Traffic Standards and Guidelines
2001/2002 Survey

RSS 17

School Crossing Facilities

LAND transport safety AUTHORITY

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Survey of Traffic Standards and Guidelines

The Land Transport Safety Authority (LTSA) is the government agency 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 effectiveness 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.

John Kay

General Manager, Operations

Executive Summary

Introduction

- Interview surveys were conducted during 2002 to investigate procedures and policies for two safety areas – school crossing facilities and data collection.
- This report details the results of the surveys of school crossing facilities for 32 Road Controlling Authorities (RCAs). School crossing facilities have been defined as *a measure introduced specifically to assist children crossing the road to and from school, as part of their normal school day*. They include, but are not limited to: school traffic wardens, school patrols at school crossing points (kea crossings), school patrols at pedestrian crossings and 'dedicated' midblock traffic signal controlled crossings.
- Field surveys were conducted on a sample of 59 kea crossings to obtain a snapshot of the on-road situation relative to the standards, verify responses to the interview and to discuss problems or successes on site with RCA staff.

Interview Findings

- 30 out of the 32 authorities surveyed had a school crossing facility of one type or another operating on their roads, indicating the widespread use of such measures. School patrols were the most popular form of school crossing facility utilised. The majority of school crossing facilities were provided at primary schools.
- The request for a crossing facility often originates from the school itself.
- Pedestrian and vehicle counts were reported as not always being undertaken by RCAs despite warrant criteria relying on such information to determine the appropriate form of crossing.
- RCAs reported using a number of guidelines to determine which type of school crossing facility was the most appropriate.
- School patrols are being operated at sites with a wide range of pedestrian and vehicle activity, including below recommended warrant criteria.
- Many RCAs acknowledged that no formal monitoring programme exists to review the suitability of school crossing facilities in terms of need, type and design.
- A number of documents and sources are referred to by RCAs to assist in the actual design of school crossing facilities. The majority of the respondents claimed that most of their school crossing facilities met identified design standards.
- In addition to the formally required signs and markings identifying a school crossing facility, raised pedestrian platforms, kerb extensions or refuges are also often provided.
- A reactive approach to incidents, accidents or requests for changes is often adopted.

- Respondents were aware of both accidents and incidents (near-misses or regulation breaches) at school crossing locations. Remedial measures to address safety concerns have been mainly centred on enforcement initiatives.
- The range of reference manuals and design guides identified by RCAs led to a number of respondents requesting that LTSA develop and produce a single school crossing facility document encompassing all of the options available to RCAs.

Field Survey Results

- 59 kea crossings were examined in the field surveys.
- The kea crossings examined generally followed the design principles set out in the regulations and *Traffic Note 29* in terms of the provision of signs (including their support posts) and markings. However, while it is acknowledged some of the non-compliance identified during the field surveys may not be safety critical, the extent of variance from standard is extremely disappointing. This is particularly so given the relatively short time kea crossings have been in place and the clear and detailed requirements provided.
- Road markings associated with the crossing were typically located in accordance with the specifications, and met minimum stated dimensions. Issues of concern were with regards to the centreline markings. Some kea crossings did not have the minimum 30m centreline length on the approach to the crossing whilst at other locations, the centreline was carried on through the crossing. RCAs also need to pay greater attention to detail in terms of the provision and marking out of pedestrian hold lines.
- Permanent road signs associated with kea crossings were installed on both approaches in over 90% of the sites surveyed, although some were not positioned a sufficient distance from the crossing.
- Few sites had the support posts for the temporary signs in accordance with design specifications set out in the *Traffic Regulations 1976*. Of particular concern was the positioning of support posts for the 'children' flag.
- Some concern exists with regards to the impact of the temporary 'children' flag during periods of high wind. The design of the flag means that when the wind blows, the target area for motorists to observe is very much reduced. Solid signs, rather than flags, have been used in some locations. However, solid signs are heavier and more cumbersome to set up. This in turn may lead to the sign being left out when the patrol is not operating. The height of such signs or flags is also an issue needing consideration, as they should not detract from the Patrol's view of oncoming traffic.

Recommendations

- *School Traffic Safety Team* manual should be updated bringing together all the techniques currently used to assist pupils travel to and from school.

This document should include details concerning elements of the design and provision of school crossing facilities.

- Encourage the inclusion of school crossing facilities within the Safety Management System processes being developed by RCAs.
- RCAs should carry out a regular audit of facilities to:
  - assess the appropriateness of the school crossing facility in terms of current pedestrian and vehicle volumes and traffic conditions; and
  - ensure the crossing facilities meet regulatory requirements and are operating in an efficient and safe manner.

Contents

1. Introduction

During April to July 2002 the Regional Offices of the Land Transport Safety Authority (LTSA) conducted surveys of two roading or road safety issues in road controlling authorities (RCAs).

The two areas surveyed were:

- school crossing facilities, carried out for a sample of 32 RCAs; and
- data collection, carried out for all RCAs.

This report describes the procedures for the school crossing facility survey and presents the results.

