Traffic Standards and Guidelines
2001/2002 Survey

RSS 18

Data Collection

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 Engineer Section at the nearest LTSA Regional Office if you would like further information or assistance with implementing traffic standards or guidelines.

John Kay

General Manager, Operations

Executive Summary

Introduction

- Surveys were conducted during 2002 to investigate procedures and policies for two safety areas – school crossing facilities and data collection.
- This report describes the procedures for the data collection surveys and presents the results. "RSS 17 School Crossing Facilities" details the results of the surveys of school crossing facilities.

Methodology

- Staff in 32 road controlling authorities (RCAs) participating in the school crossing facilities survey were interviewed face-to-face about their data collection programmes by Land Transport Safety Authority (LTSA) staff, after receiving the questionnaire in advance to prepare responses.
- The questionnaire was mailed to all remaining authorities with a request for the most appropriate person to complete it and mail it back.
- RCAs were asked to provide details of road network data they kept in their RAMM (Road Assessment and Maintenance Management) databases, and to supply details of any additional road data they kept elsewhere, including information relevant to traffic safety or efficiency.

Survey Results and Discussion

- A total of 70 RCAs completed the RAMM questionnaire, and 58 RCAs also supplied information about their general data collection programmes.
- Virtually all RCAs stored information about their pavements in RAMM, which was to be expected since this is a Transfund requirement. RAMM also has provision for optional information to be entered, for instance traffic facilities data (control devices, signs, markings and guard and sight rails), bridges, street lighting and skid resistance). RCAs used these optional categories to varying degrees, ranging from 73 percent inputting signs information, down to 17 percent using RAMM to record skid resistance data.
- RCAs were asked to use the General Data Collection forms to record where they kept relevant road network data not kept on RAMM. By combining these returns with those from RAMM, it was possible to assess the total amount of road network data that RCAs collected. It was apparent that most recorded signs, street lighting and markings data (allowing for some nil returns), however a disappointingly low percentage collected skid resistance data.
- It was also apparent that most general data collected by RCAs was concerned with road network information, rather than road user behaviour

on the network. For instance, there was little indication that RCAs collected information about red light running, pedestrian crossing or stop sign violations, cycle helmet or restraint use and so forth. There is considerable scope for RCAs to expand their data collection programmes, including data needed to bring to fruition the Government's recent initiatives to promote cycling and walking, public transport use and Safety Management Systems.

- Most authorities did not keep historical records of changes to information in their RAMM databases. Historical records could be of considerable use when analysing the effects of changes to the roading network. For instance, recording the date that route lighting was changed from low to high pressure sodium would assist any later analysis of night time crash rates for the route.
- Only a handful of RCAs had linked their RAMM database to a crash database. The vast amount of data in RAMM means that it is a rich source of material capable of being used to analyse the safety performance of the road network when linked to a crash database.
- The LTSA has been exporting CAS (Crash Analysis System) crash data to RAMM for several years. CAS is now available directly to registered users and contains many sophisticated crash analysis tools. RCAs are encouraged to use CAS, but they should also consider linking their own RAMM data to CAS, so they are able to query more road network and management data than will be available through CAS alone.
- Most RCAs were satisfied with the way RAMM performed as a database, although some qualified their support and others suggested some changes. Comments received about the performance of the RAMM database have been sent to the company responsible for its development and support (with reference to individuals or RCAs removed), to assist in its further development.

Recommendations

The LTSA encourages RCAs to:

- keep historical records of changes to information in their databases (the RAMM software could possibly be adapted to encourage this)
- link data collection databases they hold to the LTSA's CAS database
- keep abreast of technological advances in data collection methods, to ensure they have the information needed to manage their road networks at appropriate levels of safety
- monitor skid resistance levels on their major roads at regular intervals
- identify road user behaviour data that is being, or could be, collected and recorded and linked to their databases

- be aware of data collection requirements arising from Government transport policies in the area of public transport, cycling and pedestrians, Safety Management Systems and road network projects.

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:

- data collection
- school crossing facilities

This report describes the procedures for the survey of data collection and presents the results.

2. Purpose of the Survey

The purpose of the survey was to:

- identify what data are available for monitoring the performance of the road network and driver behaviour on it, and for research purposes
- identify any gaps in data collection, or in the way it is collected and used
- encourage authorities and road safety agencies to duplicate data collection methods to enable consistent, compatible data
- report to RCAs on "best practice" and encourage the widespread adoption of "best practice"

3. Methodology

A questionnaire was sent to all RCAs in New Zealand. For most of the 32 authorities included in the survey of school crossing facilties, representatives completed the questionnaire face-to-face with LTSA staff. Questionnaires were sent in advance to allow staff to research answers if necessary. In this situation the LTSA staff were able to clarify questions and prompt respondents as necessary to obtain full responses.

The remaining RCAs were mailed a questionnaire with a request that the most appropriate person in the authority complete and mail it back to the LTSA. The responses obtained were therefore dependent on the respondents' interpretation of the questions being asked.

The questionnaire was divided into 2 parts:

- Road Assessment and Maintenance Management (RAMM)* data
- General data collection

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Transfund New Zealand (Transfund) requires RCAs to keep RAMM data primarily as a pavement management tool. Core information kept in the RAMM database includes road names, carriageway dimensions, traffic volumes, traffic loading, drainage, and pavement condition. RAMM software also allows optional information to be entered into the database, such as for traffic facilities (control devices, signs, markings and railings), bridges, street lighting and skid resistance.

General data collection of interest to the LTSA centred around information relevant to traffic safety or efficiency, and included regular (systematic, routine) data collection programmes, or ad hoc surveys.

RCAs were asked to complete all questions in the RAMM data questionnaire, and to complete a one-page form for each relevant subject heading for general data collection.

A total of 70 RCAs completed the RAMM questionnaire, and 58 RCAs also supplied information about general data collection.

Appendix 1 lists the RCAs that responded to the questionnaire. Appendix 2 lists the subject categories for which responses were received from the General Data Collection questionnaire. Appendix 3 shows a copy of the questionnaire used in the survey.

There were no field inspections carried out for this survey.

