Child Pedestrian Safety En Route To and From Rural Schools: A Case Study

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Hamilton, New Zealand

1999

This 1998-9 Summer Research Scholarship report was funded by the Child Accident Prevention Foundation of New Zealand

EXECUTIVE SUMMARY AND RECOMMENDATIONS

This research examines the safety hazards faced by child pedestrians at rural schools within the Waipa District. The main objectives of this research were to identify hazards child pedestrians face, to identify current counter-measures to these hazards, and to evaluate the regulations and policies pertaining to these counter-measures and child pedestrian safety. Meeting these objectives then allowed the design of possible counter-measures to the hazards faced by rural child pedestrians. The ultimate goal of this research was to improve child pedestrian safety at rural schools.

To achieve these goals and objectives, case studies were selected. The Waipa District was selected as a case study of a particular geographical area with concerns about pedestrian safety. Within this district Hautapu School was selected as an in-depth study into the specific concerns about child pedestrian safety at rural schools.

Various methodologies were applied to obtain specific information from the varying sources. These methodologies and sources included: interviews with key informers, analysis of regulations and policy, a parental survey and a classroom discussion with school children who face the particular hazards. The results of these various approaches provided an understanding of the hazards facing child pedestrians at rural schools, and the concerns these give rise to. The commonality of the hazards and concerns was reflected in the shared experiences of various schools in the district. Once this information was collected and analysed the results were then used to develop possible counter-measures to improve the safety of child pedestrians on their journey to and from rural schools. These counter-measures recommended are listed below;

1. Children should not walk or ride bicycles to or from rural schools. Instead, it is suggested that they should use other forms of transport such as private cars or buses, with buses being the preferred option.

- It is suggested that moves be made to make bus services more accessible to rural school pupils. Increasing the bus service would decrease the risks that rural child pedestrians face as school buses are a very safe form of transport. Buses are preferred to cars as they are more efficient in that they carry more passengers and are safer than cars. This in turn would reduce the volume of traffic on the road and eliminate many of the hazards in car-parks, stemming from traffic congestion and confusion created by parents in cars dropping off and picking up children.

2. In instances where it is not practical for children from rural schools to bus or travel to school by car, they should receive total supervision when crossing the road to enter or leave the school grounds.

- This supervision should be provided by, teachers, parents, and traffic safety wardens.

3. Mandatory lower speed limits on roads outside rural schools for the hour before and after school. This is a longer term initiative which would require regulatory changes and is premised on the belief that if you change the regulation you can change the behaviour.

4. It is further recommended that steps be taken to increase drivers' awareness that they are approaching a school zone. This can be achieved by;

- increasing the visibility of rural schools.
- improved signage, a school warning sign and an attached speed limit supplementary sign is suggested.
- rumble strips which would alert drivers through audible stimulation, thus increasing their awareness that they are entering the school zone.

5. The final recommendation is to increase the size of car-parks at rural schools with a lack of parking-spaces. However this is the least preferred recommendation as it is a countermeasure to a hazard (congestion in the car-park) that is a consequence of another hazard (traffic volume).

In addition to these suggested counter-measures the research prompted a beginning to the process of reducing the speed limit outside Hautapu School. This practical outcome of the research greatly relieved those directly affected by the hazards facing child pedestrians at Hautapu School, these being, the principal, the teachers, the parents and the pupils who unanimously identified speed as their greatest safety concern.

ACKNOWLEDGEMENTS

The researchers would like to acknowledge the following for their contributions to the production of this report;

The University of Waikato, Faculty of Arts and Social Science and in particular the Programme in Sociology, and the Social Science Research Programme, for hosting the project and providing the resources required to produce this report.

Secondly, we would like to thank Dr. David Swain for giving his time, editorial assistance, knowledge and expertise so generously.

We would also like to extend our thanks to the key informers who gave freely of their time and greatly enhanced our understanding of specific legislation, policies, regulations and practices. These key informers include officials in their roles within the New Zealand Police, the Land Transport Safety Authority and the Waipa District Council.

We would also like to thank the staff, and pupils of Hautapu School. A special thanks is given to Dorothy Barrett who drew our attention to the particular road hazards facing Hautapu School.

Finally we would like to extend our appreciation to the Warehouse for their support and assistance with this project.

CONTENTS

1. INTRODUCTION

At 8.18 am on the 7 h of November 1995 two sisters, Nicole and Christina Lindsey, aged 6 and 7, suffered serious head injuries and fractures when they were struck by a car while crossing the road outside Hautapu School, in the North Island's Waipa District. This tragic accident is but one example of the hazards and the injuries that child pedestrians face. In New Zealand, for 5 to 9 year olds, pedestrian injury is the leading cause of death from any cause (illness and injury). Apart from the pain, suffering and misery these accidents cause are the financial costs to the country every year. Using the statistical value of life decided by the Minister of Transport in 1991, the cost of child pedestrian deaths alone in 1997 was 22 million dollars (at April 1991 prices). It is the need to reduce these deaths, injuries and costs they incur that prompted this research.

Accident statistics indicate that children are at particular risk on their journey to and from the school grounds and that child pedestrians in rural areas face greater risk of serious injury and death than children in urban centres. Thus highlighting a specific area in need of investigation. This research attempted to fill a gap in the area of child pedestrian research by conducting an investigation of the safety hazards facing child pedestrians *en* route to and from rural schools.

This research is necessary in its potential to help minimise future injuries to children on their journey to and from rural schools and to avoid the pain, suffering, guilt and loss that child pedestrian accidents cause. Along with the pain and suffering, but to a lesser degree, is the reduction of health costs associated with these types of accidents. This research will also allow those most closely affected by the present hazards to feel safer and reduce stress and anxiety, thus increasing social and psychological well-being.

The research involved an assessment of present policies and prevention strategies. The purpose of this was to formulate counter-measures to the hazards identified in the

research with the objective of increasing the safety of child pedestrians at rural schools. In doing so, this research addresses three questions:

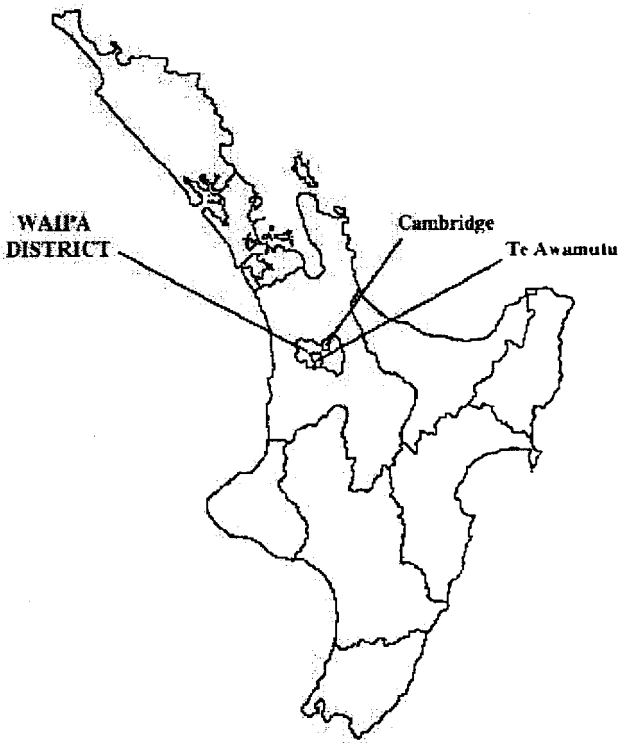
- what are the hazards facing children on their way to and from rural schools?
- what are the present prevention strategies to counter these hazards? and;
- what are the possible counter-measures that could reduce these hazards?

The focus on roading and safety policies was an essential component of the research as existing policies defined the bounds of any counter-measure development and implementation. The need for this type of research to contain a policy analysis element has been recognised by Alan Wilcox (1992). Wilcox stated that "[s]ome fundamental research from a policy analysis perspective needs to be carried out". He further argued that this type of research needs to take a zero based approach to the problem of road accidents and that such research should be multidisciplinary "using the approaches of disciplines such as community psychology, sociology, and psychology in creating behavioural change for the prevention of road accidents" (Wilcox, 1992:29). These are the approaches that this research employs.