2. Purpose of the Survey

The purpose of the survey was to:

- Identify the type and the extent of different school crossing facilities currently being used.
- Establish what standards and guidelines are being used by RCAs for the design and provision of school crossing facilities.
- Determine what programmes are used to identify deficiencies and hence upgrade school crossing facilities.
- Measure on-road practices against current standards and guidelines specifically for school crossing points (kea crossings).
- Identify issues that could be improved upon in the provision of school crossing facilities, and recommend appropriate remedial action.

3. Methodology

3.1 Sample Selection

A sample of 32 RCAs was chosen for inclusion in the school crossing facility survey. This sample included 30 territorial local authorities (TLA) and two regional offices of Transit New Zealand (TNZ). The sample was weighted towards authorities not included in the 2000/2001 LTSA surveys.

Appendix 1 lists the 32 RCAs included in the surveys.

3.2 Interview Surveys

Interview surveys were conducted with representatives of each of the 32 authorities. Survey forms were sent in advance to allow time to research answers where necessary. Questions were centred around the standards, guidelines, programmes and practices used for the provision of school crossing facilities.

For the purpose of the survey, a school crossing facility was defined as

> *a measure introduced specifically to assist children crossing the road to and from school, as part of the normal school day.*

School crossing facilities may include:

- **School traffic wardens** – pedestrian operated facility at a specified location. These are generally at unmarked crossing points but may be at marked pedestrian crossings, or crossings controlled by traffic signals. Traffic wardens have no control over vehicular traffic. RCA's need not authorise school wardens.
- **School patrols at a school crossing point ('kea' crossing)** – pedestrian operated facility that only operates as a pedestrian crossing point when a school patrol, adult supervisor and two fluorescent orange flags are present. For simplicity, this type of facility is referred to as a kea crossing for the remainder of the report.
- **School patrols at a pedestrian crossing**– pedestrian operated facility at a marked pedestrian crossing ('zebra' crossing), using signs to stop traffic while school pupils cross. They are normally operated by responsible school pupils under adult supervision. For simplicity, this type of facility is referred to as a school patrol for the remainder of the report.
- **'Dedicated' midblock traffic signal controlled crossings** – pedestrian crossing controlled by traffic lights without formal crossing supervision, but used almost exclusively by school children.

The survey also allowed RCAs the opportunity to provide details of other specific school crossing facilities provided. Pedestrian crossings without a school patrol but used by school children to and from school, have not been considered within this report.

A breakdown of the number of schools within each TLA along with the number and type of school crossing facilities provided is contained in Appendix 1. While a school may be located within a particular TLA, its crossing facility may be located on a road controlled by either the TLA or TNZ. Either of these may be the RCA and thus responsible for the design, provision and maintenance of the school crossing.

The questions used for the interview surveys are shown in Appendix 2. In order to assist RCAs with the process of identifying the number and type of school crossing facilities, each RCA was provided with a list of schools within their area. This has allowed an assessment of crossing facilities by school type (Primary, Intermediate and Secondary) to be carried out.

3.3 Field Surveys

RCAs have the opportunity to install a variety of school crossing facilities. In order to obtain a sufficient amount of data on which to report upon, a field survey of only one type of crossing was undertaken.

RCAs were permitted to install school crossing points (kea crossings) without first obtaining LTSA approval in January 2001. Given this recent availability, field surveys concentrated solely upon the provision of this type of school crossing facility. The objective of the field surveys was to determine whether the kea crossings inspected complied with the legal requirements stipulated in Part 8A of the *Traffic Regulations 1976*. The survey also sought to provide generic information on the location and layout of kea crossings and to establish the type and extent of signs and markings used in addition to those noted in the regulations.

Field surveys were conducted while the kea crossing was not set up in order to eliminate the risk of distracting children operating or using the crossing. However, in a number of cases, surveyors did view the crossing in operation in order to ascertain the provision and use of the associated temporary traffic signs.

Up to a maximum of 10 kea crossings were surveyed for each RCA resulting in a total of 59 crossings being inspected for 17 RCAs. Appendix 1 shows the number surveyed in each RCA. The survey process acknowledged that kea crossings might not have been provided in some of the RCAs surveyed. In such cases, field surveys could obviously not be carried out.

A copy of the survey form used for the field survey is shown in Appendix 3.

4. Results of the Interview Surveys

4.1 Types of School Crossing Facilities

Thirty of the 32 authorities surveyed had a school crossing facility of one type or another operating on their roads, indicating the widespread use of such measures. Table 4.1.1 shows the number of RCAs with the different types of school crossing facilities.

Table 4.1.1 RCAs with school crossing facilities

School Crossing Facility	Number of RCAs
Traffic Warden	20
Kea Crossing	16
School Patrol	29
Traffic Signal Controlled Crossing	8
Other	6

The questionnaire also sought to broadly identify which crossing facilities were provided for schools according to pupil age range. To simplify this issue, three bands were used: primary, intermediate and secondary schools.

The type and number of school crossing facilities recorded for each school, according to pupil age range, are shown in Table 4.1.2. School patrols were the most popular form of school crossing facility utilised, whilst the majority of school crossing facilities were provided at primary schools.