4. Results of the Surveys

4.1 RAMM data

4.1.1 Information kept in RAMM

(a) Inventory tables

Table 1 below shows the number and percentage of authorities (out of the 70 replies received) using the various database inventory tables available in RAMM.

A brief explanation of the type of data stored in these inventory tables can be found in Appendix 3 under "RAMM Database Inventory Table Names".

Almost all RCAs surveyed used the tables to store pavement information (carriageway surfacing, roughness and rating), plus traffic volume, and all recorded carriageway dimensions and road names (essential to identify the road). The remaining tables available in RAMM were used to varying degrees.

Table 1 RCAs using RAMM inventory tables

Inventory Table	No.	%	Inventory Table	No.	%
Road names	70	*100*	Traffic facilities	51	*73*
Carriageway (dimensions)	70	*100*	Pavement layer & rehabilitation	48	*69*
Traffic volume	69	*99*			
Carriageway surfacing	68	*97*	Traffic loading	41	*59*
Roughness	67	*96*	Minor structures	41	*59*
Rating (sealed road)	67	*96*	Road features	40	*57*
Surface water channel	65	*93*	Berm	39	*56*
Drainage	58	*83*	Crossing	26	*37*
Footpath	58	*83*	Rating (unsealed road)	21	*30*
Footpath surfacing	52	*74*	NZ map grid co-ordinates	10	*14*
Shoulders	52	*74*	Other	8	*11*

RAMM also has several tables labelled "other" which allows RCAs to input additional data they wish to use. Eight authorities mentioned they used these tables to record information in the following categories:

- maintenance costs;
- bridges (BRIMMS);
- skid resistance (including SCRIM);
- high speed data (including SCRIM);
- FWD (Falling Weight Deflectometer); and
- intersections

(b) Traffic facilities table

This table is split into 4 sub-sections for control devices, signs, markings and railings. RCAs were asked whether or not they used the table, and what information they recorded.

Table 2 RCAs using traffic facilities table

RCAs using table	No.	%
Signs	51	*73*
Markings	43	*61*
Railings	36	*51*
Control devices	15	*21*

- Signs: information recorded was generally sign type, location and date installed, and to a lesser extent information about the sign support or sign history
- Markings: type and location generally recorded; sometimes information about side of road or length of marking
- Railings: location and type of railing (generally guard rails or sight rails)

- Control devices: the table was used to record information about traffic signals, roundabouts or islands

(c) Bridge database:

Of the 34 RCAs who used RAMM for recording bridge information, 25 specified BRIMMS as the software used, 2 mentioned using RAMM bridge tables, 1 used BARR software, and 6 did not specify what software they used. Of the authorities who gave detailed replies to this subject, most recorded location, type, dimensions and year of construction. Some recorded a variety of other information such as structure, foundations, bearing or loading, spans, beams and so on.

Almost a third of authorities (10) who didn't use RAMM for recording bridge data mentioned they used other means - 3 used an Access database, 2 specified BAIMS software, 2 used an unidentified database through their consultants, 2 mentioned "in-house" systems, 2 used separate spreadsheets, and 1 had a hard copy inventory.

One authority using a spreadsheet at the time of the survey mentioned it would use RAMM with BRIMMS software when it was updated.

(d) Street lighting database:

Almost all of the RCAs (27) using a street lighting database in RAMM mentioned using SLIM software. Most of these authorities kept inventory data specifying location, poles, lamps, light source, power supply, brackets, fittings, age of equipment, maintenance history, etc.

Of the 38 RCAs not using RAMM for a street lighting database, 18 provided information about where they stored this information, and a further 2 mentioned they would be using SLIM software (presumably in RAMM) in the near future.

Eight authorities maintained their own separate database, generally using either Access or Maximo; 5 had databases maintained by relevant power companies who provided information to them by spreadsheet, 4 used their own spreadsheets, and 1 used Lightman software.

(e) Skid resistance database

Eleven of the 12 RCAs using RAMM for a skid resistance database provided comments about their programmes. Transit New Zealand (Transit NZ) regional offices accounted for 3 of these replies - Transit NZ held high-speed data survey information in RAMM, of which skid resistance was one of the tables. Transit NZ carried out surveys annually, using the SCRIM machine to obtain data for both wheel tracks in each direction of travel.

Four other RCAs used SCRIM surveys for their data, although no mention was made of how frequently the surveys were carried out. One of these authorities used Pavscan software in conjunction with SCRIM data.

The remaining 4 RCAs held only minimal skid resistance data, ranging from a couple of small trials to a once only survey on some roads.

Most authorities replying 'No' to this question did not elaborate any further, however 1 mentioned holding partial survey information on disk, 1 had an out of date SCRIM survey, 1 was planning to carry out SCRIM surveys on major roads and a further 1 carried out visual inspections only.

(f) Other databases linked to RAMM

The most common links to RAMM were with GIS, mentioned by 4 RCAs, and dTims pavement deterioration model, mentioned by 2 RCAs. A few authorities linked their own bridge, street lighting, or sign databases to RAMM. Other authorities mentioned linking a variety of databases to RAMM including utilities, NOMAD for 10 year forward works programme, TMS, AMS, street furniture, Benkleman beam, and specific data analysis via an Access database.

One authority planned to link GIS and RARID.

Table 3 Summary of RCAs using RAMM databases

Subject	RCAs using RAMM database					
	Yes		No		No Answer	
	No.	%	No.	%	No.	%
Bridge	34	*49*	35	*50*	1	*1*
Street lighting	29	*42*	38	*54*	3	*4*
Skid resistance	12	*17*	55	*79*	3	*4*
Other database linked	19	*27*	47	*67*	4	*6*

4.1.2 Frequency of condition rating surveys for pavements

Most of these surveys were carried out either annually, or biennially, however a number of RCAs surveyed major roads within the roading hierarchy annually and lesser roads biennially. A few authorities carried out surveys at different intervals and 1 authority didn't undertake any surveys.

