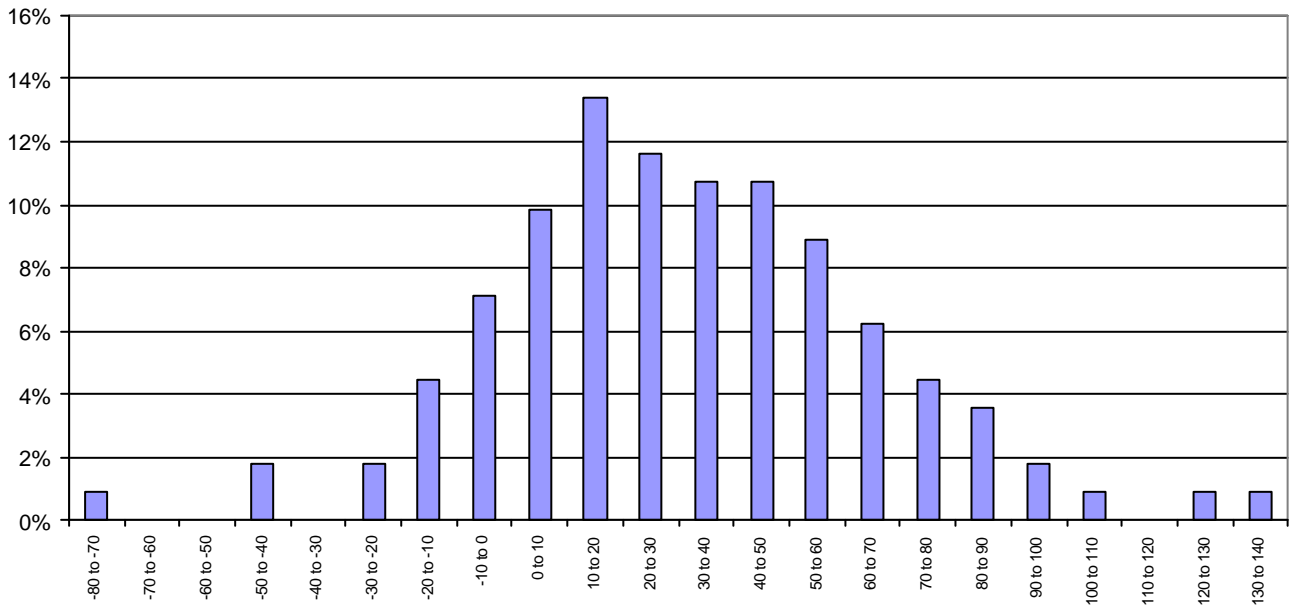
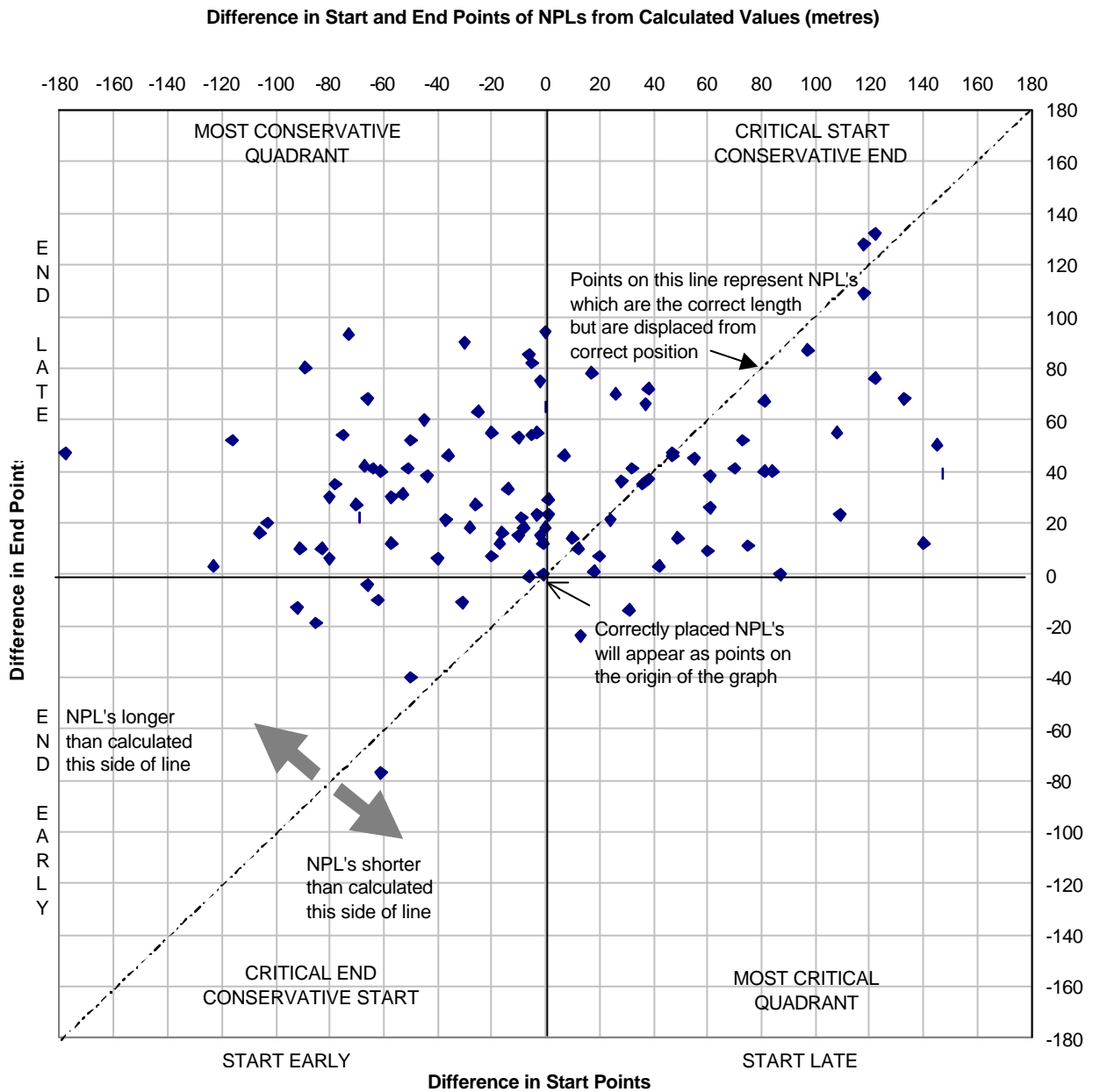