Table 4.1.2 School crossing facilities by school type

Pupil age range	RCA by School Crossing Facility					
	Traffic Warden (1)	Kea Crossing	School Patrol	Traffic Signals	Other (2)	Total
Primary	138	87	362	15	5	607
Intermediate	6	6	32	1	1	46
Secondary	5	1	9	13	2	30
TOTAL	149	94	403	29	8	683

(1) Traffic warden data is approximate. RCAs need not authorise school traffic wardens and some RCAs therefore do not have a record of their use and operation.
(2) Other dedicated crossings includes adult supervision (paid or otherwise), not officially designated as a school traffic warden

Occasionally, two or more schools in close proximity to one another shared a school crossing facility. Where this is known to happen and has been identified, only one crossing has been recorded and attributed to the school with the lowest pupil age range.

4.2 Requests for a new school crossing

Requests for a new or improved school crossing facility typically came from a number of sources within each RCA. The number of RCAs identifying each source of request is shown below:

- Schools (28 RCAs).
- Local council (13 RCAs).
- Parents (9 RCAs).
- Road Safety Co-ordinator (6 RCAs).
- Police (6 RCAs).

4.3 Data Collection

The survey identified that RCAs collect a wide range of data to help justify and design the correct type of school crossing facility. In addition, different RCAs placed a different level of importance to the type of data collected.

Table 4.3.1 Data collection undertaken

Data collected	RCA by Survey Frequency							
	Always		Usually		Seldom		Never or Not Sure	
	No.	%	No.	%	No.	%	No.	%
Pedestrian counts	22	69	3	9	3	9	4	13
Vehicle flows	22	69	6	19	1	3	3	9
Crash data	9	28	10	31	9	28	4	13
Vehicle speeds	5	16	10	31	12	38	5	16
Pupil surveys (1)	3	9	4	13	11	34	14	44

(1) For instance, data that may be collected as part of a 'Safe Routes to School' project.

4.4 School Crossing Warrants

RCAs reported using various guidelines to determine which was the most appropriate type of school crossing facility for installation. Design guides used by RCAs include:

- Road Research Unit *Technical Recommendation (TR11) Recommended Practice for Pedestrian Crossings*, 1988.
- Transit New Zealand/Land Transport Safety Authority *Manual of Traffic Signs and Markings (MOTSAM)*, 1998
- Land Transport Safety Authority *Traffic Note 29 (TN29): School Crossing Points (kea crossings) – Information*, 2001
- Land Transport Safety Authority *School Traffic Safety Team* manual, 1994
- Austroads *Guide to Traffic Engineering Practice - Pedestrians Part 13 (AustRoads Part 13)*, 1995

A number of RCAs also suggested that consultation with the school and police was an essential action when considering the provision and type of school crossing facility.

TR11 indicates that a School Patrol is warranted if, during the normal school weekday, the traffic flow taken during any half hour period exceeds 100 vehicles and the product of the pedestrians (P) per half hour and the vehicles (V) per half hour exceeds 5,000.

Traffic Wardens are generally used to help pupils across a road at places where pedestrian crossings, and therefore a School Patrol, could not be justified. No set warrant exists for the provision of Traffic Wardens, and they can, and are, used at a range of locations including pedestrian crossings and traffic signal controlled crossings.

TN29 recommends that kea crossings are impractical and unjustified where the half hour PV product is less than 3,000. The Note also advises that whilst kea crossings have operated successfully where the half hour product exceeds 20,000, alternative treatment should be considered in such instances.

AustRoads Part 13 is used by some RCAs during the design of mid-block traffic signal controlled crossings. This document suggests that this type of facility is justified for a school where traffic flow in two separate hourly periods exceeds 600 vehicles and pedestrian flow exceeds 50 persons and has a hourly pedestrian and vehicle flow product exceeding 40,000. The New Zealand Standard *Specification for Traffic Signals* (NZS 5431) 1973 was not specifically identified as a document used in the design of this type of crossing by any RCA. This design guide notes that a mid-block traffic signal controlled road crossing can be justified on a volume, delay or accident warrant, or combination of all three. The volume warrant requires the product of the average hourly pedestrian and vehicle flow to exceed 200,000.

The survey sought to establish the proportion of school crossings complying with the RCAs identified warrant level. The results for those RCAs able to provide an estimate are shown in Table 4.4.1.

Table 4.4.1 School crossing facilities estimated as meeting warrant for each RCA

Estimated % of crossings meeting warrant	RCA by Crossing Facility							
	School Patrol		School Traffic Warden		Kea Crossing		Dedicated signal control	
	No.	%	No.	%	No.	%	No.	%
50% or less	4	17	1	7	1	8	1	13
51 - 60%	0	0	0	0	0	0	0	0
61 - 70%	1	4	0	0	0	0	0	0
71 - 80%	3	13	0	0	0	0	0	0
81 - 90%	2	8	1	7	0	0	0	0
91 - 100%	14	58	13	86	12	92	7	87
Total	24	100	15	100	13	100	8	100

It is of interest to note that some RCAs estimated Traffic Wardens did not meet an identified warrant, despite no formal warrant existing. As noted previously, Traffic Wardens need not be approved by the RCA. A number of unofficial adult supervised crossings do exist and this may have influenced the response of those people interviewed.