Results are shown in Table 4 below:

Table 4 Frequency of condition rating surveys

Frequency of RCA Survey	No.	%
Annually	22	*32*
Annual/Biennial	15	*21*
Two years in 3	1	*1*
Biennial	22	*32*
Half network each year	2	*3*
Every 2 - 3 years	1	*1*
Never	1	*1*
No answer	6	*9*

4.1.3 Frequency of RCA updates for selected RAMM data

Table 5 below shows the frequency with which RCAs updated selected tables or databases within RAMM. The tables and databases shown in this section are of particular interest to the LTSA. Not all RCAs used these RAMM data sets (refer to the tables in section 4.1.1 for actual numbers). Only authorities using this information were included in this table. The numbers in the table show the percentage of RCAs updating data at the frequency indicated.

"As required" includes where information is updated following alterations, improvements or changes of any kind.

Table 5 Frequency of RCA updates for selected RAMM data

RAMM data	Percentage of RCAs updating data at stated frequency								
	Monthly or less	Quarterly or less	6 monthly or less	Annually or less	Bi-ennially	As required	Ongoing	Other	No Answer
Street lights	44	53	59	80	0	14	6	0	0
Signs	35	49	57	78	0	12	4	4	2
Traffic volume	19	31	37	70	3	6	12	4	5
Markings	9	21	33	70	0	12	2	5	11
Control devices	16	32	37	58	0	37	0	5	0
Skid resistance	0	13	19	57	0	38	6	0	0
Carriageway	11	22	26	55	4	26	4	2	9
Railings	17	34	37	54	0	25	6	3	12
Shoulders	6	19	25	44	0	33	4	6	13

With the exception of shoulders, at least half of RCAs updated the above data sets annually or more frequently, in a systematic or routine way. Street lights, signs, traffic volume and markings in that order were updated in this way the most often, ranging from 80 to 70 percent of authorities. The numbers shown in the table will be an underestimate in most cases, as nil replies ("no answer") distort the figures slightly.

Authorities who updated data in a more ad hoc way ("as required"/"ongoing") may also have done so on a regular basis, however it is impossible to tell from the information provided, how frequently this was.

4.1.4 (a) Historical record of changes

Table 6 shows the number and percentage of RCAs who kept historical records of changes to the data shown in Table 5.

Table 6 Historical record of changes

RAMM data [inventory or database]	No. RCAs keeping RAMM data	No. keeping historical data	*% keeping historical data*
Traffic volume	69	56	*81*
Skid resistance	12	8	*67*
Signs	51	17	*33*
Street lights	42	14	*33*
Control devices	15	4	*27*
Carriageway	70	17	*24*
Shoulders	52	11	*21*
Markings	43	9	*21*
Railings	36	7	*19*

Only for traffic volume and skid resistance did most RCAs keeping these data also retain historical records of changes to the database. A third or less of authorities kept records of changes to other data.

4.1.4 (b) Linking information to a crash database

RAMM has the capability of linking to other databases. The LTSA was interested to learn whether any authorities linked RAMM data shown in Table 5 with any crash databases, including the LTSA CAS and AIS databases.

Table 7 RAMM data linked to a crash database

Data from RAMM tables or database	RCA replies							
	Yes		No		Don't know		No answer	
	No.	*%*	No.	*%*	No.	*%*	No.	*%*
Information linked to a crash database?	8	*11*	40	*58*	8	*11*	14	*20*

Only 8 authorities had links between data in RAMM and a crash database, although a further 2 had links between RAMM and GIS under development, and were then intending to link GIS with the LTSA crash database.

Two authorities had made the link through CJN Technologies, while others simply mentioned that a link between RAMM and either CAS or AIS had been made.

Roughly half of the RCAs that had not linked RAMM with a crash database mentioned they were aware that such a link could be made.

4.1.5 Comments about RAMM as a database

Most RCAs (50 or 71%) were satisfied with the performance of RAMM as a database, although 10 of these authorities qualified their approval. Six authorities stated they were not satisfied with RAMM, and a further 14 were undecided.

A selection of comments from RCAs satisfied with RAMM were:

- Easy to extract data
- Has the facility to record most of the data needed in asset management
- Any new fields can be included with RAMM updates
- Good as an inventory database
- Good for reseals treatment selection programme
- Meets the requirements as an assets register/database

These comments were selected from RCAs that qualified their approval of RAMM:

- Difficulties with carriageway dimensions for asset valuation - insensitive to widths and doesn't easily incorporate new seal widening
- Keen to see complete transfer of functionality from Unix to Windows base
- Generally good data repository but deficient in retaining some historic data
- Minor problems still exist, although RAMM has improved significantly in the last 10 years
- Would be more versatile if fully integrated with GIS

RCAs that stated they were not satisfied with RAMM had the following comments:

- For a small road network (750 km) would be just as happy with an Excel system
- Not user friendly
- Too complicated - too big and too much stuff in it
- Big time commitment required to keep it up to date
- Street lighting and bridges databases are kept elsewhere, but as RAMM improves these will be moved back into RAMM
- We also use Confirm for asset management
- Some reports not as easy to extract as we would like

The following comments came from RCAs that were unsure whether or not they were satisfied with RAMM:

- Not quite versatile enough for all asset management information
- Some inventory items are difficult to manage e.g. maintenance cost data
- Good as a database, has limitations as an asset management tool
- Database OK however ratings etc. not relevant and not required by Transfund
- Could be more user friendly - very large, difficult to operate at times

There were also a couple of suggestions for improvements:

- The ability to load hourly counts
- Improvement to the graphical presentation

4.1.6 Availability of RAMM information to external agencies and the public

Most RCAs (58 or 83%) allowed RAMM information to be used by external agencies or the general public, although this was normally subjected to restrictions or conditions. The main restrictions are listed below, some of which are overlapping:

- Must be legitimate request (17 RCAs)
- Prior Council approval required (9 RCAs)
- Available to contractors/consultants/government agencies (9 RCAs)
- Available to Police/Transit NZ/LTSA/Transfund (4 RCAs)
- Subject to conditions and/or costs (4 RCAs)

Some authorities also commented that each request for information would be treated on its merits; others would not allow commercially sensitive information to be sent out; some would allow only certain types of information e.g. traffic volumes or carriageway data; and others mentioned they had never been asked for any RAMM data.