The present research encompassed four forms of research; strategic, applied, action, and social assessment. The research is strategic in that it encompassed acquiring new knowledge related to a specific topic which is considered to be of particular relevance to a future practical need. It is also applied research as it encompassed undertaking research directed towards a specific practical aim or objective of immediate relevance (Beattie, 1986). In addition to this, the research involved social assessment in that it focused on policies and was based on a partnership with affected individuals, groups and communities (Davey, 1995). And as it involved studying a social situation with a view to improving the quality of action within it the research can also be considered as action research (Baxter, 1996:63).

Given the timeframe and funding available for the research it was necessary to restrict the scope of the research to a specific geographical area. Consequently the Waipa was selected as a case study District (see Map 1. below).

Map 1. The Waipa District



Within the Waipa District, Hautapu School was selected as a case study. This enabled an in-depth investigation into the specific hazards facing child pedestrians at one particular school in this district. In addition to this, principals from the other rural schools in the district were interviewed to allow common hazards to be identified. The in-depth investigation of one school and the exploration into the experiences of other rural schools in the district provided an insight into the development of possible counter-measures to commonly identified hazards.

It was ultimately hoped that Hautapu School would be able to use the results of this research to take effective action to improve the children's safety, such as reducing the speed limit along the Hautapu Road. It was also hoped that the findings and conclusions of this research would be beneficial to other rural schools who faced similar child safety hazards and barriers when it came to designing and implementing counter-measures to increase the safety of their pupils.

2. LITERATURE REVIEW

There is a vast array of literature on traffic safety and traffic safety research in New Zealand. This literature is fundamental in illustrating the risks and hazards New Zealand's child pedestrians face. Central to this research is the epidemiological literature and data on traffic accidents.

2.1 ACCIDENT STATISTICS

Of the 540 people killed in traffic related accidents in 1997, 54 were pedestrians, and of these 11 were children aged between 0 and 14 years. Of the 13,378 traffic related injuries in 1997, 925 were pedestrians, and of these 334 were children aged between 0 and 14 years. As a group these children are over represented. While children made up 36% of pedestrian injury incidents on public roads reported to the Land Transport Safety Authority (LTSA) in 1997, they only account for 23% of the population. School aged children are shown to be at twice the risk of injury as the population overall (Safekids, 1998).

Pedestrian injury is New Zealand's second leading cause of child injury death (0-14 years). For 5 to 9 year olds, it is the leading cause of death from any cause (illness and injury). Over the last five years (1994-98) on average every 18 days, a child pedestrian died in New Zealand (20 per year). On average, nearly every day a New Zealand child pedestrian was injured seriously enough to be admitted to hospital. This equates to around 350 children per annum, the equivalent of 11 classrooms full of children annually (Safekids, 1998). Of these deaths, boys account for 59% (Roberts, 1994). Of those child pedestrians hospitalised 13% are likely to be admitted to an intensive care unit, commonly with head or multiple injuries. Estimates from Starship Children's Hospital are that 1 in 20 hospitalised child pedestrians are likely to suffer a severe, permanent disability (Safekids, 1998). The child pedestrian death rate is highest for children under five years, however, the hospitalisation rate is highest in the 5-9 year age

group (Roberts, 1994). Table 1. below illustrates the rate of child pedestrian causalities and deaths in New Zealand for the year ending December 1997.

Table 1.

PEDESTRIAN CASUALTIES AND POPULATION STATISTICS
BY AGE GROUPS
Year ended December 1997

				[---- Per 100,00 ---- Population]	
Age Groups	Population	Injured	Killed	Injured	Killed
Under 5	283540	53	3	18.7	1.1
5 to 9	299280	153	7	51.1	2.3
10 to 14	273120	128	1	46.9	0.4
15 to 19	271030	102	5	37.6	1.8
20 to 24	273510	62	2	22.7	0.7
25 to 29	285640	58	5	20.3	1.8
30 to 34	298400	44	6	14.7	2.0
35 to 39	305190	31	1	10.2	0.3
40 to 44	271250	32	3	11.8	1.1
45 to 49	250580	23	2	9.2	0.8
50 to 54	204050	26	0	12.7	0.0
55 to 59	171870	16	2	9.3	1.2
60 to 64	138270	14	2	10.1	1.4
65 to 69	134200	22	1	16.4	0.7
70 to 74	116520	30	1	25.7	0.9
75 to 79	86500	28	6	32.4	6.9
80 & over	98810	41	7	41.5	7.1
Unknown age	0	62	0	0	0
Total	3760760	925	54	24.6	1.4

NOTE: Population is the resident population as at 30 June 1997.
(LTSA, 1998).

Child pedestrian death rates in New Zealand are high by international standards. Trends in pedestrian injury death rates for children aged 0-4 and 5-14 show New Zealand is way behind nations such as England, Wales, Denmark, Sweden, and the USA (Roberts, 1993). In 1987, the under five child pedestrian death rate in New Zealand (4.0/100,000) was 13 times higher than in Sweden (0.3/100,000) and twice as high as in the USA (1.8/100,000). For children aged 5-14 years the child pedestrian death rate in New Zealand (2.5/100,000) was twice as high as Sweden (1.2/100,000).

Over the past 20 years New Zealand has experienced both the smallest absolute reduction and the smallest percentage reduction in child pedestrian death rates (Roberts, 1994). Although accident statistics show the size of the problem of child pedestrian safety they also show that the number of pedestrian accidents, and the deaths and injuries they cause, are declining. As Table 2. below shows pedestrian deaths in 1993 and 1997 were the lowest in 27 years, and the number of pedestrian injuries in 1997 were the lowest over the same period. Both as raw numbers and numbers per 100,000 units of population.

Table 2. Pedestrian Casualties and Population Statistics Historical

Year ending 31 December

				[-- per 100,000 Population --]	
Year	Population	Injured	Killed	Injured	Killed
1970	2852100	1786	99	62.6	3.5
1971	2898500	1861	113	64.2	3.9
1972	2959700	1993	125	67.3	4.2
1973	3024900	2198	157	72.7	5.2
1974	3091900	2034	125	65.8	4
1975	3143700	1760	112	56	3.6
1976	3163400	1473	102	46.6	3.2
1977	3166400	1447	124	45.7	3.9
1978	3165200	1224	116	38.7	3.7
1979	3163900	1157	106	36.6	3.4
1980	3164100	1246	98	39.4	3.1
1981	3195800	1121	104	35.1	3.3
1982	3229800	1128	89	34.9	2.8
1983	3269500	1144	103	35	3.2
1984	3299500	1343	119	40.7	3.6
1985	3311200	1225	125	37	3.8
1986	3316700	1265	112	38.1	3.4
1987	3349100	1256	110	37.5	3.3
1988	3356200	1119	83	33.3	2.5
1989	3384510	1039	81	30.7	2.4
1990	3429100	1161	104	33.9	3
1991	3449700	1015	88	29.4	2.6
1992	3485400	1007	76	28.9	2.2
1993	3524800	949	74	26.9	2.1
1994	3577200	1063	54	29.7	1.5
1995	3643200	1053	71	25.9	1.9
1996	3717400	969	63	26.1	1.7
1997	3761100	925	54	24.6	1.4

NOTE: Population from 1997 is from Statistics NZ INFOS series DPEA, SDBC.

(Source: LTSA, 1998)

2.2 COSTS

Behind the epidemiological figures are the social and financial costs child pedestrian accidents incur. The "social cost" of child pedestrian accidents is the measure of all costs which the crash inflicts on the community as a whole, that is, on road users, providers of emergency services/health care services and private individuals including their families, households, and friends (i.e. private costs). These social costs refer not only to material losses but also to intangible items, such as pain, anguish and suffering; which cannot be equated to a monetary figure. Thus, the social cost of crashes represent in a single potent measure the key aspect of road crashes that policy-makers are trying to reduce - their cost to society in terms of loss of life, human suffering and damage (Bowie, 1997).