Only 3 (9%) RCAs had programmed formal reviews to ensure crossing facilities were still appropriate, while one indicated a monitoring system was in the process of being established. The remaining 28 (88%) either had ad hoc or casual reviews such as occasional general observations of a crossing and/or informal discussions with police and schools.

4.5 Pedestrian and Vehicle Activity at School Crossings

Respondents were asked to estimate the amount or level of pedestrian (P) and vehicle (V) activity at the different types of school crossing facilities in their authority. The product of pedestrian and vehicle movements (PV) during any two half-hour periods was used as a basis for the range in activity levels.

For those RCAs able to provide an estimate, the number of RCAs operating some or all of their school crossings within the identified activity level range are shown Table 4.5.1.

Table 4.5.1 RCAs operating some or all of their school crossing facilities by level of activity

School Crossing Facility	Number of RCAs operating some or all of their school facilities by PV activity range			
	<3000	3,000 - 5,000	5,000 - 20,000	>20,000
Traffic Warden	11	7	2	2
Kea crossing	5	7	6	-
School patrol	10	10	17	6
Traffic signals	-	-	1	7

4.6 Changes to School Crossings

Twenty three RCAs have changed at least one school crossing to a different type of facility during the last five years. This change may have been as a result of an increase or decrease in levels of pedestrian or vehicle activity, safety concerns or simply the availability of a more appropriate facility, such as the kea crossing.

The number of school crossing facilities changed to a different type are shown below:

- School Patrols: 14 RCAs had changed 37 school patrol operations to different types of crossing. 15 of these were to kea crossings and 16 to dedicated traffic signal control crossings.
- School Traffic Wardens: 12 RCAs had changed 15 traffic warden operations. 8 were to school patrols and 7 to kea crossings.
- Kea Crossings: 3 RCAS had changed 5 kea crossings to 4 school patrols and 1 ‘other’ type of crossing.
- ‘Other’: 10 RCAs had replaced a non-standard type of crossing facility with 52 formal crossings such as keas (39), school patrols (9) and dedicated signals (4).

Overall, 14 (44%) different RCAs have reported either changing or replacing a particular type of school crossing facility during the past five years to a kea crossing. Where kea crossings have been introduced to replace an existing facility, RCAs reported this had been carried out because existing pedestrian crossings did not meet warrants, because of school and parent pressure, and/or to provide suitable crossing facilities to improve general road safety outside the school.

Six RCAs had replaced 15 school patrols with kea crossings. No RCA reported maintaining the old pedestrian crossing markings when a kea crossing had been implemented at these locations.

4.7 Standards for Design of School Crossings

Documents and standards used and referred to by RCAs in the design of school crossing facilities include:

- *TR11*
- *TN29*
- *The Traffic Regulations 1976*
- *MOTSAM*
- *AustRoads Part 13*
- *School Traffic Safety Team manual*
- Trafinz *Guide to Pedestrian Crossing Facilities,* 2001
- own in-house guidelines

Some RCAs referred to a combination of the above in order to achieve an appropriate and suitable design.

4.8 Compliance with Design Standards

RCAs were asked to estimate the percentage of school crossing facilities fully complying with the design standards used. The results for those RCAs operating the identified type of school crossing facility, and who were able to provide an estimate, are shown in Table 4.8.1.

Table 4.8.1 School crossing facilities estimated as meeting standards for each RCA

Estimated % of school crossing facilities meeting standard	RCA by School Crossing Facility							
	School Patrol		School Traffic Warden		Kea Crossing		Dedicated signal control	
	No.	%	No.	%	No.	%	No.	%
50% or less	1	4	2	9	0	0	0	0
51 - 60%	0	0	0	0	0	0	0	0
61 - 70%	1	4	0	0	1	7	0	0
71 - 80%	2	9	0	0	0	0	0	0
81 - 90%	5	22	3	27	1	7	0	0
91 - 100%	14	61	6	55	12	86	6	100
Total	23	100	11	100	14	100	6	100

4.9 Design Concerns

RCAs reported a number of design issues typically difficult to achieve in providing and operating a school crossing facility complying with the design standard. The most troublesome aspects highlighted by more than one respondent were:

- Achieving suitable visibility requirements.
- Vehicles parking adjacent to the crossing location regardless of restrictions.

- Maintenance and vandalism to signs.

4.10 Additional Measures

Along with the road signs and markings stipulated in the Traffic Regulations 1976 for various school crossing facilities, a number of additional measures are also provided by RCAs to assist crossing movements at these locations. Additional measures or devices identified included:

- Kerb extensions and central refuges to reduce pedestrian crossing time and exposure.
- Raised pedestrian platforms.
- Reflectorised support posts.
- Additional signs, such as children crossing fold-down signs.
- Tactile paving.