Figure 3 shows the displacement of all NPL start and end points from the calculated position. All NPLs with the correct start and end points, and therefore the correct length, appear on this graph at the point of origin (0,0). NPLs falling on the dashed line outside the point of origin are the correct length, but displaced from the correct location. NPLs shown above the line are longer than calculated values, and those below the line are shorter than calculated.

FIGURE 3:

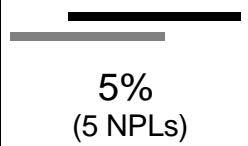
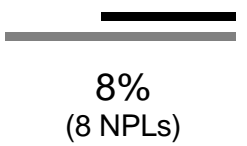
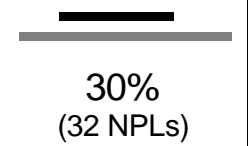
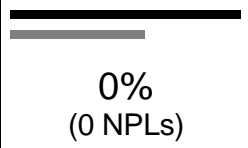
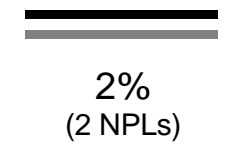
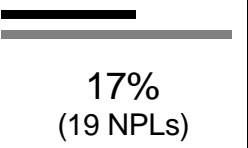
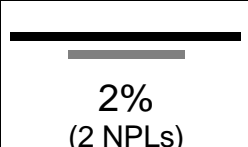
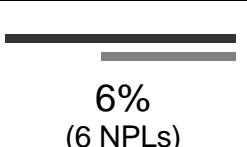
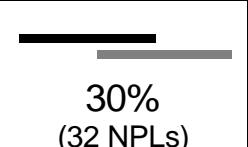


Widespread variations between calculated and actual values are clearly evident in Figure 3. NPLs starting late or finishing early have safety implications, as the motorist could be lead into thinking there was sufficient visibility to overtake when there was not. The most critical category are NPLs that start late and finish early.

The matrix in Table 4 summarises the data shown in Figure 3. From the table it can be seen that 43% of NPLs started early and 38% started late, while only 19% started at the correct location (within plus or minus 10 metres of the point calculated by LTSA). Most NPLs (77%) finished late, with only 16% finishing at the correct point and 7% finishing early.