"Two very important components of the social cost of an accident are the cost of lives lost and the cost of permanent disabilities resulting from accident injuries. These two are, no doubt related" (curia, 1991:2). In terms of life itself many years are lost due to child pedestrian accidents. It has been estimated that yearly in New Zealand child pedestrian accidents account for an estimated 1,400 years of potential years of life lost to society (Safekids, 1998). In 1991, the statistical value of life was decided by the Minister of Transport to be $2 million at April 1991 prices (curia, 1991).

Road traffic crashes impose a heavy economic burden on society. "The cost to society (in July 1996 dollars) of road crashes in all of New Zealand in 1997 was estimated to be $2,942 million ($1,159 million for urban crashes and $1,783 million for rural crashes)" (LTSA, 1998). "ACC has estimated its costs for a six year old girl, injured as a pedestrian, who loses a leg and suffers a serious head injury, at between $1.4 million and $4 million dollars over her lifetime (dependent on her ability to support herself as an adult)" (Safekids, 1998).

"The cost of medical treatment of traffic injuries is an important component of the social cost of road crashes" (Kennaird, in Langley, Phillips, and Marshall, 1991). In relation to pedestrian accidents this is more so than other types of accidents because of the disproportionate costs associated with treating pedestrian injuries. In their study of the public hospital inpatient costs of injury due to motor vehicle traffic crashes at

Dunedin Hospital over a two year period (1 April 1988 to March 1990), Langley et al. found that traffic crash injuries were the most expensive class of injury event to treat (Langley et al., 1991). They found that injury cases were on average more expensive to treat than non-injury cases ($3115 versus $2749 per case). Of these injuries they found that at a mean cost of $5,253 per case, injuries caused by motor vehicle traffic crashes (MVTCs) were the most expensive class of injury to treat (Langley et al., October 1991). Costs by type of road user are shown in Table 3. "Other road users" includes other specified road users (e.g. horse riders) and unspecified persons.

For Langley et al. (1991) the most striking finding was the variation in average costs. Injuries to pedestrians were on average twice as costly to treat as those to occupants. Costs per day were, however, not so different. Pedestrians had a cost per day of $415 whereas in the case of all road users it was $422. They found that a significant proportion of the mean pedestrian cost can be accounted for by the relatively high average length of stay for pedestrians which was nearly twice that of all other road users.

Table 3. provides an estimate of national inpatient costs and shows that in terms of distribution of road users the Dunedin Hospital experience was not markedly different from the country as a whole. Pedestrians accounted for 10% of the national cases (as they still do) and 18% of the national costs (Langley, et al., 1991).

Table 3. Inpatient Costs by Injury Event at Dunedin Hospital (1988/89) & National Estimates (1988).

	DUNEDIN							NATIONAL		
	Freq.	%	Tot.LOS*	Av.LoS*	Tot.Cost	%	Av.Cost	Freq.		Est.Tot.Cost
Occupant	291	50	2,925	10	$1,301,154	42	$4,471	4528	50	$20,246,135 43
Motorcyclists	166	28	2,038	12	$846,626	28	$5,100	2341	26	$11,939,100 25
Pedestrian	66	11	1,569	24	$612,466	20	$9,280	926	10	$8,593,280 18
Pedal Cyclist	15	3	189	13	$110,898	4	$7,393	397	4	$2,935,021 6
Other Road Users	46	8	551	12	$196,454	6	$4,271	834	9	$3,562,014 8
Total	584	100	7,272	12	$3,067,597	100	$5,253	9026	100	$47,275,550 100

LoS-Length of Stay*

Langley et al.'s results demonstrate that average costs vary significantly according to class of road user. They argue that "[t]his is particularly important for pedestrians where the medical costs are likely to make up a substantial proportion of the total costs of a crash, there being minimal property damage". Pedestrians had the highest mean cost and contributed disproportionately to the total cost. A longer than average length of stay was identified here as an explanation. Related to this is the severity of injury. Langley and Marshall have shown that pedestrians tend to have more severe injuries (in Langley, et al., 1991).

2.2.1 Costs to the Waipa District

Bowie (1997) has found that in New Zealand rural populations have higher social costs than urban populations because rural travel tends to be less safe than urban. The cost to society of traffic crashes in Waipa District during 1997 was estimated to be $43.2 million (in 1996 dollars). This is made up of:

$9.4 Million for urban road crashes

- $33.8 Million for rural road crashes

The values (in 1996 dollars) of social cost per reported crash used to obtain the above totals are:

Rural Fatal Crash	$2,673,000	Urban Fatal Crash	$2,451,000
Rural Serious Crash	$608,000	Urban Serious Crash	$338,000
Rural Minor Crash	$96,000	Urban Minor Crash	$40,000

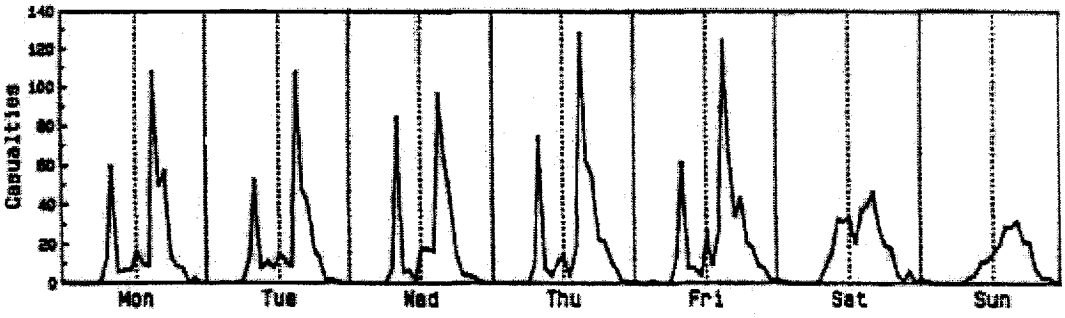
These values include an allowance for unreported injury crashes and the above totals for the whole District also include an allowance for non-injury crashes. These official values are based on "willingness-to-pay studies" which estimate the amount New Zealanders are prepared to pay to reduce their risk of fatal or serious injury (LTSA, 1998).

2.3 WHERE AND WHEN CHILD PEDESTRIAN ACCIDENTS OCCUR

Child pedestrian injuries are sustained in both traffic situations (on public roads) and non-traffic situations (typically toddlers backed over in home driveways). Injuries sustained in traffic situations are most common, resulting in approximately 80% of deaths and hospitalisations (Safekids, 1998). Of the child pedestrian accidents in traffic situations, over 50 percent involve school age children during weekdays, in the hour before school starts in the morning and the three hours after school finishes in the afternoon (Ministry of Transport, 1984).

McCracken and Kototailo's (1995:18) research found that "[c]hildren face very specific hazards associated with their journey to and from school". This contention is supported by the analysis of Jones and Nguyen, (1988) who found that "[w]ith school age children there is a very distinct pattern associated with the times for travel to and from school". This is clearly illustrated in Figure 1. below.

Figure 1. Pedestrian casualties by day of week and hour of day for children aged 5-14 years.



(Source: Jones & Nguyen, 1988)

Jones and Nguyen found that on weekdays there are large peaks before school and again after school and a much smaller peak at lunchtime. After school the casualty numbers peak between 3pm and 4pm and then tail off into the evening. The tail on Friday night, and to a lesser degree Thursday night, extends later into the evening than

on the first three nights of the week. There is a clear decrease in casualties on the weekend without the large peaks evident during the week. The low broad peak on Saturday morning which is not evident on Sunday can probably be associated with Saturday sports and shopping (Jones & Nguyen, 1988).