No RCA surveyed had a formal policy regarding the use of such additional measures, with RCAs tending to install them on a case by case basis as the situation allowed, or as the opportunity arose.

4.11 Criteria for Locating School Crossing Facilities

The need to consult with key partners such as the school and police was specifically identified by many respondents as part of the process for determining the appropriate location of a school crossing facility. Conflicts between providing school crossing facilities on pedestrian desire lines (i.e. the most direct route between origin and destination) and achieving a 'standard compliant' facility was acknowledged as an issue. In such circumstances, the problem was typically resolved on a case by case basis.

4.12 School Crossing Facilities and Speed Limits

Three RCAs have installed a total of 5 school crossings on roads with a speed limit in excess of 50km/h. All of these were recorded as having received LTSA approval, and all were kea crossings. As part of the process of introducing these kea crossings, speed surveys had been carried out in addition to the normal data collection process.

4.13 Road Safety at School Crossings

The questionnaire sought to identify the systems or programmes RCAs had established to monitor the safety of school crossing facilities.

Seven RCAs noted they had a programme to formally review the safety of school crossing facilities. Such reviews however varied from monthly maintenance meetings to audits every 5 years. The majority of RCAs reported that no formal review programme existed but road safety at such

crossings was monitored informally day by day through school, parent and police incident reports.

Two RCAs had recognised a lack of formal and planned monitoring and intended to include such a process as part of their upcoming Safety Management System.

Of the 30 RCAs with school crossing facilities, 8 indicated they were aware of crashes occurring at school crossing location over the past 10 years.

4.14 Regulation Breaches

In addition to the actual safety or crash record of school crossing facilities, the survey sought to identify the process undertaken for reporting incidents such as near misses or regulation breaches, and the resultant action to address the problem.

Nine RCAs were aware of regulation 'breaches' occurring at school crossings within their area. Eight noted that the incidents were reported to the police by the school, who typically passed the information on to the RCA. The remaining RCA had been informed of the occurrence directly by the school. Breaches identified included red light running at dedicated signal control junctions, drivers swerving around school patrol signs and vehicles being parked in no stopping areas.

School Traffic Safety Team manual contains a form that should be completed to record incidents of vehicles failing to comply with an authorised school patrol. This blank 'School Patrol Infringement Report' allows information about the event, including vehicle registrations, to be noted down. This form should be submitted to the local Police and provides scope for feedback to the school on actions taken to address the problem. No RCA directly referred to the official School Patrol Infringement Report form as part of the survey.

RCAs identified actions to address these infringements were mainly enforcement based with the police targeting the area at particular times of the day. However, some RCAs had reviewed the appropriateness of the crossing type as well as the location, signing and marking of the crossing.

4.15 Comments on LTSA Role in School Crossing Facilities

RCAs considered that the LTSA could assist in a number of ways with regards the provision of school crossing facilities.

Respondents sought clearer information from the LTSA for the design, provision and justification of all types of school crossing facilities, for instance in a single document purely related to school transport issues. In addition, it was suggested operational information, currently contained in *School Traffic Safety Team* manual should be made more widely available and guidance on

the provision of personal protective equipment for school patrols and wardens more clearly defined. Such a document could also identify the role of the RCA and the interaction and consultation required with the Police, School and LTSA.

Other relevant comments, each made by one or two respondents were that the LTSA should:

- Introduce School Speed Zones (already carried out).
- Publicise the use and promote the benefits of kea crossings.
- Allow the use of 'children' flags as used at kea crossings at marked crossings.
- Clarify issues associated with the provision of kea crossings (carried out as Revision 1 to *TN29*)
- Relax the warrant criteria for the provision of school crossing facilities.
- Investigate the need for a national campaign to raise driver awareness of school crossing facilities.
- Be involved in the design of suitable drop off and pick up facilities outside schools
- Actively encourage RCAs to implement suitable school crossing facilities and continue to be available to provide advice on current best practice.
- Actively discourage non compliant devices used at school crossings.
- Improve the school bus system thus reducing need to walk or be driven to school.
- Fully fund all school safety work.
- Clarify criteria on the use of pedestrian and vehicle warrants.
- Relax the current warrants for crossing facilities.
- Provide a check list to ensure all appropriate procedures are followed to correctly install a school crossing facility.

In addition to the above, some RCAs expressed a level of frustration that whilst they were willing to fund a crossing facility, it could only be effectively implemented with support from the school which was not always forthcoming.

5. Results of the Field Surveys

5.1 Survey Locations

In total, 59 kea crossings were surveyed for 17 RCAs. Examples of some of the kea crossings surveyed are shown in Appendix 4.

- All the sites were on two-way, single-carriageway roads.
- 57 were located on roads with a 50km/h speed limit and 2 with a 70km/h speed limit.
- 56 served primary schools and 3 served intermediate schools.

Of the 59 kea crossings 40 were located at a midblock location, 11 were on a main road within 30m of an intersection, and 8 were on a side road within 30m of an intersection.

Thirty nine kea crossings were located within 20m of the school gate. Eight of these were immediately opposite the gate and 15 were within 5m of the school gate. Nine crossings were over 100m away from the school gate. The distance between the school gate and kea crossing was unknown or not stated at 4 sites.