It is of concern that only 2% of NPLs surveyed had the correct start and finish points.

**TABLE 4: MATRIX COMPARING MARKED NPLs AGAINST CALCULATED VALUES**

	Early Finish	Correct Finish	Late Finish	Total
Early Start	 <p>5% (5 NPLs)</p>	 <p>8% (8 NPLs)</p>	 <p>30% (32 NPLs)</p>	<p>43% (45 NPLs)</p>
Correct Start	 <p>0% (0 NPLs)</p>	 <p>2% (2 NPLs)</p>	 <p>17% (19 NPLs)</p>	<p>19% (21 NPLs)</p>
Late Start	 <p>2% (2 NPLs)</p>	 <p>6% (6 NPLs)</p>	 <p>30% (32 NPLs)</p>	<p>38% (40 NPLs)</p>
Total	<p>7% (7 NPLs)</p>	<p>16% (16 NPLs)</p>	<p>77% (83 NPLs)</p>	<p>100% (106 NPLs)</p>

Thirty percent of NPLs started early and finished late. This would not generally be critical from a safety point of view, as it indicates an inherent factor of safety in the length of NPL. However lines that are too long can be problematic in that they prohibit overtaking where opportunities exist, and can lead to disrespect for the markings. The average NPL surveyed in this category was 92 metres longer than calculated by LTSA.

An equally large group of NPLs (30%) started late and finished late, indicating that the lines were completely displaced. From observations made during the surveys it appeared that many of these lines were marked at the crest of the vertical curve, rather than on the approaches.

Two NPLs (2%) in the surveys were in the most critical category of lines that started late and finished early.

Appendix 4 compares existing NPL locations against calculated locations on a site by site basis for the Auckland, Wellington and Christchurch LTSA regions.

#### 4.2.2 Consistency of NPL Marking on Routes

LTSA surveyors were asked to assess whether or not routes had been marked consistently, and to comment on the overall effectiveness of NPL marking. Forty one rural routes in 21 road controlling authority areas were used in this analysis. Of these, 36 routes had NPLs marked, and 5 did not.

The results are indicative only, as time constraints did not allow more than subjective assessments.

The results showed:

- 24 (67%) of the routes with NPLs were marked consistently

- The remaining 12 (33%) NPL routes required additional NPLs for vertical curvature, or sometimes for a combination of vertical and horizontal curvature. In some cases, an NPL had been marked in one direction, but not in the opposite direction. On a number of routes, marked NPL sites were considered no worse than potential sites that had been left unmarked
- The 5 routes not marked with NPLs were consistent in that there were no markings along the entire route. However, the surveyors suggested all should have had at least one NPL marked

#### 4.2.3 No Passing Advance Warning Lines

Five percent of sites did not have the legally required advance warning lines. A further 5% had advance warning lines not marked in accordance with MOTSAM, having the wrong number of stripes (ranging from 3 to 7 instead of 5 as specified).

The average length of advance warning line (where 5 stripes were marked) was 101.5 metres, compared with 100 metres specified in MOTSAM.

## **5. Discussion**

Forty two percent of authorities considered the current MOTSAM standards to be inadequate, particularly in the following areas:

- MOTSAM policy allows too much individual RCA discretion on whether to install NPLs, leading to inconsistent application throughout the country
- The policy does not allow sufficient choice of operating speeds when determining the length and location of NPLs. (The policy does not recognise different operating speeds inherent in the new 60 km/h and 80 km/h speed limits, nor does the 100km/h operating speed used in the policy adequately reflect actual operating speeds in rural areas.)
- Horizontal curves are not catered for in the policy
- Target eye and object heights may not reflect the current vehicle fleet nor adequately consider night-time visibility needs

These concerns suggest a review of the MOTSAM guidelines could be justified.

Equally, there appeared to be a considerable lack of understanding of the criteria contained in MOTSAM with regards to the engineering basis for the standards and in their application. This is clearly demonstrated in the field survey results as they show a great deal of inconsistency in the marking of NPLs. Only 2% of NPLs marked for vertical curvature were accurate.

Over a third (38%) of NPLs started late, and 7% finished early. These results reveal a lower margin of safety than the standards provide as they indicate to motorists it is safe to complete or commence overtaking manoeuvres when it is not. These “unsafe” NPLs

should be reviewed and remarked as soon as possible in compliance with the current standards.