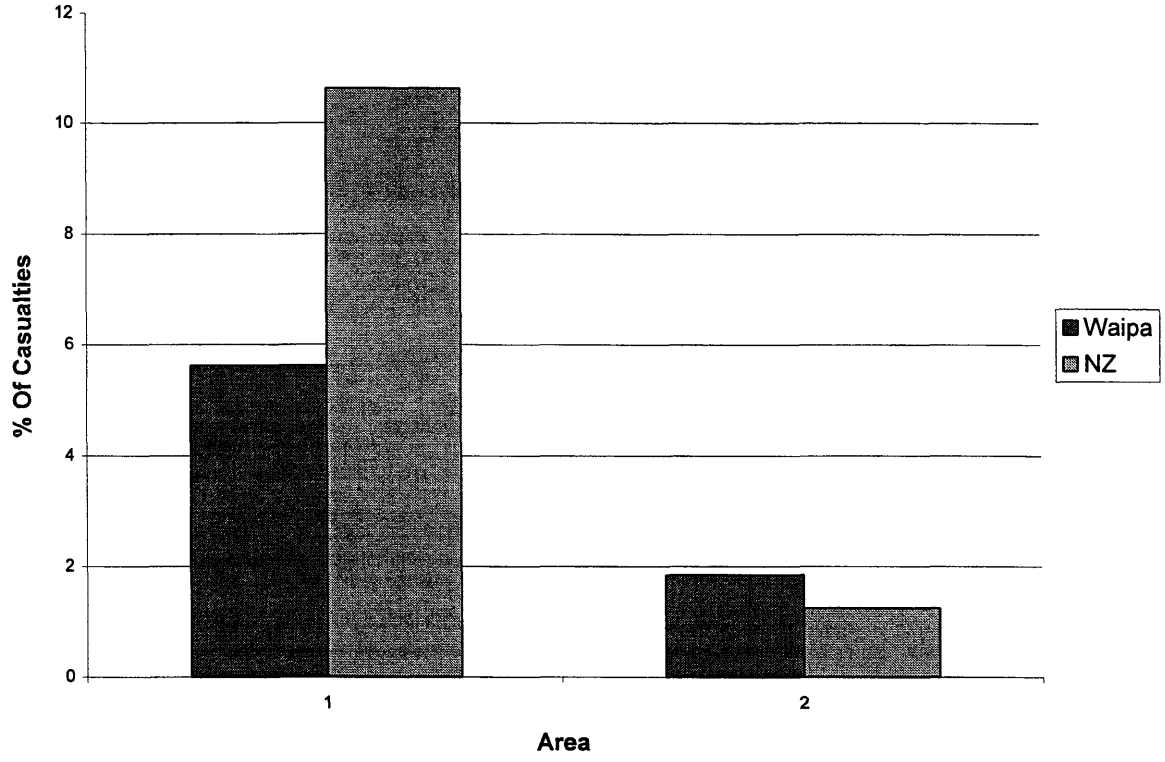
As well as an analysis of the distribution of child pedestrian accidents during the day, Jones and Nguyen (1988) also analysed the distribution throughout the year. They found that the pattern for school age children follows the school year with a low casualty rate over the summer vacation (mainly January but beginning in December and extending into February) (Jones & Nguyen, 1988).

In addition to the differences in the time of day, week, and month that pedestrian accidents occur overall are the differences in where they occur. For example, there is a distinction between rural and urban pedestrian accidents. In 1997 the 713 pedestrian crossing road injury accidents and the 68 other pedestrian injury accidents on urban roads accounted for 7.91% and 0.75% of all injury accidents. This is compared to 31 pedestrian crossing road injury accidents and 12 other pedestrian injury accidents on open roads that accounted for 0.34% and 0.13% of all injury accidents. In 1997 the 29 pedestrian crossing road fatal accidents and five other pedestrian fatal accidents on urban roads accounted for 6.18% and 1.07% of all fatal accidents. This is compared to six pedestrian crossing road fatal accidents and six pedestrian other fatal accidents on open roads accounted for 1.28% and 1.28% of all fatal accidents. Although these figures show that many more pedestrians are killed and injured on urban roads they also show that 1 in 21 pedestrian accidents in urban areas results in a fatality whereas 1 in 3.6 pedestrian accidents on open roads result in a fatality.

2.3.1 Pedestrian Accidents in the Waipa District

Accident data for the Waipa District for 1993-97 shows that urban areas within the district have a rate of pedestrian casualties well below the national average while the rate is higher for rural areas (see Figure 2.). These figures are similar to Waipa's crash figures overall which also show a slight increase in rural crashes and a corresponding decrease in urban crashes (LTSA, 1998).

Figure 2. Child Pedestrian Casualties in New Zealand and the Waipa District as a Percentage of All Traffic Casualties Between the Years of 1993 and 1997



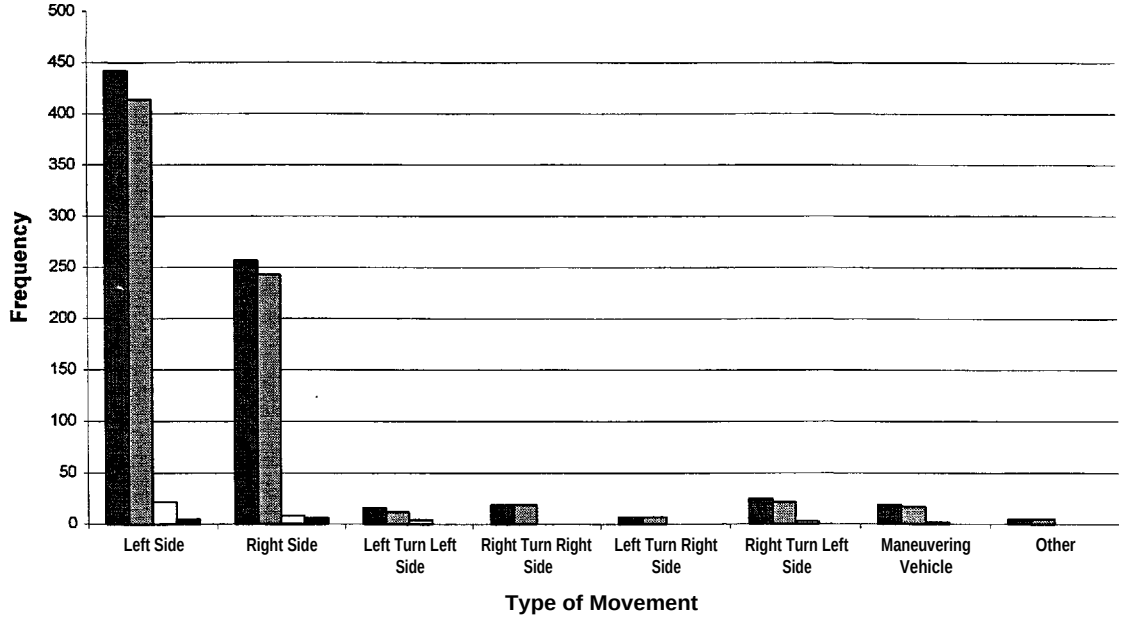
- 1. Urban
- 2. Rural

(Source: LTSA, 1998).

2.4 HOW CHILD PEDESTRIAN ACCIDENTS OCCUR

There is a considerable body of research both in New Zealand and overseas which attests the complexity of causation in child pedestrian accidents (McCracken, 1995). The most common "cause" of child pedestrian accidents identified is simply "crossing in the path of approaching traffic" (Whittaker, 1976:2). From motor accident reports it is frequently found that the children simply step off the pavement into the path of approaching vehicles or suddenly emerge from between parked cars or appear to act on impulse or were playing on or near the roadway (Whittaker, 1976). The LTSA's accident figures from 1997 show that the majority of pedestrian accidents occur when pedestrians cross from the left side of the road (see Figure 3.).

Figure 3. Accident Movements of Pedestrians Crossing the Road for the Year Ending 31 December 1997.



*Tow Cars, Vans, Taxis, etc. 0 Buses and Trucks • Motorcycles

Given that New Zealand drivers travel on the left-hand side of the road, the distance from the left-hand side of the road is the closest to traffic and as a consequence there is less distance and time for both driver and pedestrian to react. Figure 3. below shows that crossing from the side of the road closest to the vehicle almost doubles the chance of being hit. Of those pedestrians hit crossing the road Figure 3. also shows that it is cars, vans and taxis that are involved in the great majority of these accidents.