4.2 General data collection

Replies to the general data collection questionnaire were received from 58 RCAs. This questionnaire was used to record where RCAs stored data not contained in RAMM, or additional to that contained in RAMM.

Most replies described data from counting programmes, particularly traffic counts* and, to a lesser extent, pedestrian, intersection volume and cycle counts.

*'*Traffic counts' were automated counts generally by tube, loops or sensors, and included volume, speed and classification of vehicles*

Substantial feedback was also received for parking surveys, vehicle speeds**, traffic signs, crashes, traffic signals, street lighting, road markings, and pavements. Details of the full list of replies, which covered 39 subjects and involved 142 returns are shown in Appendix 1 and Appendix 2.

The wide variety of data collected by RCAs made a general analysis of all responses to the questionnaire impracticable. This report has therefore concentrated on the subjects receiving the most replies. Further information about any of the subjects listed in Appendix 2 can be obtained from the LTSA on request.

Responses showed that data were collected roughly equally between consultants, contractors and in-house, and were usually collected by more than one of these agencies for any one subject. Approximately half (52%) of all data were collected routinely, the remainder in an ad hoc fashion. Of the data collected routinely, almost half (49%) were at a frequency of 6 months or less, a further 28 percent were collected annually, and 10 percent were at intervals greater than 1 year. The remainder were not quantified, often being specific to contract.

4.2.1 Traffic counts

Forty RCAs provided information about their traffic counting programmes.

One third of the counts were conducted in-house, 39 percent by consultants, and 28 percent by contractors. Most counts (62%) were collected routinely, just over a fifth (21%) were collected in an ad hoc way, and the remainder were a mixture of routine and ad hoc. The majority (88%) of routine programmes collected data annually or more frequently. Some RCAs varied the counting frequency according to road hierarchy, with minor roads being counted less frequently than major roads. Many ad hoc counts were taken after re-seals or road improvements had been carried out.

Virtually all counting programmes used automated equipment, generally traffic counters or classifiers connected to tubes or loops in the road. A few RCAs mentioned using axle stations or axle counters. Most of the major metropolitan areas also used SCATS loops to record traffic volumes in addition to traffic counters. In most cases counting equipment was rotated amongst the various sites within a RCA area. One RCA mentioned having a number of control sites where counting was carried out continuously. Most RCAs used their equipment to record volume, speed and classification of vehicles.

Although most authorities used modern equipment, a few did not. Modern counter technology allows much more flexibility, for instance, the ability to

***'Vehicle speeds' were separate one-off type speed surveys not done as part of a general traffic counting programme*

programme specific outputs or a range of outputs after the surveys are completed, rather than being restricted to outputs that are pre-set as in some older counters. Authorities should consider taking advantage of this technology if they are not currently.

Most authorities stored their traffic count data in a database (generally RAMM) or in a spreadsheet, and in almost half of responses, both. Around a quarter of RCAs also mentioned keeping hard copy of counts. One RCA appeared to store traffic count information in hard copy format only. Around three quarters of RCAs presented count results both electronically and in hard copy format, with the remainder split fairly evenly between either format. All but 3 RCAs made count information available to outsiders, although a few stipulated Government agencies or Transfund only. At least one authority had the information available on its website.

Almost all RCAs (37) mentioned that data collected from traffic counts were used to develop internal policies and programmes. The most common use was for planning purposes (annual plans and forward planning), asset management (including road upgrades and maintenance), seal extension or re-seal programmes, and road hierarchy development.

The most obvious on-road changes resulting from the use of traffic counting data were roads that were sealed, re-sealed, maintained or upgraded as a result of the programmes mentioned above. Apart from these, many RCAs mentioned improvements in traffic management or road design (such as provision of extra lanes or other capacity improvements, intersection improvements etc), and measures to reduce speed, such as various forms of traffic calming. One authority mentioned that all benefit cost calculations were based on traffic count data, which dictated all roading work subsidised by Transfund.

Only 2 RCAs had suggestions of how LTSA might assist with traffic counting programmes. One wanted standard spreadsheet or database formats to be made available, to enable consistency of data nationally. The other suggested LTSA assists with greater integration of RCA data nationally, particularly speed surveys.

4.2.2 Pedestrian counts

Ten RCAs provided details of pedestrian counts they had undertaken. Half were done by consultants, a quarter in-house, and a quarter by contractors. Most RCAs (6) carried out the counts in an ad hoc way, 3 carried them out routinely, and 1 used a combination of routine and ad hoc counting. Most of the routine counts were annually or more frequently.

All pedestrian counts were carried out manually, generally using hand counters or enumerators. In most cases the counts were of pedestrians

crossing the road (usually as part of a survey to determine what type of pedestrian crossing facility, if any, was warranted), although a few RCAs also counted pedestrian flows along roads or footpaths, sometimes for extended periods of time.

Of the 10 RCAs, 6 kept their records in a spreadsheet, 2 in a database, and 2 had hard copy only. Around half of authorities keeping electronic records also kept hard copy of survey forms or site sketches. Exactly half of the authorities surveyed presented count results both electronically and in hard copy format, and half in hard copy only. All but 1 RCA made count information available on request, although 1 stipulated to government agencies or schools only, and 1 recovered costs.

Only 4 authorities mentioned that pedestrian counts were used to develop internal policies and programmes. These varied between developing special needs warrants e.g. for Kea Crossings, to pedestrian upgrade programmes, and feeding into asset management data or district plan/roading upgrade programmes.

Most RCAs reported that information from these counts was used to upgrade or downgrade pedestrian facilities on a site specific basis e.g. removal of pedestrian crossings or replacement with refuge islands.

The only suggestion for LTSA assistance was to be kept up to date with standards and guidelines - presumably this was directed at general pedestrian issues, rather than specifically at pedestrian counting programmes.

4.2.3 Manual intersection counts

Nine RCAs provided information about manual intersection counts. A third of these counts were carried out in-house by council staff, the remainder by consultants or contractors. Most RCAs (7) conducted the counts in an ad hoc way, rather than as part of a systematic programme.

Counts were generally of vehicle turning movements, showing directional splits and broad band vehicle classifications, and generally during peak hours. Most authorities used their own standard forms to record information in 15 minute time slots.