Almost a third (30%) of lines started early and finished late. While this would not generally be a cause for safety concerns, any lines that are too long unduly restrict overtaking opportunities, and could lead to disrespect for NPL markings in general.

Almost a third (29%) of the routes surveyed were inconsistently marked. Often vertical curves marked with NPLs had visibility similar to or no worse than other crests left unmarked along the route. In some cases, an NPL would be marked for one direction of travel only.

There is pressure from RCAs for the development of guidelines for marking NPLs on horizontal curves and for other changes to existing criteria. The poor level of consistency and compliance with existing policy and standards may be partly a reflection of this desire for change, but also demonstrates a poor understanding of the criteria and its application.

Broadening the scope for marking NPLs to cover other situations of limited visibility on roads may be justified in terms of providing positive guidance to motorists. However if the criteria are widened and applied as inconsistently as existing standards, there will be significantly reduced legal opportunities to pass, likely increases in general non-compliance and potentially reduced safety benefits.

## **6. Recommendations**

- RCAs should review their NPLs identified as “unsafe” (that is, starting late or finishing early) as soon as practicable to ensure compliance with current standards. Any review should include checks to ensure that marking along routes is consistent.
- LTSA should convene a working party, representative of interested parties, to consider issues raised by this survey, and in particular to report on:
  - ◆ Whether the existing criteria should be amended to provide a range of sight distance values based on operating speeds
  - ◆ Any justification for adjustment to eye and target heights
  - ◆ Whether NPLs should be marked at horizontal curves and, if so, what criteria should be used
  - ◆ The need for a standard methodology for surveying and setting out NPLs and , if so, what method should be used and how should it be documented
  - ◆ Safety and compliance issues

**Appendix 1, Road Controlling Authorities Surveyed.**

**NPL Surveys**

RCA	Routes	NPL Sites	NPLs	NPLs used in analysis	Non NPL Sites
Ashburton	1	1	2	2	0
Banks Peninsula	0	0	0	0	0
Central Hawkes Bay	0	0	0	0	0
Christchurch	4	3	6	6	3
Clutha	0	0	0	0	0
Far North	2	2	3	0	1
Franklin	1	3	6	4	0
Gisborne	0	0	0	0	0
Hastings	1	1	2	2	0
Hurunui	3	3	5	4	0
Kapiti Coast	0	0	0	0	0
Matamata Piako	1	2	4	4	1
Porirua	0	0	0	0	0
Rangitikei	2	3	6	6	1
Selwyn	2	3	6	5	0
South Waikato	1	1	1	1	1
Southland	2	2	4	4	0
Tararua	3	3	6	2	1
Tasman	6	7	14	11	0
Timaru	3	6	10	10	0
TNZ Auckland	2	5	8	7	0
TNZ Dunedin	3	6	12	11	0
TNZ Wanganui	1	1	2	2	0
TNZ Wellington	1	1	2	2	0
Waikato	1	3	5	3	0
Waimakariri	2	3	6	4	0
Waimate	1	1	2	2	0
Waipa	1	2	3	2	1
Waitaki	2	5	10	8	0
Western Bay of Plenty	3	1	2	2	3
Whakatane	2	2	4	2	0
Total	51	70	131	106	12

Appendix 2, No Passing Lines Questionnaire, 2000

## No Passing Lines Questionnaire, 2000

Road Controlling Authority

Person(s) Interviewed

Contact Phone No.

Date

Interviewer

### QUESTIONS

1. Who decides the standards to be used for marking no-passing lines in your authority?

2. What standards does your authority use?

3. Does your authority use no passing lines in the following situations? (*Answer Y, N, or S in box for yes, no, or sometimes*)

- (a) On approaches to raised traffic islands that separate opposing traffic flows
- (b) On approaches to hazards or obstructions in the carriageway that separate opposing traffic flows
- (c) On approaches to railway level crossings
- (d) As centre lines on undivided 4 lane rural roads
- (e) At vertical curves where restricted visibility makes overtaking unsafe
- (f) As remedial measures on lengths of road with proven overtaking crash histories
- (g) As centre lines on multi lane undivided urban roads
- (h) As centre lines at right turn bays
- (i) At horizontal curves where restricted visibility makes overtaking unsafe
- (j) Alongside flush medians

Any other situations?