2.5 CHILD PEDESTRIAN BEHAVIOUR AND CHARACTERISTICS

Children are a small and powerless minority. They are not in control of vehicles which have the potential to cause immense damage, and as pedestrians are more vulnerable than those in vehicles which offer a far greater degree of protection. Children are not `little adults'. They cannot cope with adult-oriented roading environments as successfully as adults. Cycling, walking and travelling as a passenger in a vehicle are all areas where children's behaviour and decisions determine their level of safety. However, research shows that because their motor, perceptual and cognitive skills are

not yet fully developed most primary school aged children:

- are unable to judge both speed and distance as well as adults (and being non-drivers, find it difficult to understand the time or distances required for cars to stop).
- have peripheral (side) vision which is not fully developed, making them less likely to notice objects (e.g. cars) in their side vision.
- have greater difficulty working out where sounds are coming from.
- are small, therefore it is difficult for them to see and be seen by drivers over parked cars.
- generally think about one thing at a time, often ignoring other things happening around them. Consequently, they may not always look properly for traffic when excited, and may be easily distracted in groups.
- may freeze when finding themselves in danger, instead of taking evasive action as an adult might (Safekids, 1998).

T.G Whittaker (1976) argued that "[w]e can provide young people with the skills in the development of their safety awareness, we can assist them develop their conceptual thinking but we certainly cannot predict with certainty, their behaviour in all traffic situations". He also argued that however desirable improved designs in the traffic scene may be, the fact remains that New Zealand's traffic environment is not designed to counter the immaturity of the child pedestrian and he also prophetically noted that "the problem of casualties is with us now and it appears that it will be for some years to come" (Whittaker, 1976:7).

2.6 DRIVER BEHAVIOUR AND CHARACTERISTICS

It is not only the behaviour of the children that is a cause of child pedestrian accidents, it is also the behaviour of some of the adult drivers who hit them. It has been recognised that "[d]river behaviour often does not take into account the needs and rights of pedestrians and the developmental limitations of child pedestrians in particular" (McCracken & Kototailo, 1995:19). Behaviours of particular concern that have been identified are speeding around schools and in suburban areas, failure to give-way at pedestrian crossings and yellow line (at crossings) and verge/footpath parking.

Acceleration and deceleration are particular driver behaviours that relate to child pedestrian safety. The faster drivers travel, the harder it is for them to avoid a child that ends up in their path. An alert driver travelling at 50 km/h can just stop in time to avoid a child who steps out onto the road 45 metres (three house sections) away. That same driver, travelling at 60 km/h, will still be travelling at 44 km/h when they hit the child (Safekids, 1998).Research shows that the risk of a pedestrian dying increases with speed. The risk of death to pedestrians increases as the speed increases, from a 5% risk at 30 km/h, 40% at 50 km/h, 70% at 60 km/h to a 96% risk at 70 km/h (LTSA, 1999).

The outcomes of these risks are reflected in the 1997 road accident statistics. In the year ended 31 December 1997, in 50 km/h or less speed zones, 825 pedestrians were injured and 36 killed. In 70 km/h speed zones 36 were injured and 5 killed and in 100 km/h zones 51 were injured and 13 killed'. These figures show that the chances of being killed as opposed to being injured increase as the speed limits of the roads increase. In the 50 km/h zones 1 in 23.9 pedestrian accidents resulted in death, in 70 km/h zones 1 in 8.2 pedestrian accidents resulted in death, and in 100 km/h zones 1 in 4.9 pedestrian accidents resulted in death.These figures show a correlation between increased speed and increased probability of a pedestrian accident resulting in death. These figures cannot show that reducing speeds reduces the number of pedestrian accidents but that reducing speed limits should reduce the probability of death resulting from these accidents.

"Studies on the relationship between speed and accidents have found that strategies which reduce open road vehicle speeds can produce corresponding reductions in accident rates and accident severity's" (Graham & Bean, 1992:160).These findings illustratehow there is little argument that very high speeds are associated with increased accident risk. However, there is now considerable evidence that accident numbers are very sensitive to average speeds. In New Zealand it has been estimated that for rural roads "a 1 km/h reduction in average speed could save at least 5 percent of fatal accidents" (Edgar, 1992:123).

' **Although these figures show that less pedestrian accidents occur on the roads with faster speed limits they do not show the volume of pedestrian or vehicle usage on these roads so the probability of sustaining a pedestrian accident cannot be determined.**

2.7 SIGNAGE AS A COUNTER-MEASURE

People rely heavily on their sense of sight (Weiten, 1992). It is estimated that 90% of drivers' information input is visual. "There is no doubt that drivers' visual perception plays a crucial role in the driver-vehicle-road system" (Isler & Parsonson, 1992:61). These findings support the argument that "[t]raffic signs are some of the most commonly used traffic control devices" (Francis, 1974:76).

Research conducted by Francis (1974), and Johansson and Backlund (1966), suggests that signs are effective in increasing driver awareness. Francis' (1974) research into a "children crossing" sign's effectiveness at New Zealand schools found that traffic slowed earlier on their approach to the crossing when the sign was displayed, while speeds were not reduced as much when the sign was closed (Francis, 1974). This research also showed that the sign appeared to increase the variation in traffic speeds on the approach to the crossing. Francis (1974) noted that this is not normally a desirable situation but the reduction in speed was considered to outweigh this disadvantage and this opinion was also held by the school staff supervising the crossing. Yet more than the message the sign conveys is the importance drivers attach to the sign and how this affects recognition.

In road roadside surveys conducted in Sweden by Johansson and Backlund (1966), people were stopped immediately after they passed a sign and asked to identify the last sign they saw. The accuracy of reporting the sign under these conditions was as low as 30 percent for some signs and could be described as a function of the "subjective importance" of the sign to the driver, or the amount of risk involved in ignoring the sign *(cited in* Shinar, 1978). These results are illustrated in Table 4. below.

Table 4. The Ability to Recall Different Signs Correctly Shortly After Passing Them.

SIGN	PERCENTAGE OF DRIVERS CORRECTLY RECALLING SIGNS
50 km/h speed limit begins 300m ahead	78
Police control	63
Breaks in the road surface (due to frost) from here 1 km ahead	55
General Warning	18%
Pedestrian crossing 300m ahead	17%

Adapted from data of Johansson and Rumar (1966)

These findings clearly show the low priority these drivers placed on signs indicating pedestrians may be present. They also show the importance these drivers placed on speed limit signs.

2.8 CAR-PARKING AS A HAZARD

Research has shown that a high density of on-street parking is seen as a major risk factor for child pedestrian injury (Roberts, 1994). The LTSA have recognised this in relation to schools in that most schools were not designed for large numbers of children being delivered and collected by car at the school gates. However, there is a definite trend both in New Zealand and internationally, for more and more children to be delivered and picked up from school by car. The result for many schools is "chaos at the school gate". The LTSA acknowledges that chaos at the school gate can be a real irritation for schools and that more importantly it can be a real danger for children, and as a response have instituted the Chaos at *the School* Gate initiative for schools with drop-off/pick up problem (LTSA, 1998).

2.9 COUNTER-MEASURE APPROACHES

The literature reveals three approaches to traffic safety enhancement: education, enforcement and engineering. Education, enforcement and engineering are the three approaches widely recognised as the means through which traffic safety is achieved, and that counter-measures can be located within. Although not mutually exclusive, these approaches each possess certain characteristics, benefits, and weaknesses. There is debate about the merits of each approach which is often fierce and characterised by conflicting data and analyses.

2.9.1 Education

The traditional approach to preventing child pedestrian injury in New Zealand is pedestrian education. This approach is taken by the Ministry of Education (as outlined in the health curriculum) and implemented by teachers, police youth education officers, District and Regional Councils through their Traffic Safety Co-ordinators, the Land Transport Safety Authority, other organisations and parents themselves who should provide initial traffic safety education.

2.9.2 Enforcement

The police have sole responsibility for enforcing driving regulations. However, this responsibility is not an easy one. "With 92,000 kilometres of road in NZ, 2.2 million vehicles and 2 million drivers it is not surprising that police officer(s) cannot be on-the-spot when every traffic offence occurs" (Wright, 1992:184). Yet every year the police spend thousands of hours specifically enforcing traffic regulations. In the Waipa District alone the police spend 11,800 hours p.a. on traffic enforcement duties. Unlike other organisations the Police also have a responsibility to enforce legislation and educate people in the area of traffic safety.