Two thirds of authorities (6) kept count information in a spreadsheet, sometimes with hard copy back up, 2 kept hard copy only, and 1 used a database. Four authorities presented results both electronically and in hard copy format, 4 used hard copy only, and 1 electronically only. Seven RCAs made count information available on request.

Four RCAs used data from the counts to develop internal policies or programmes, although it was not always clear what this was. Replies

mentioned intersection or general layout design, monitoring, and ongoing development.

The most common on-road changes resulting from use of the data were changes to intersection design or controls. Other uses were project specific including one way street systems, and streetscape changes to shopping and CBD areas.

4.2.4 Parking surveys

Eight RCAs provided data about parking surveys they had been involved with. Half of the surveys were carried out in-house, the remainder by consultants or contractors. Surveys were normally conducted on an ad hoc basis, although 1 authority carried them out monthly, and 2 others programmed them for every 5 years.

Surveys normally involved manual field observation and recording of data. The types of data collected varied between authorities, and included information about meter feeding, identification and location of parking signs, and availability of parking spaces.

Five RCAs kept survey data on a spreadsheet (including 1 that also used a database, and 2 that also kept hard copy), 1 kept it in hard copy format only, and 2 did not specify how they stored their data. Three authorities presented results both electronically and in hard copy format, 3 used hard copy only, and 2 did not specify. Five authorities made information available on request.

Five RCAs commented that parking survey data were used in the development of internal policies or programmes. These included meter fee setting, parking management, and development of a town centre structure plan. On-road changes resulting from data collected included rationalisation of parking signs, rationalisation of long and short term parking spaces, and provision of additional parking spaces, loading zones, etc.

4.2.5 Vehicle speeds

Eight RCAs provided details of speed surveys they had carried out that were separate from speed data gathered in the course of their traffic counting programmes. Most RCAs collected the information in-house, although some also used consultants or contractors. In all cases, the surveys were of an ad hoc nature.

A variety of methods were employed to gather the data. In most cases, traffic counters were used (refer to 4.2.1), but laser or radar guns, speed trailers and floating car surveys also featured. Five RCAs stored data in spreadsheets (sometimes also keeping hard copy), 2 used a database, and 1 did not store

the data. Results of the surveys were normally presented both electronically and in hard copy format (5 RCAs), while 2 used hard copy only, and 1 did not have results to present (the data logger associated with the speed trailer was not functioning properly). Five authorities made the information available to outside agencies, most notably the Police.

Five RCAs used the survey results to develop internal policies or programmes. These included road safety action plans, general speed enforcement, planning of roading projects (often aimed at reducing speeds), safety reviews of side roads and entrances, and planning of specific projects.

Specific changes to the road or environment resulting from the surveys included lower operating speeds as a result of enforcement changes, installation of traffic calming measures, changes to road delineation and signage, and use of speed cameras.

Several RCAs made suggestions about how the LTSA could help with speed surveys. These included providing or making available on loan the use of laser speed guns, and reliable data loggers for use with speed trailers, and producing a simple guideline to give a consistent methodology for measuring vehicle speeds (an updated guideline is under preparation for release when the Speed Limits Rule comes into force. It will address the issues raised by RCAs).

4.2.6 Traffic signs

Seven RCAs gave details of information they collected associated with traffic signs. All authorities used contractors to collect the data, although several also collected some information in-house. Five RCAs collected data routinely.

Field inspections involving visual observation of signs were generally used to gather data. Data recorded normally included location, age and condition of signs, plus details of sign type. Some RCAs updated their records of signs as they were replaced or added.

Half the RCAs that provided details of how data were stored (1 RCA did not) used databases (Maximo, Confirm and SAM for Windows), while the remaining half used spreadsheets (Excel). All RCAs used electronic format to present results of data gathered, often in addition to hard copy. None of the authorities made the information available to outside agencies or the public.

Four RCAs mentioned they used the data to develop internal policies or programmes. These included annual renewal programmes, valuation of assets, budgets, and to assess the level of service performance of the contractor. On-road changes resulting from the data collected were normally to do with the signs themselves, and ensuring they were properly maintained or upgraded.

4.2.7 Traffic signals

Five RCAs provided information about traffic signal data collected. Four RCAs collected the data themselves (including 1 that also used consultants and contractors), while 1 used contractors exclusively. There was a reasonably even split between information gathered routinely, or in an ad hoc fashion.

Most authorities used visual inspection to record location and details of the signals. Those running SCATS were also able to use computers to monitor the operational history of the signals. All stored data electronically, mostly on databases such as Access, Maximo and Confirm, and some also used spreadsheets. At least 1 authority used laptops to electronically input data from field surveys. All 5 RCAs presented results of data gathered in electronic format, while some also used hard copy. Three made data available to outside agencies on request, although 1 restricted this to contractors working on their roading network.

Data gathered from the surveys were used for a variety of purposes, including asset management, SCATS management strategy, budgeting, and as a means of evaluating signal performance. Operational improvements to the signals often resulted from this.

4.2.8 Street lighting

Five RCAs provided details of street lighting data they collected. All used either contractors or consultants to do the work. Three RCAs had the data collected routinely, the remaining 2 on an ad hoc basis.

All 5 authorities used manual inspection to record information, generally noting inventory details including condition of the lights. One authority also recorded any noticeable crash damage, and another included a GPS reference of the location.

Four RCAs stored the information on databases (Access, Confirm and Maximo) while the other used a spreadsheet. All presented the results in electronic format. Only 2 RCAs made the information available to outside agencies.

4.2.9 Crash information

Four RCAs provided information about crash data they collected which was additional to the Traffic Crash Reports (TCRs) submitted to the LTSA by Police.

All 4 authorities used consultants to collect the data on an ad hoc basis (although reports were generally forwarded to the RCA at regular intervals). The consultants used a network of contacts to fill out "unofficial crash report forms", which were then entered into the RCAs computer systems. Most RCAs used a database (usually the LTSA's AIS system), although 1 used a spreadsheet. In all cases results from the data gathered were presented in hard copy format, although 1 RCA also did this electronically. All 4 authorities made the information available on request, although 2 restricted its use to LTSA only.