Comments:



<p>4. Are no-passing advance warning lines also used in the situations described above? (Answer Yes, No or Sometimes)</p> <p><input type="checkbox"/> (a)</p> <p><input type="checkbox"/> (b)</p> <p><input type="checkbox"/> (c)</p> <p><input type="checkbox"/> (d)</p> <p><input type="checkbox"/> (e)</p> <p><input type="checkbox"/> (f)</p> <p><input type="checkbox"/> (g)</p> <p><input type="checkbox"/> (h)</p> <p><input type="checkbox"/> (i)</p> <p><input type="checkbox"/> (j)</p> <p>Any other situations?</p> <p>Comments:</p>
<p>5. Do you consider the standards your authority uses to be adequate, or could they be improved? If so, how?</p>
<p>6. Does your authority have a policy to mark all of its roads with no-passing lines where restricted visibility at vertical curves makes passing dangerous?</p> <p>Yes/No</p> <p>If No, does your authority mark some roads, and what criteria are used to determine this?</p>
<p>7. What is your authority's policy with regard to marking no passing lines at the other situations described in question 3? What criteria, if any, are used to determine this?</p>
<p>8. How does your authority identify possible no passing line sites?</p>
<p>9. What systems are in place to ensure that roads or routes have been marked in a consistent manner?</p>
<p>10. How does your authority ensure that no passing lines are correctly reinstated after road works or re-seals?</p>
<p>11. When roads are upgraded, or new roads constructed, what checks, if any, are made at the design stage to eliminate the need for no passing lines?</p> <p>Are checks made after a road has been upgraded that no passing lines are still appropriate?</p>

12. Does your authority (or its consultants) have a specific methodology for surveying and setting out no-passing lines? Please describe the process used, including provisions made for the safety of workers.

Are there any problems?

13. Do you have any general comments about no-passing lines, or suggestions on ways the LTSA could be of assistance on this issue?

**Appendix 3, Field Sheet for No Passing Lines, 2000**

**ROUTE ANALYSIS**

RCA NAME \_\_\_\_\_ ROUTE LENGTH (km): \_\_\_\_\_

ROAD NAME: \_\_\_\_\_ APPROX AADT \_\_\_\_\_

ROUTE SUMMARY: \_\_\_\_\_

No. of sites where NPLs installed: \_\_\_\_\_ No. of additional sites where NPLs should be installed: \_\_\_\_\_

COMMENTS ON ROUTE CONSISTENCY: \_\_\_\_\_

OTHER COMMENTS: \_\_\_\_\_

SITE 1: LOCATION	DIRECTION	NEW SURVEY DATA	RESTRICTED VISIBILITY			NO PASSING LINE (NPL)			ADVANCE WARNING LINES	
			1. LOSE VIS	2. REGAIN VIS	3. LENGTH	4. START POINT	5. END POINT	6. LENGTH	7. NO. OF STRIPES	8. LENGTH
			DIFFERENCE BETWEEN SURVEYED & EXISTING							
	DIRECTION A	NEW SURVEY DATA	0m							
		EXISTING NPL								
		DIFFERENCE BETWEEN SURVEYED & EXISTING								
	DIRECTION B	NEW SURVEY DATA								
		EXISTING NPL								
		DIFFERENCE BETWEEN SURVEYED & EXISTING								