2.9.3 Engineering

Engineering is the responsibility of Road Controlling Authorities (RCAs). State highways are the responsibility of Transit New Zealand while all other public roads are the responsibility of Territorial Local Authorities (TLAs). The engineers and planners of these RCAs play a vital role in road safety improvement (Jadaan, 1992). Yet as McCracken & Kototailo (1995:16) argue, "[t]he special needs of child pedestrians and their right to freedom of mobility are often inadequately recognised by urban planners and those responsible for creating the roading environment. The needs of pedestrians appear often to be given a lower priority than the needs of drivers and traffic flow when decisions regarding the roading environment are made." Ultimately the problem is that "[t]he traffic environment is made by adults for adults" *(cited* in Ministry of Transport, 1984:2).

2.9.4 Synthesis and Synergy

Each of the counter-measure approaches do not stand in isolation from the others. All three approaches involve behaviour modification, and all three need elements of the other two to operate at their maximum potential. For example, once a pedestrian crossing is built (engineering) children must learn to use it (education) and the correct way of using it must be enforced (enforcement). In this way all three approaches are reinforcing the others. This integrated approach also avoids the shortcoming of each in isolation. Particularly with children it has been acknowledged that `[w]hile we can

teach children about road safety, *we cannot turn them into little adults,* therefore, the design of roading environments - and the behaviour of drivers - must recognise their rights and limitations as pedestrians" (Kidsafe, 1998).

"Engineers influence road users through appropriate geometric design and can create the appropriate environment to modify driver behaviour. An example of the latter is the deliberate reduction of vehicle speeds in residential areas" (Jadaan, 1992:95). Yet this behaviour modification is based on behaviour that was initially learned and enforced where necessary. The polemics of the various counter-measures are counter-productive and pointless when the issue is "the safety of children". Ultimately, "[i]nterventions which combine education, engineering and enforcement strategies, undertaken in a collaborative and co-ordinated fashion, are seen as having the greatest chance of success" (McCracken & Kototailo, 1995:17).

However, it must be acknowledged that unlike education (proactive) and enforcement (reactive), engineering (proactive) does not offer choice or discretion. Unlike education or enforcement, which are ongoing processes, environmental change is tangible and permanent. Unlike education and enforcement, physical traffic enhancement devices are first constructed and then only require maintenance, whereas education and enforcement require constant and consistent application over time. However, over time counter-measures must be updated and upgraded to address the technology to which they are a response. In this sense they are very much like the other two approaches.

3. METHODOLOGY

3.1 SETTING THE SCENE

The objective of this research was to identify and examine the traffic safety hazards facing child pedestrians at rural schools. The purpose of this objective was to help in the formulation of possible counter-measures to increase child pedestrian safety when travelling to and from rural schools. To achieve this goal the Waipa District was selected as a case study. The Waipa District was selected because it is an area with a rate of pedestrian injuries in rural areas higher than the national average (see Figure 2.).

As part of this investigation Hautapu School was selected as a case study to highlight the issues that rural schools in the Waipa District face. This approach enabled specific issues, concerns, hazards and counter-measures to be identified and examined in depth. Hautapu School was selected as a case study not only because it is a rural school in the Waipa District, but also because of the serious concerns for child pedestrian safety that arose from a 1995 accident in which two pupils were seriously injured outside the school.

3.2 THE CASE STUDY

Hautapu School is a full primary school with a role of 185 students. The school was founded in 1878 and moved onto its present site in 1910. Since that time the Hautapu district has evolved from a predominantly dairying area to a lifestyle and horse rearing and training area. There are many small land-holdings of 5-10 hectares, and several horticulture and stud properties have been successfully established. While a significant number of pupils come from the local surrounding area (including the Hautapu Dairy Factory Village) many come from Cambridge township (Hautapu School, 1999).

Hautapu School is 1 of 22 rural schools in the Waipa District. It is located on the intersection of Hautapu Road and Forrest Road, approximately 5 kilometres north-west of Cambridge. Forrest Road is on the west side of the school while Hautapu Road is on the north side of the school. Forrest Road is a quiet rural road with approximately 150 vehicles per day (Hall, 1998). Hautapu Road on the other hand is a much busier road with approximately 1600 vehicles per day (Hall, 1998). Hautapu Road is often used as a short cut by motorists commuting between Hamilton and Cambridge via State Highway 1, yet unlike the State Highway 1 route, Hautapu Road is not a speed camera zone. Hautapu Road also has a dairy factory on it and consequently has a great deal of milk tanker traffic. Both Hautapu Road and Forrest Road have 100 km/h speed limits outside the school. However, surveys conducted by Hautapu School (1997) show that many motorists using Hautapu Road travel at speeds in excess of 130 kilometres per hour past the school grounds.

The speed and volume of traffic using the Hautapu Road, coupled with poor signage, a lack of driver awareness, and car-park congestion (with only 22 parks for approximately 80 cars) means that Hautapu School pupils face extreme danger on a daily basis (Hughes, 1997). Yet despite the tragedy in 1995, and the numerous calls by parents and attempts by Hautapu School to have the speed limits reduced, no changes occurred, nor were any other counter-measures implemented by those authorities who have the power and responsibility to address the hazards child pedestrians face. For these reasons Hautapu School was selected as a case study.

In order to establish a good understanding of the complexities of issues related to the case study and the broader topic of child pedestrian safety at rural schools in the Waipa District, various methodological approaches were applied. The methodologies employed included; a literature review, site inspections, a survey of parents of children at Hautapu School, telephone interviews with principals of rural schools in the Waipa District, a classroom discussion with children from Hautapu School, and interviews with various key actors.

3.3 LITERATURE REVIEW

The first methodology employed was a secondary analysis of existing research and data on child pedestrian safety. The purpose of this analysis was to set the stage for the rest of the research and provide an understanding of the complexities of the issues relating to child pedestrian safety.

This review encompassed an examination of the various forms of literature that address child pedestrian safety. This included examining previous research into the problem, local and central government documentation in the form of legislation, official accident figures, investigations, reports, official correspondence, and other responses in relation to the problem. This review outlined the problem, formed the basis of the critical analyses of existing prevention strategies, and informed the formulation and implementation of the additional methodologies employed in this research.

The literature review helped identify who and how many are involved in child pedestrian accidents, why they are involved in these accidents, what type accidents these are, when and where they occur, and what they cost. Collecting this information involved examining previous research into child pedestrian accidents, official accident data, and mass media reports on these accidents.

The Land Transport Safety Authority (LTSA) is New Zealand's leading provider of safety information and advice on land transport, and its publications outline the most comprehensive sets of traffic accident data. These include *Motor Accidents in New Zealand* 1997, *Waipa District Road Safety Report*, 1993-1997, and other publications which provide a wealth of epidemiological data relating to the case study. The LTSA compiles these reports and distributes them to "assist community road safety initiatives and promote an increased awareness of problem areas" (LTSA, 1998:3). The data in these publications are in tabulated and graphical form and illustrate the number of accidents, where they occur, when they occur, how they occur and characteristics of the causalities. However, these publications do not provide in-depth analyses, these are to be found instead in research into child pedestrian safety.

There is extensive literature on research into traffic safety, although only a part of it specifically covers child pedestrian safety. This type of literature includes papers given at road safety seminars such as the *Road Traffic Safety Seminar 1988, Wellington, 14-16 September 1988* and the *National Road Safety Seminar, 2-4 November 1992, Wellington,New Zealand.* These papers provide a concise overview of research into traffic safety in New Zealand. Research reports include *Measuring the Effectiveness of a Pedestrian Crossing Warning Sign* by the Traffic Research Section, Road Transport Division,Ministry of Transport in October 1974 which examined the effectiveness of Pedestrian Crossing Warning Signs, *The Public Hospital Inpatient Costs of Injury due to Motor Vehicle Traffic Crashes* by John Langley, et al., from the Injury Prevention Research Unit, Dunedin: University of Otago, October 1991 and, *Estimates of Social Costs of Accidents and Injuries Estimates of Social Costs of Accidents and Injuries* conducted by J.C. Guria, for the Land Transport Division Ministry of Transport, May, 1991, both which examine the costs of traffic accidents.As well as the data and analysis these pieces of research offer are the examples of the various methodologies employed when investigating this issue.