5.2 Kea Crossing Layout

Kerb extensions were provided on both sides of the road at 55 out of the 59 kea crossings surveyed; one kea crossing had a kerb extension on one side of the crossing only. Twenty nine sites had both kerb extensions 1.8m or more wide while 7 crossing locations had just one kerb extension meeting this dimension.

Four kea crossings surveyed also had a central pedestrian refuge.

5.3 Kea Crossing Design – Road Markings

The type, location, dimension and colour of road markings at the crossing, as well as on the approach and exit were surveyed.

The regulations stipulate that kea crossings must be marked with 'reflectorised white' lines.

Vehicle hold Lines

Vehicle hold lines should be provided and located a minimum distance of 5.0m from the crossing point definition lines.

All of the kea crossings surveyed had white vehicle hold lines on both of the approaches, of which:

- 54 (92%) had both vehicle hold lines located 5.0m or more from the crossing point definition lines.
- 48 (81%) had both vehicle hold lines considered to be in good condition.
- 39 (66%) had reflectorised markings; 13 were reported as not having reflectorised markings and the reflectorisation at 7 locations was unknown or could not be determined.

Pedestrian Hold Lines

Pedestrian hold lines should be provided at each end of the crossing, with definition lines between 1.5m and 3.0m wide to demarcate the crossing.

- 48 (81%) had pedestrian hold lines provided at both ends of the crossing. Of these, 37 were marked out in white. The other sites typically had the hold lines marked out in yellow.
- 15 (25%) had pedestrian hold lines in reflectorised white.
- 33 (56%) had both sets of pedestrian hold lines deemed to be in good condition.
- 42 (71%) had crossing point definition line widths between 1.5m and 3.0m.

Centreline Markings

Centreline markings should be provided on each approach to the crossing, and be a minimum of 30m long commencing from the vehicle hold line. It should be noted that it might not be possible to provide a 30m long centreline at some locations, for instance crossings located adjacent to an intersection.

- 38 midblock sites were identified as being able to accommodate a 30m centreline marking. 24 (63%) of these complied with the 30m requirement.
- In some cases, a dashed or solid centre line was continued straight through the crossing rather than starting/stopping at the vehicle hold line.
- Where centre lines were provided, all markings were considered to be in good condition.

No-stopping lines – exit

Road markings indicating the length of the no-stopping restriction must be a minimum of 6.0m long.

- 54 (92%) sites surveyed had the no-stopping lines provided on both exit sides of the kea crossing. Two sites had the no-stopping lines on one of the exit sides only and three sites did not have any no-stopping lines on either exit side of the kea crossing.
- 52 (88%) sites complied with the minimum 6m stopping restriction length on both exit sides.
- 51 (86%) sites had the no-stopping lines on both exit sides of the crossing in good condition.

No stopping lines – approach

The minimum length of the no-stopping lines on the approach side to the crossing should be 15m or alternatively 6.0m where a 1.8m or more wide ‘bulbous kerb’ or inset parking has been provided to ensure adequate visibility.

- 57 (97%) sites had the no-stopping lines on both approaches to the crossing. The two remaining sites did not have the no stopping lines on either approach to the crossing
- 49 (83%) sites complied with the minimum parking restriction length, either with or without a kerb extension and/or inset parking provision.
- 48 (81%) sites had the no-stopping lines on both approaches to the crossing in good condition. No condition information was provided at 8 sites.

Crossing Widths

The regulations state 'a school crossing point may not exceed 10m in width'. In addition, at a distance of 30m from the crossing, no permanent feature should obstruct the view of the entire width of the crossing to an approaching motorist

- 55 (93%) kea crossings had a width less than 10m.
- All 52 of the sites for which this information was obtained had unobstructed views of the crossing from a distance 30m away on both approaches. No information was obtained for the remaining 7 sites.

Additional Markings

Additional road markings provided in the immediate vicinity of the kea crossings surveyed included:

- Reflectorised raised pavement markers (RRPMs) on both the kerb and in the carriageway.
- Edge lines.
- Diagonal shoulder markings.
- Flush medians.
- Cycle lanes with cycle lane symbols.
- Bus stop markings.
- Parking bays.
- Look and stop 'mooloo' markings – local child road safety markings on the footpath.
- No overtaking lines.
- Raised platform ramp markings.
- Hazard markers.
- 'SCHOOL' marked across the road.
- Faded, but still visible 'zebra' bars and diamond markings associated with a replaced/removed pedestrian crossing.

5.4 Kea Crossing Design – Road Signs and Support Posts

Both permanent and temporary traffic signs are needed to indicate the presence of a kea crossing. Temporary traffic signs should only be installed, and hence be visible, to approaching drivers during the operation of the crossing. Information on temporary signs was only collected when surveyors observed the crossing actually being operated. Accordingly, the amount of survey data collected concerning the temporary signs is limited.

Permanent 'Children' and 'School' Signs

Permanent 'children' and supplementary 'school' signs should be provided facing oncoming traffic, and be located a minimum of 60m from the vehicle hold line.