Comments

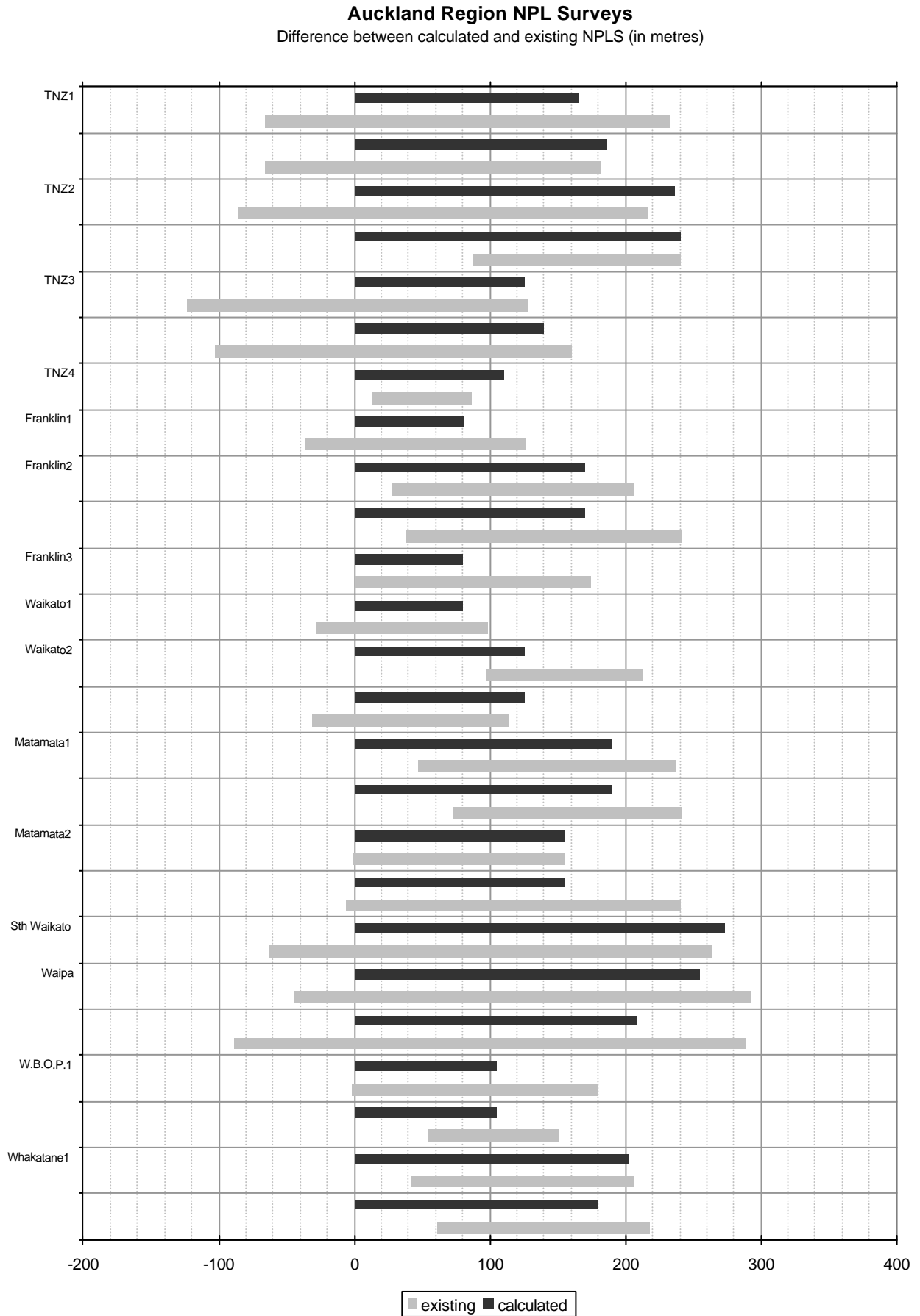
SITE 2: LOCATION	DIRECTION	NEW SURVEY DATA	RESTRICTED VISIBILITY			NO PASSING LINE (NPL)			ADVANCE WARNING LINES	
			1. LOSE VIS	2. REGAIN VIS	3. LENGTH	4. START POINT	5. END POINT	6. LENGTH	7. NO. OF STRIPES	8. LENGTH
			DIFFERENCE BETWEEN SURVEYED & EXISTING							
	DIRECTION A	NEW SURVEY DATA	0m							
		EXISTING NPL								
		DIFFERENCE BETWEEN SURVEYED & EXISTING								
	DIRECTION B	NEW SURVEY DATA								
		EXISTING NPL								
		DIFFERENCE BETWEEN SURVEYED & EXISTING								