Policy and legislative literature was also very important to this research. This kind of literature outlined the policy, philosophies and regulations relating to traffic safety in New Zealand. This type of literature included The LTSA's *Guidelines For Setting Speed Limits,* the Transport Act, the Land Transport Act, the Local Government Act, *The Manual of Traffic Signs and Markings, The New Zealand Curriculum Framework, The Health and Physical Education in New Zealand Curriculum,* and other such regulatory documents.Also reviewed are local and central government documents of intent such as the Waipa District Council's *Annual Plan 1998/99.* This type of literature was of particular importance for the conducting of interviews with key informants.

Literature on safety measures employed to enhance traffic was also examined. This literature included research into these measures, literature explaining these safety measures and literature advertising these measures.However, as Ian Roberts has argued, although "[p]edestrian injuries are a major cause of death and disability in New Zealand children there is little available information to guide prevention strategies" (Roberts, 1994:4).

3.4 SITE INSPECTION

The site inspection conducted loosely followed site inspections carried out by The National Roads Board Accident Investigation Teams, and included Hautapu School, the roads it is located on and the surrounding environment.

The purpose of the site inspection was to:

- obtain supplemental information only obtainable in the field (e.g., critical dimensions, viewing and measurement of traffic characteristics etc.);
- further interpret the findings of the literature review, and modify as appropriate;
- finalise the basis for, and identify a range of candidate counter-measures for evaluation; and
- identify the need for and scope of further analysis.

The procedure used in the site inspection included:

- driving through the location several times;
- walking around the location;
- viewing the location from different approaches and taking photographs as necessary;
- examining important vehicle paths (especially approaches to conflict areas which feature prevailing accident types);
- checking for technical faults in pavement marking, signage,
- identifying a list of candidate counter-measure alternatives and
- determine if further data collection or analysis is necessary.

This methodology provided the research with sufficient information to aid in the preparation of additional methodologies. It also provided an indication of whether education and/or enforcement counter-measures should be considered. This inspection was then followed up with a survey of the views of the parents of children at Hautapu School to collect their experiences and concerns about particular child pedestrian safety issues.

3.5 PARENT SURVEY

In order to gain an insight into the traffic safety issues that concerned the families of school children attending Hautapu School a survey was conducted. The purpose of the surveywas to identify and establish the level of parental concern regarding the pedestrian safety at Hautapu School. In order to obtain representative results it was necessary to obtain a high response rate. However, all previous surveys administered by the school had yielded response rates below 45%. In an attempt to compensate for the typical low response rate of the potential respondents innovative techniques were applied.

A four-page questionnaire containing 15 questions was designed to measure concerns (seeAppendix 1.). The length of the survey was purposely kept to a minimum to encourage participation. The questionnaire was printed on yellow paper to increase its visibility.

The questionnaire was sent home with the eldest child in each family with their weekly newsletter. This method of administration was selected as it did not require the collection of addresses of parents nor did it incur the expense of postage.However, concern did exist about this method of administration. There was concern that some children might not give the questionnaires to their parents, or would fail to return them to school.To compensate for this, a notice was placed in the school newsletter. This notice informed parents that research was being conducted for the purpose of increased child pedestrian safety at Hautapu School. The notice also informed that as part of this research a questionnaire was going to be sent home with the children. Thus parents knew to expect the questionnaire and were expecting it when it arrived. It was assumed thatparentswould ask their children for correspondence from the school on Wednesdays, as this was the day the weekly school newsletter was sent home. Consequently the questionnaire was sent home on the Wednesday the week following the notice about the research.

Attached to the questionnaire was a letter which further elaborated on the research goals and stressed the importance of obtaining a high response rate. In an attempt to encourage the children to return the questionnaire to school we provided a tangible

incentive. Each of the children received a chocolate bar when they returned the completed questionnaire. These chocolate bars were kindly supplied by The Warehouse.

3.6 CLASSROOM DISCUSSION

In addition to the experiences and concerns of parents, the concerns of school pupils from Hautapu School were also collected. The purpose of this was to gain an insight into the problem from their perspective. These concerns were collected through a classroom discussion and group work that was facilitated by the researchers.

The classroom discussion involved 36 children in form one (year 6) and form two (year 7). The whole exercise took approximately one hour to conduct. The children were asked to organise themselves into five groups before the discussion began. Once the groups were established the children were informed of the particulars involved in the discussion group exercise.

The discussion was premised on three main questions (see Appendix 2.). The first question asked children to identify safety hazards and incidents that they had experienced near the school. As part of this question the children were also asked to identify how these incidents made them feel. The second question asked the children to identify the possible causes of these incidents, and the final question asked them to devise possible counter-measures to the hazards they had identified.

The students were given ten minutes to discuss and write down their views. They did this in the groups they were in. The children did not receive any prompting from the researchers as to what the issues, causes or possible counter-measures were, nor were they given a budget restraint for the counter-measure design. All of the responses given were generated by the children's discussions in their group. This part of the exercise took approximately 30 minutes.

Once the group-work was carried out members of each of the groups were asked to explain to the class as a whole the ideas that their group had come up with, and these ideas and concerns were then discussed by the class as a whole. This class discussion

lasted for approximately 20 minutes. Once the discussion was concluded the respondents were thanked for their participation.

3.7 PRINCIPAL INTERVIEWS

In an attempt to see how generalisable were the concerns and road safety issues facing Hautapu School, structured telephone interviews were conducted with the principals of other primary and intermediate schools in the Waipa District. This enabled the identification of ways other schools in the district had approached similar safety issues and how effective these were at reducing the risk of child pedestrian injury.

The traffic safety issues identified by the Hautapu School case study were used to design a telephone interview schedule (see Appendix 3.). This schedule was used to direct telephone conversations with principals of rural schools in the Waipa District. A list ofallprimary and intermediate schools in the Waipa District was supplied by the Ministry of Education. However, only those 22 schools who identified themselves as being rural were used in the analysis.Each telephone interview took five to ten minutes to conduct. Prior to the interviews most of the schools were contacted to set up a convenient time to speak with the principal.This was important as many of the principalswho took part in this part of the research were teaching principals, and therefore needed to be contacted outside school hours.

The results of the telephone interviews were compiled and used to identify similarities and differences among the safety issues identified by Hautapu School and other schools in the district.They were also used in the formulation of the workable counter-measures for the particular case study.

3.8KEY INFORMANT INTERVIEWS

Information from key informants was collected through unstructured interviews conducted over the telephone, and several were face to face. The key informants interviewed included experts who are addressing the problem of child pedestrian safety in some way, and public officials who are responsible for addressing the problem. This included officials from the Police, the Waipa District Council, the LTSA, the

Ministry of Education, Hautapu School, and other public officials responsible for or concerned about child pedestrians. Among the key actors interviewed were engineers and planners, as they play a particularly important role. They have an important role in road safety in that they "adjust the design of the road network to cater for human characteristics and possible errors" (Jadaan, 1992:95).

The key informers provided literature, explained regulations and decision-making processes, and clarified regulations and specific data. Consequently these interviews led to a greater understanding than provided by the literature review of regulations alone in that they highlighted where and why discretion is employed.

The results from the previous methodologies, particularly the literature review, enabled interviews with the key public officials where there was a degree of understanding of the regulations on the part of the researchers. This allowed better communication and in turn an even greater understanding of the regulations and processes relating to the problem of child pedestrian safety. Of particular interest were the regulations and issues relating to speed limits.

3.9 ANALYSIS

The analysis of the information collected took various forms, each of which was appropriate to its corresponding methodology. The results from these analyses were then integrated to produce an overall picture of the problem of child pedestrian safety at rural schools and the particular concerns and issues for those affected by them.