In addition, *MOTSAM* recommends 'children' and supplementary 'school' signs should be located in advance of the school grounds by 30m in urban areas and 100m in rural areas. Such signs should be clearly visible to approaching drivers over a distance of 60m in urban areas and 120m in rural areas.

- 54 (92%) sites had permanent 'children' and supplementary 'school' signs installed facing oncoming traffic for both approaches to the kea crossing. At one location, the supplementary 'School' sign was missing whilst in the remaining four cases, both signs were missing on one approach to the crossing.
- 3 (5%) sites had the set of signs installed on both sides of the road facing on-coming traffic for both approaches to the crossing.
- 46 (78%) sites had both sets of signs on the approaches to the crossing rated as being in good condition.
- 33 (56%) sites had both sets of signs located the correct distance from the hold line; 18 (31%) had one set of signs at the correct distance. Some sites did not achieve the required distance due to intersections preventing a full 60m approach length prior to the crossing.
- 27 (46%) sites had the set of signs on both approaches located 30m in advance of the school grounds; a further 19 (32%) sites had one set of the signs located 30m in advance of the school grounds. In a number of instances, the actual crossing and hence the 'Children' and supplementary 'School' sign are not on the same road as the school grounds. In other situations, the kea crossing and school are located close to an intersection making a 30m distance impossible to achieve.
- 45 (76%) sites had both sets of signs achieving the minimum visibility requirement set out in *MOTSAM*. A further 10 (17%) sites had one set of signs meeting the visibility requirements.

Temporary Fluoro Orange 'Children' Flag

The fluoro orange 'children' flag is a temporary sign which is installed whilst the kea crossing is operational. A permanent white support post, not less than 1.8m high, on which to place the flag, should be provided at each end of the crossing. The support should be located within 0.3m of the kerb face and the end of the vehicle hold line. The flag should be visible to approaching drives for a distance of at least 60m for urban situations.

- Overall, 19 (32%) sites had both support posts correctly located in accordance with the regulations.
- 34 (58%) sites had both sets of support posts located within 0.3m of the kerb face or the edge of the road. 10 (17%) further sites had one post correctly located in relation to the kerb face.
- 25 (42%) sites surveyed had both support posts located within 0.3m of the vehicle hold line. A further 11 (19%) sites had one post correctly located. Support posts at 2 sites were located over 30m from the recommended position.
- 57 (97%) sites had both posts painted white. Of the remaining 2 sites, one had the post removed due to the footway being reconstructed whilst no post existed at the other site.
- The temporary flags were observed in use at 11 sites. The flags observed at these sites were all in good condition except in one instance when one of the flags on an approach was missing and one set of flags were 'fluoro pink' rather than orange.
- A further four flags were observed off site and confirmed to be fluoro orange and in good condition.
- At one site, solid signs rather than flags were used, but operated and installed in the same way as the 'normal' flag. However, detailed inspection of the height of these signs suggested that they did not meet the 1.8m height criteria and could not be observed by oncoming motorists when vehicles were parked in front of them.
- At the 11 sites where the flags were observed in operation, all had a minimum uninterrupted view of 60m for the urban areas. Of the sites observed in operation, 6 had both flags flown at or above 1.8m.

Temporary School Patrol Sign

The 'school patrol' sign is mounted at the end of a 'swing out' arm which is installed and used only when the crossing is operational. Support posts, in which to install the swing out arm, should be provided at either end of the crossing within 0.3m of the crossing point definition line and 0.3m from the kerb face or edge of road.

- Overall, 30 (51%) sites had both school patrol support posts located in accordance with the regulations.
- 38 (64%) sites had both support posts for the swing out arm located within 0.3m of the crossing point definition line.

- 44 (75%) sites had both support posts located within 0.3m of the kerb face or edge of the road.
- The signs and swing out arms were observed in use at 11 sites and a further 12 signs for 6 sites observed off site. Of the total of 34 signs observed, 32 were considered to be in good condition.
- The 11 sites observed in operation all had school patrol signs that could be seen over an uninterrupted view of 60m.

School Patrol Cones

During the operation of a kea crossing, up to two cones per approach with red and white vertical stripes are permitted in addition to the other signs and markings.

No crossing observed in operation used cones.

Additional Signs

Additional signs provided in conjunction with the kea crossings surveyed included:

- A pedestrian crossing sign with supplementary 'children' plate.
- Restricted parking signs.
- Keep left signs on central refuges.
- Keep right signs on kerb extensions.
- Bus stop signs.
- Folding 'children crossing' signs.
- Pedestrian warning signs with a supplementary 'elderly' sign.

6. Discussion

6.1 Provision of School Crossing Facilities

The questionnaire survey identified that nearly all of the RCAs interviewed had implemented school crossing facilities of one sort or another. School patrols were the most popular form of crossing facility.

Schools most often identify the need for a crossing facility to address a perceived mobility or safety issue. Many RCAs acknowledged that no formal monitoring programme existed to review the suitability of school crossing facilities in terms of need, type and design. Accordingly, a reactive approach to incidents, accidents or requests for change is often adopted.