Two authorities used the data as part of their minor road safety improvement programmes and 2 used it to identify locations for "grey spot" studies. Improvements to signs, markings, condition of road etc. were the most common on-road changes resulting from use of the data.

Two RCAs wanted improved crash reporting rates to Police, which would essentially make their unofficial data collection unnecessary, and 1 also requested improved timeliness by LTSA in making crash data available from CAS.

5. Discussion

One of the main purposes of the data collection survey was to identify the types and amount of data being gathered for the road network, and road user behaviour on it. There was a very good response rate for the RAMM Data questionnaire, where 70 RCAs provided a comprehensive outline of data they collected for the road network.

The response to the General Data Collection questionnaire was lower, with 58 RCAs replying. Some authorities provided a comprehensive outline of their programmes, supplying information about numerous subjects, while others, including some of the larger authorities, provided fewer details. Many of the responses gave further information about road network data collected e.g. traffic counts, while only some provided information about road user behaviour. The relatively low number of replies concerning road user behaviour data may indicate that authorities collect little of this type of data, however it could also be indicative of a low response rate on the issue.

5.1 RAMM data

Virtually all RCAs stored information about their pavements in RAMM, which is not surprising since this is a Transfund requirement. RAMM also provides a number of tables where optional information can be entered, for instance traffic facilities data (control devices, signs, markings and railings), bridges, street lighting and skid resistance. These tables were used to varying

degrees, ranging from 73 percent of RCAs inputting signs information, down to 17 percent using the skid resistance tables.

Many RCAs noted on the RAMM Data returns where they kept relevant information not stored in RAMM itself e.g. in a spreadsheet, while others provided these details on the General Data Collection forms. By counting the total number of returns for each subject (and cross checking to ensure no double counting), it was possible to get a reasonable estimate of the total road network data stored by RCAs.

Adding the returns in this fashion showed that 83 percent of RCAs provided details of their signs data, 70 percent gave street light details, 69 percent markings details, and 23 percent skid resistance. It is apparent that some RCAs did not furnish returns (assuming that all or most held data for signs, street lights and markings somewhere).

It also indicates that a low proportion stored skid resistance data and, allowing for nil returns, the results are not encouraging, at best showing that no progress has been made since the level of skid resistance testing was last surveyed in 1999. *RSS 10 "Skid Resistance"*, LTSA, 1999 reported approximately half of 31 RCAs surveyed undertook some form of skid resistance testing. From a traffic safety perspective the low proportion of RCAs testing and recording skid resistance is cause for some concern, considering the high numbers of crashes throughout the country occurring at bends, often in the wet. The LTSA believes more RCAs need to monitor skid resistance values on their road network at regular intervals.

Most RCAs that inputted data into RAMM used the same software e.g. BRIMMS for bridge details, SLIM for street lights etc, which should ensure reasonable consistency of data entered. Authorities that did not use RAMM used a number of different database or spreadsheet formats, which in some cases were then linked to RAMM.

Most authorities did not keep historical records of changes to information in their RAMM databases (with the exception of traffic volume and to a lesser extent skid resistance data). Keeping historical records of changes can be beneficial when analysis of the changes is undertaken. For instance, recording the date when street lights along a route were changed from low pressure to high pressure sodium would assist any analysis of changes in night time crash rates.

Very few authorities (about 10 percent) had linked data from RAMM with a crash database, although many were aware that a link could be made. The vast array of data available in RAMM means that it is a potentially rich source of material capable of being used to analyse the safety performance of the road network when linked to a crash database. Linking would enable crash queries (including crash rates) to be made on any of the RAMM tables, so for

instance, an RCA could list the crash rates on all bridges within its jurisdiction, or compare crash rates between road sections of varying width.

The LTSA has been exporting CAS crash data to RAMM for several years. CAS has many sophisticated crash analysis tools. RCAs are encouraged to use CAS but should also consider linking their own RAMM data to CAS, so they are able to query more road management data than will be available through CAS alone.

Most RCAs were satisfied with the performance of RAMM as a database, and many comments were received in support of it. However a number of RCAs were not entirely satisfied with RAMM or qualified their support of it, and made comments accordingly. RAMM was developed by, and is currently supported by CJN Technologies Ltd, and the software is upgraded on an ongoing basis. Comments received about the performance of RAMM were forwarded to CJN Technologies Ltd (with reference to RCAs removed) to assist in its further development.

5.2 General data collection

Returns provided by RCAs for the General Data Collection questionnaire were considerably lower than for RAMM data, and probably understated the amount of additional data gathering that RCAs carried out. However they did indicate that most additional data collected by authorities were concerned with road network information (traffic counts, signs, signals etc) rather than road user behaviour on the network.

The Government has recently unveiled a number of new transport initiatives, including increased funding for public transport, the development of Safety Management Systems and road network classifications, and the promotion of cycling and walking as alternative transport modes.

Returns from the General Data Collection questionnaire suggested that little information was currently being colllected by RCAs in some of these areas, particularly public transport passenger counts and cyclist counts. There is considerable scope for RCAs to expand their data collection programmes to include this and other road user behaviour information.

6. Recommendations

The LTSA encourages RCAs to:

- keep historical records of changes to information in their databases (the RAMM software could be adapted to encourage this)
- link data collection databases they hold to the LTSA's CAS database

- keep abreast of technological advances in data collection methods, to ensure they have the information needed to manage their road networks at appropriate levels of safety
- monitor skid resistance levels on their major roads at regular intervals
- identify road user behaviour data that is being, or could be, collected and recorded and linked to their databases
- be aware of data collection requirements arising from Government transport policies in the area of public transport, cycling and pedestrians, Safety Management Systems and road network projects.