Comments

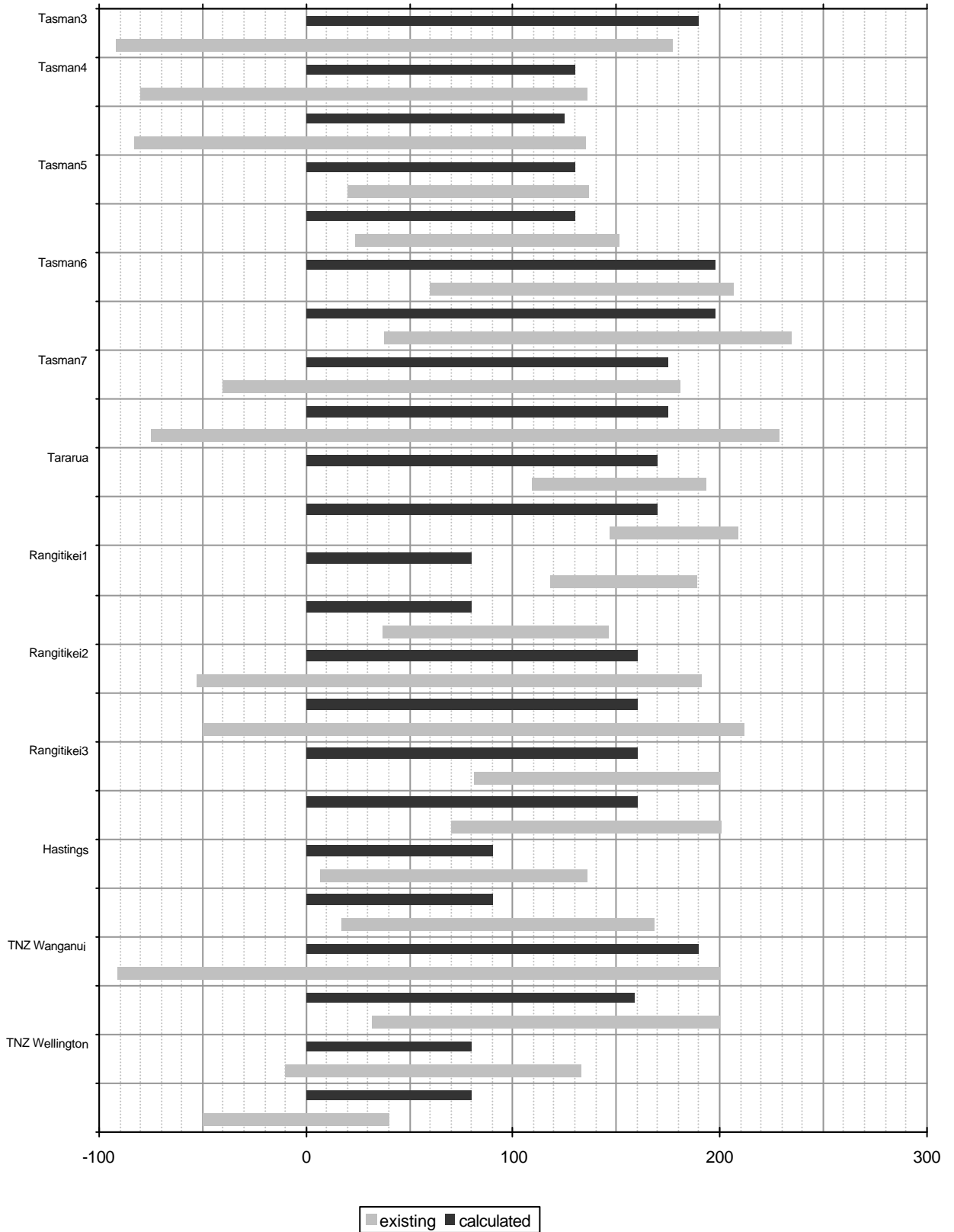
SITE 3: LOCATION	DIRECTION	NEW SURVEY DATA	RESTRICTED VISIBILITY			NO PASSING LINE (NPL)			ADVANCE WARNING LINES	
			1. LOSE VIS	2. REGAIN VIS	3. LENGTH	4. START POINT	5. END POINT	6. LENGTH	7. NO. OF STRIPES	8. LENGTH
			DIFFERENCE BETWEEN SURVEYED & EXISTING							
	DIRECTION A	NEW SURVEY DATA	0m							
		EXISTING NPL								
		DIFFERENCE BETWEEN SURVEYED & EXISTING								
	DIRECTION B	NEW SURVEY DATA								
		EXISTING NPL								
		DIFFERENCE BETWEEN SURVEYED & EXISTING								