Whilst changes to the school roll and traffic flow may be insignificant in some areas, a programme to monitor the mobility needs and issues of schools is considered desirable. A monitoring programme for school crossing facilities was identified by some RCAs for inclusion within their proposed Safety Management System.

6.2 Warrants

The amount and type of data collected prior to installing a school crossing facility varied by RCA. Pedestrian and vehicle counts were reported as not always being undertaken by RCAs despite warrant criteria relying on this information to assist in determining an appropriate form of crossing.

School patrols operate at sites with a wide range of pedestrian and vehicle activity, including below recommended warrant criteria. At such locations, RCAs may wish to consider alternative crossing facilities such as school traffic wardens or a kea crossing. Kea crossings are being used on roads with a wide range of activity as suggested in *TN29*.

6.3 School Crossing Facility Design

A number of documents and sources are referred to by RCAs to assist in the design of school crossing facilities. The majority of the respondents claimed most of their school crossing facilities met identified design standards.

In addition to the formally required signs and markings identifying a school crossing facility, raised pedestrian platforms, kerb extensions or refuges are also often provided. Where measures to assist pedestrian crossing movements are provided, their design should not disadvantage other vulnerable road users such as cyclists nor obscure or detract from those features legally required.

The range of reference manuals used by RCAs led to a number of respondents requesting LTSA develop and produce a single school crossing facility design guide encompassing all of the options available to RCAs.

6.4 Road Safety at School Crossing Facilities

A review of the LTSA crash database for the past 10 years between 1992 and 2001 indicates that 180 crashes have been reported occurring at 'school patrols'. 38 of these school patrol crashes involved pedestrians of whom 30 were children aged between 0 and 16 years old.

6.5 Kea Crossings

The kea crossings examined in the field surveys generally followed the design principles set out in the regulations and *TN29* in terms of the provision of signs (including their support posts) and markings. However, while it is acknowledged some of the non-compliance identified during the field survey may not be safety critical, the extent of variance from standard is extremely disappointing. This is particularly so given the relatively short time kea crossings have been in place and the clear and detailed requirements provided. Various features observed at some of the kea crossings surveyed are shown in Appendix 4.

Road markings associated with the crossing were typically located in accordance with standards, and met minimum stated dimensions. The main deviation from the standard to provide some concern relates to the centreline markings with some kea crossings not meeting the minimum 30m centreline length on the approach to the crossing. At other locations, the centreline was carried on through the crossing which conflicts with the specification outlined in the *Traffic Regulations 1976* (Schedule 6). RCAs also need to pay greater attention to detail in terms of the provision and marking out of pedestrian hold lines.

Whilst the vast majority of sites surveyed had a permanent 'children' sign with the 'school' supplementary plate installed for both approaches to the crossing, a number of sites had these signs insufficiently located in advance of the actual crossing. In addition, few sites had the support posts for the temporary signs in accordance with design standards set out in the Regulations. Of particular concern was the positioning of support posts for the 'children' flag up to 40m from the crossing point. The purpose and intention of locating the temporary flag adjacent to the vehicle hold line is to clearly indicate the presence and position of the crossing point while in use.

The height of the 'children' flag is also an issue, as they should not detract from the Patrol's view of oncoming traffic.

Some concern also exists with regards to the impact of the temporary 'children' flag during periods of high wind. The design of the flag means that when the wind blows, the target area for motorists to observe is very much reduced. Solid signs, rather than flags, have been used in some locations. However, solid signs are heavier and more cumbersome to set up. This in turn may lead to the sign being left out when the patrol is not operating. Whilst the lightness of materials used for flags may cause an occasional problem, the ease of installation is an important issue. Accordingly, it is suggested that flags, perhaps with a brace at the rear of the flag to help stiffen it, be installed.

7. Recommendations

- *School Traffic Safety Team* manual should be updated bringing together all the techniques currently used to assist pupils travel to and from school. This document should include details concerning elements of the design and provision of school crossing facilities.

- Encourage the inclusion of school crossing facilities within the Safety Management System processes being developed by RCAs.

- RCAs should carry out a regular audit of facilities to:
  - assess the appropriateness of the school crossing facility in terms of current pedestrian and vehicle volumes and traffic conditions; and
  - ensure the crossing facilities meet regulatory requirements and are operating in an efficient and safe manner.

Road Safety Survey Series

RSS 1	Traffic Signal Light Output	1995/96
RSS 2	Street Lighting	1995/96
RSS 3	Treatment of Slip Lanes at Traffic Signals	1995/96
RSS 4	Stop and Give Way controls at Intersections	1996/97
RSS 5	Advisory Speed Signs	1996/97
RSS 6	Pedestrian Crossings	1996/97
RSS 7	Temporary Speed Limits	1998
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
RSS 15	Roadside Hazard Management	2001
RSS 16	Road Hierarchies	2001
RSS 17	School Crossing Facilities	2002
RSS 18	Data Collection	2002

These reports are available on the LTSA website at www.ltsa.govt.nz or 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.