APPENDICES

Appendix 1 Road Controlling Authorities Surveyed

RCAs replying to RAMM data and general data questionnaires

RCA	General data subject returns	RCA	General data subject returns
Ashburton District	1	Otorohanga District	2
Auckland City	3	Palmerston North City	1
Banks Peninsula District	1	Porirua City	1
Buller District		Queenstown Lakes District	1
Carterton District	1	Rangitikei District	
Central Hawkes Bay	1	Rodney District	1
Central Otago District	3	Rotorua District	1
Chatham Islands District	1	Ruapehu District	2
Christchurch City	3	Selwyn District	3
Clutha District		South Taranaki District	1
Dunedin City*	9	South Waikato District	1
Far North District	1	South Wairarapa District	1
Franklin District	3	Southland District	2
Gisborne District	1	Stratford District	
Hamilton City	10	Tararua District	
Hastings District	4	Tasman District	5
Hauraki District	1	Taupo District	9
Horowhenua District	1	Tauranga District	3
Hurunui District	1	Thames-Coromandel District	5
Hutt City	8	Timaru District	5
Invercargill City	4	Transit NZ (Wellington)	7
Kaikoura District	1	Transit NZ (Auckland)	
Kaipara District	1	Transit NZ Dunedin	
Kaipiti Coast District	1	Upper Hutt City	1
Kawerau District	2	Waikato District	
Mackenzie District	1	Waimakariri District	1
Manawatu District	1	Waimate District	1
Manukau City	1	Waipa District	1
Marlborough District	3	Wairoa District	1
Masteron District		Waitomo District	
Matamata-Piako District	1	Wanganui District	1
Napier City		Wellington City	3
Nelson City	7	Western Bay of Plenty District	
New Plymouth District	2	Whakatane District	
North Shore City	2	Whangarei District	1
Opotiki District	1		

**RAMM data questionnaire not returned*

Appendix 2 General Data Collection

Replies from RCAs showing returns per subject

Data Subject	No of Returns
Advisory Speed Surveys	1
Asset valuations	1
Barriers (ARMCO)	1
Bridges	1
Bus shelters	1
Centre line surveys	1
Commodity surveys	1
Crash information	4
Cycle counts	3
Footpath condition survey	1
Highway information/route data	1
Intersection controls	1
Manual intersection counts	9
Night Inspections	1
Parking surveys	8
Pavements - deflections	3
Pavements - layers	1
Pavements - profiles	1
Pavements - Macro texture	1
Pavements - Micro texture	1
Pavements - NAASRA roughness	2
Pedestrian counts	10
Public transport passenger counts	1
Road marking Reflectometer surveys	1
Road markings	4
Road names	1
Road openings	1
Road safety deficiencies	1
Roadside hazards	1
Routine Inspections	1
Seat belt surveys	1
Skid resistance	2
Speed limits	2
Street furniture	1
Street lighting	5
Street sweeping	2
Tracks model - cordon surveys	1
Traffic counts	40
Traffic facilities	1
Traffic signals	5
Traffic signs	7
Travel time surveys	1
Vehicle noise/emissions	1
Vehicle speeds	8

Appendix 3 Data Collection Questionnaire

Road Controlling Authority:
Person(s) Replying to Questionnaire
Position in Organisation:
Contact Phone No.:
Date:
Interviewer:

NOTE: The LTSA is seeking information about any regular (systematic, routine) or ad hoc (e.g. a one off survey to evaluate a new traffic control device) data collection programmes that are relevant to traffic safety or efficiency. This includes:

- roadway characteristics data e.g. RAMM information
- "observational" information e.g. how many drivers changed their behaviour when a new sign was erected, but does NOT include data collected on public opinions or attitudes, or results of driver interview surveys, UNLESS they have been evaluated alongside observational results e.g. if speed measurements have been taken to evaluate a change in speeds after a change in speed limit, it would be useful to know how many drivers were aware that the speed limit had been changed.

Examples of the type of data the LTSA is interested in are listed below.

Buses/public transport volumes	RAMM
Cell phone use by drivers	Red light violations
Crash blackspot analysis (if not part of LTSA monitoring system)	RGDAS
Crash database (where RCA's have their own system - includes tow truck records, non Police reported etc)	Seatbelt/restraint use
Cycle helmet use	School/kea/zebra crossing violations
Cycle volumes	Signs asset database (if not on RAMM or if additional to RAMM)
Intersection turning/volume counts	Speed limit ratings
Lateral offset surveys (distance of street furniture/hazards from road edge)	Skid resistance (if not on RAMM or if additional to RAMM)
Lateral placement surveys (effect of changed lane markings or control devices on vehicle position in the roadway)	Traffic signals (if not on RAMM or if additional to RAMM)
Markings asset database (if not on RAMM or if additional to RAMM)	Traffic volumes (machine, SCATS, manual etc)
On-street/ off-street parking surveys	Vehicle classification (cars, trucks, vans, m/c etc)
Pavement texture depth (macro)	Vehicle noise
Pedestrian volumes (across road, along footpaths)	Vehicle speeds

This list is not exhaustive.

The Questionnaire is in 2 parts - (1) "RAMM data" and (2) general data collection "non-RAMM data". The RAMM data questionnaire can be completed on the pages provided. The table in the appendix provides descriptions of the RAMM inventory tables. Please complete the general data collection questionnaire using one page per data subject heading. Any relevant data not contained in RAMM should be described here. ***You will need to photocopy the required number of pages***. Please keep replies brief and pertinent.

RAMM DATA

1. What information do you keep in RAMM?	(a) RAMM Database Inventory Tables *(tick any tables that you use)*	☐ Road names	☐ Carriageway (dimensions)	☐ Traffic Volume
		☐ Traffic Loading	☐ Shoulders	☐ SWC (Surface Water Channel)
		☐ Footpath	☐ Berm	☐ Crossing
		☐ Footpath Surfacing	☐ Carriageway Surfacing	☐ Pavement layer & rehabilitation
		☐ Drainage	☐ Traffic Facilities	☐ Roughness
		☐ Rating (sealed roads)	☐ Rating (unsealed)	☐ Road Features
		☐ Minor Structures	☐ NZ Map Grid Co-ordinates	☐ Other (*specify*)
		☐ Other (*specify*)	☐ Other (*specify*)	☐ Other (*specify*)
	(b) If you ticked Traffic Facilities please tick the sub-sections you use. *(briefly describe information recorded)*	☐ Control Devices	☐ Signs	
		☐ Markings	☐ Railings	
	(c) Do you keep a bridge database on RAMM?	☐ Yes ☐ No	*(If yes, please specify software used e.g. BRIMMS, and briefly describe information recorded)*	
	(d) Do you keep a street lighting database on RAMM?	☐ Yes ☐ No	*(If yes, please specify software used e.g. SLIM, and briefly describe information recorded)*	
	(e) Do you keep a skid resistance (e.g. SCRIM) database on RAMM?	☐ Yes ☐ No	*(If yes, please specify any software used, and briefly describe information recorded)*	
	(f) Do you link any other databases to RAMM?	☐ Yes ☐ No	*(If yes, please specify any software used, and briefly describe the linked database(s))*	