Comments

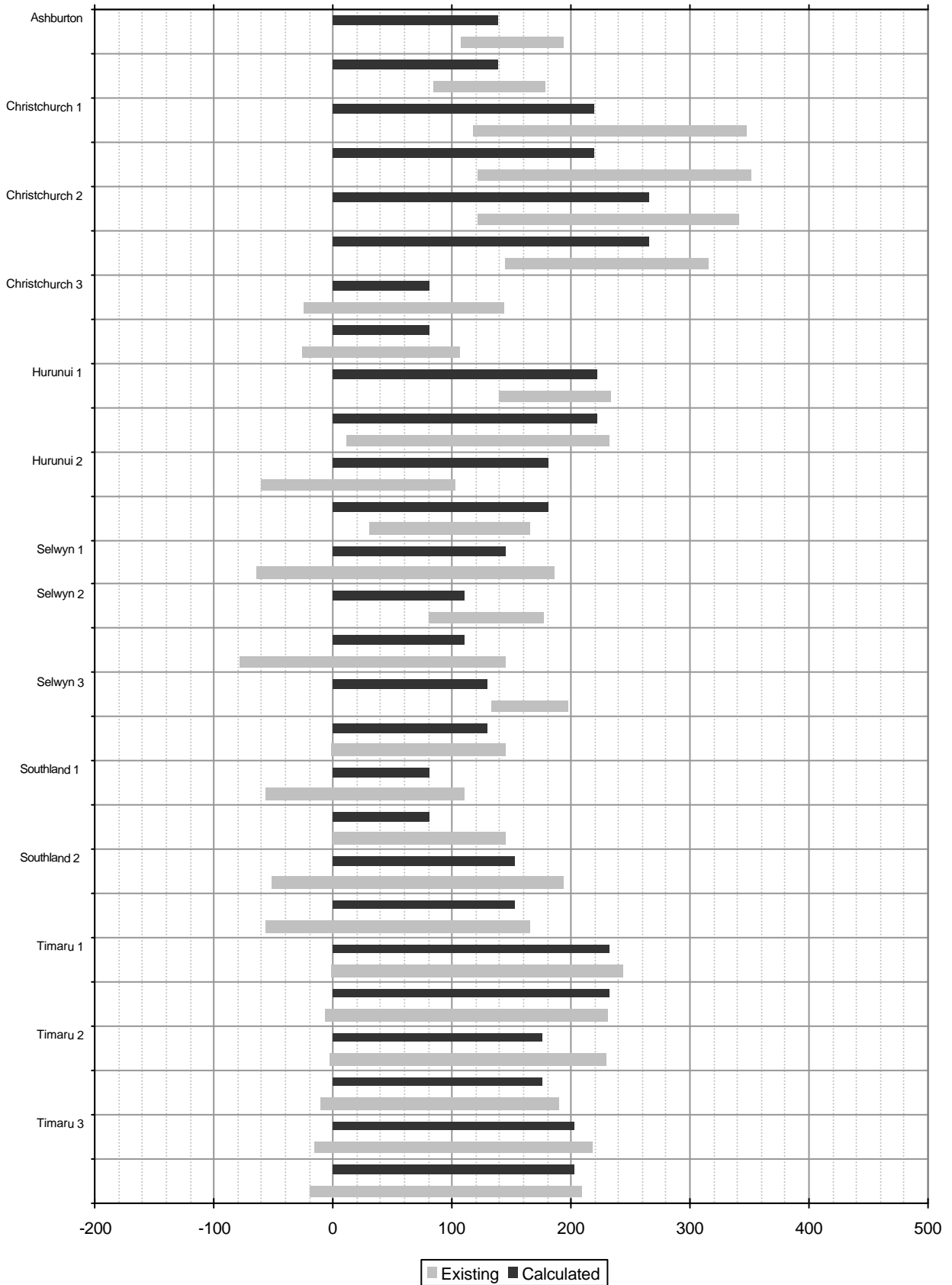
Appendix 4, Difference in NPL Location Versus Calculated Location



**Wellington Region NPL Surveys**  
 Difference between calculated and existing NPLS (in metres)



**Christchurch Region NPL Surveys**  
Difference between calculated and existing NPLS (in metres)





**Road Safety Survey Series**

RSS 1	Traffic Signal Light Output	1995/96
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RSS 6	Pedestrian Crossings	1996/97
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RSS 8	Traffic Control at Road Works	1998
RSS 9	Safety Management Systems	1998
RSS 10	Skid Resistance	1999
RSS 11	Pedestrian Platforms	1999
RSS 12	Floodlighting Pedestrian Crossings	1999
RSS 13	No Passing Lines	2000
RSS 14	Roundabouts	2000

These reports may be purchased from the Regional Engineer, Land Transport Safety Authority in Auckland (Private Bag 92-515), Wellington (PO Box 27-249) or Christchurch (PO Box 13-364) at a cost of \$10 each including GST.