<table>
<tr><td>2. How often are condition rating surveys carried out for pavements?</td><td colspan="3"></td></tr>
<tr><td rowspan="4">3. How often is data updated for the following tables, sub-tables or databases?</td><td colspan="3">weekly, monthly, 6 monthly, annually or other (specify)</td></tr>
<tr><td>Carriageway (dimensions)</td><td>Traffic Volume</td><td>Shoulders</td></tr>
<tr><td>Control Devices</td><td>Signs</td><td>Markings</td></tr>
<tr><td>Railings</td><td>Street Lights</td><td>Skid resistance</td></tr>
<tr><td rowspan="3">4(a). Do you keep an historical record of changes to information in these tables, sub-tables or databases? e.g. if a road's marking changed from centre line to flush median, is the date of change recorded and a record of the old marking retained?</td><td>Carriageway (dimensions)
☐ Yes ☐ No</td><td>Traffic Volume
☐ Yes ☐ No</td><td>Shoulders
☐ Yes ☐ No</td></tr>
<tr><td>Control Devices
☐ Yes ☐ No</td><td>Signs
☐ Yes ☐ No</td><td>Markings
☐ Yes ☐ No</td></tr>
<tr><td>Railings
☐ Yes ☐ No</td><td>Street Lights
☐ Yes ☐ No</td><td>Skid resistance
☐ Yes ☐ No</td></tr>
<tr><td>4(b). Has this information been linked, or could it be easily linked, to any crash database? e.g. could it be put into the LTSA Monitoring Database?</td><td colspan="3">(Please comment below):</td></tr>
<tr><td>5. Are you satisfied with RAMM as a database? e.g. is it sufficiently versatile to hold all your road asset maintenance and management data, and are the outputs to your liking?</td><td colspan="3">☐ Yes ☐ No ☐ Not Sure Please comment below:</td></tr>
<tr><td>6. Is the information in RAMM available to external agencies or the public?</td><td colspan="3">☐ Yes ☐ No (if yes, please specify the circumstances):</td></tr>
</table>

GENERAL DATA COLLECTION *(Copy 1 page for each data subject)*

Subject *(state type of data collected e.g. vehicle speeds):*						
1. How many sites are in the programme?						
2. Who collects the data?	*(tick as appropriate)*	*(state position, title or name of person managing the programme)*				
	☐ (a) In house					
	☐ (b) Consultants					
	☐ (c) Contractors					
	☐ (d) Other *(specify)*					
3. How often is the data collected? *(tick as appropriate)*	☐ (a) Ad hoc					
	☐ (b) Routinely	Weekly ☐	Monthly ☐	6 Monthly ☐	Annually ☐	Other (specify) ☐
4. How is the data collected?	(a) Describe the methodology used					
	(b) What equipment is used?					
5. How is the data stored?	*(tick as appropriate)*	*(Please specify details)*				
	☐ (a) Spreadsheet					
	☐ (b) Database					
	☐ (c) Other					
6. How are the results presented?	*(tick as appropriate)*	Report	Table	Graph	Other (specify)	
	☐ (a) Hard copy	☐	☐	☐	☐	
	☐ (b) Electronically	☐	☐	☐	☐	
	Comments:					
7. What are the results used for?	(a) What on-road changes have occurred as a result of the surveys?					
	(b) Are the results used to develop internal policies, standards or programmes?	☐ Yes ☐ No *(if yes, specify below):*				
	(c) Are the analysed results or raw data available to external agencies or the public?	☐ Yes ☐ No *(if yes, specify below):*				
8. Is the LTSA able to assist in any way?						

RAMM DATABASE INVENTORY TABLE NAMES

Tables	Table Names	Table Contents
Road Names	roadnames	Names of roads
Carriageway	carr_way	Descriptions & dimensions of road sections
Traffic Volume	traffic	Traffic volumes
Traffic Loading	loading	Pavement loadings (HCVs)
Shoulders	shoulder	Shoulder descriptions & dimensions
Surface Water Channel (SWC)	sw_channel	Surface water channel (parallel to road)
Footpath	footpath	Footpath description, location, length
Crossing	crossing	Berm description, location, length
Footpath Surfacing	footpath_surface	Footpath surface description
Carriageway Surfacing	c_surface	Carriageway surfacing descriptions
Pavement Layer & Rehabilitation	pave_layer pave_layer_rehab	Pavement layer description Pavement structure rehabilitation details
Drainage	drainage	Drainage type, location, maintenance
Traffic Facilities ▪ Control Devices ▪ Signs ▪ Markings ▪ Railings	traf_facil	Traffic facility type & location ▪ Traffic signals, islands ▪ Traffic signs ▪ Road markings ▪ Barriers, sight boards
Roughness	rough	NAASRA pavement roughness counts
Rating (Sealed Roads)	rating	Pavement condition rating for sealed roads
Rating (Unsealed Roads)	rating_unsealed	Pavement condition rating for unsealed roads
Road Features	features	Feature location & type (e.g. monument)
Minor Structures	minor_structure	Minor structure location & type (e.g. crib wall)
NZ Map Grid Co-ordinates	nzmg_coordinate	Grid co-ordinates for single point features

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 Land Transport Safety Authority in Auckland (Private Bag 92-515), Hamilton (Private Bag 3081), Napier (PO Box 972), Palmerston North (PO Box 1947), Wellington (PO Box 27-249), Christchurch (PO Box 13-364) or Dunedin (PO Box 5245) at a cost of $10 each including GST.