The analysis applied to the raw data was as follows:

- survey data was statistically analysed
- interview data was coded and thematically analysed
- information collected through the classroom discussion was also thematically analysed
- information collected through consultation with key informants was compared, and related to the regulations they implement.

- a critical analysis was applied to the regulations, policy and guidelines. This involved analysing and interpreting present regulations to determine whether they are adhered to, whether they are appropriate, and how they may be altered to better regulate that for which they are formulated.

Once the separate analyses had been conducted, the results were then interrelated. This synthesis involved a comparison and contrast between various concerned or accountable groups, speeds, legislation and its implementation. This comparative analysis involved integrating each set of results and relating these back to the problem to help in the formulation of practical counter-measures. For example, the site inspection was linked to the epidemiological data which in turn was linked to the parents' concerns and the views of the children, these data were then in turn connected to the interviews with principals from rural schools in the Waipa District which was linked to the regulations and so on. By drawing these areas together this synthesis was able to illustrate where links do and do not exist, should and should not exist. This synthesis of some of the dimensions of the problem gave a comprehensive illustration of the situation and helped in the formulation of practical counter-measures to hazards identified.

4. RESULTS

This section outlines and presents separately the results from the various methodologies utilised in this research. These include the results from the survey of the views of parents from Hautapu School, the interviews with principals of rural schools in the Waipa District, and the classroom discussion held with children at Hautapu School.

4.1 PARENT SURVEY

The questionnaire was administered to 123 families of children attending Hautapu School. Of these 74 were returned, resulting in a response rate of 60%. Of these responses 95% (70) reported that they had concerns pertaining to child pedestrian safety at Hautapu School. Four parents reported that they had no concerns about child pedestrian safety at this school. However, of these four parents two reported that they would like to see the speed limit on Forrest and Hautapu Road reduced, furthermore two thought that increasing visibility of Hautapu School would serve to improve child pedestrian safety. In other words, although their initial response indicated that they had no concerns, the internal validity check indicated that they did have some concerns relating to safety. Only one of these four parents consistently responded in a manner that supported their original statement that they had no concerns about child pedestrian safety. This respondent did not call for changes to roading conditions nor did they report any problems with access, speed or visibility.

Speed, access and visibility were identified as being the main road safety hazards facing the pupils of Hautapu School, with 84% (64) of all respondents identifying the speed limit on Hautapu Road as a key issue. Of the respondents 48% also identified the speed limit on Forrest Road as a safety hazard. This was followed by access to the school, with 69% (51) of respondents reporting access to the school as being problematic.

Visibility was also identified as being a road safety hazard with 48% of respondents identifying the visibility of the school from Hautapu Road as being problematic and 37% identifying the visibility of the school from Forrest Road as being poor. Other road safety hazards were identified by 6% of respondents. These included; traffic congestion on Forrest Road and the driving behaviour of other parents.

4.1.1Speed

Of the respondents 92% called for the speed limit on Hautapu Road to be reduced from 100 km/h. Of these 33% called for the speed to be reduced to 80 km/h, 53% wanted the speed limit reduced to 70 km/h, 11% wanted it reduced to 50 km/h, and a further 3% called for the speed outside the school to be set at 60 km/h.

The speed limit on Forrest Road was viewed by the parents as being of less importance than the speed on Hautapu Road, with 18% of respondents reporting that they did not want the speed on Forrest Road reduced. This compared with 8% of respondents reporting satisfaction with the speed limit on Hautapu Road. The reasons suggesting why parents were less concerned about the speed limit on Forrest Road were that cars tended not exceed the speed limit on this road due the fact that they were either approaching an intersection and therefore were slowing down outside the school on Forrest Road in order to give way at the Forrest/Hautapu Road intersection, or they had just turned on to Forrest Road from Hautapu Road and did not have the distance to pick up speed outside the school.

However, 82% of respondents still called for speed reductions to be implemented on this stretch of road.Of these 28% wanted to see the speed limit on Forrest Road reduced from 100 km/h to 80 km/h, 50% wanted it reduced further to 70 km/h, 13% wanted it to be reduced to 50 km/h, and further 3% call a reduction to 60 km/h. The remaining 5% made calls for a reduction to 20 km/h through the Forrest Road car-park.

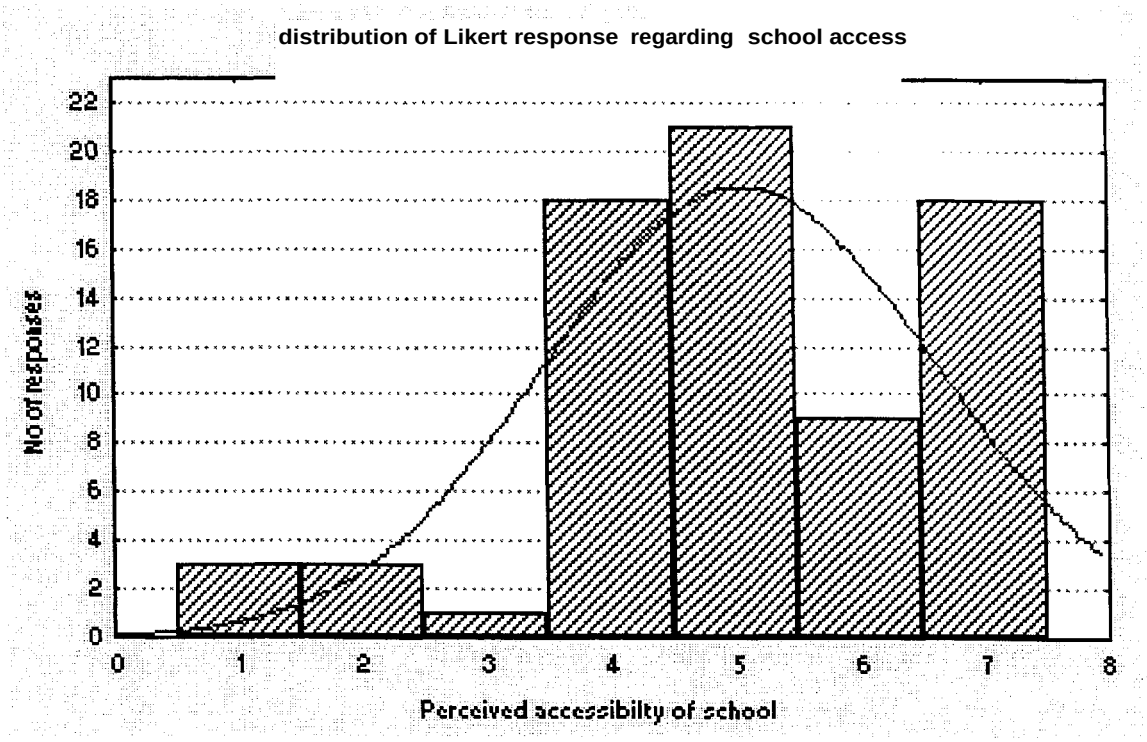
It is interesting to note that although fewer people called for a speed reduction to be made on Forrest Road, the speeds they wanted the limit to be reduced to were lower than the speed on Hautapu Road. The reasons given for lower speeds on Forrest Road related to the school car-park which is basically street parking on Forrest Road.

The speed on Hautapu Road was identified by 35 respondents as being a factor which affected access. To improve this situation some of the respondents suggested putting speed humps on Hautapu Road, educating parents, and periodic speed blitzing by the police in an attempt to reduce speed along Hautapu Road. They believed that this would decrease the speeds travelled at along Hautapu Road and increase the safety of the car-park and improve the accessibility of the school. Car-parking was identified as the main factor affecting access to the school, with 65 respondents identifying the car-park as an access hazard. The car-park was also identified by most respondents as being a road safety hazard.

4.1.2 Access

Figure 4. shows the distribution of Likert scale responses regarding school accessibility. This scale ranged from one to seven, with one being very accessible and seven being not accessible. The mean response was five. The distribution of responses was positively skewed suggesting that the majority of parents have some concern in regard to school accessibility, with 18 respondents reporting that they had experienced difficulties when trying to access the school and as a result regarded the school as not very accessible. On the other hand, three regarded the school as very accessible.

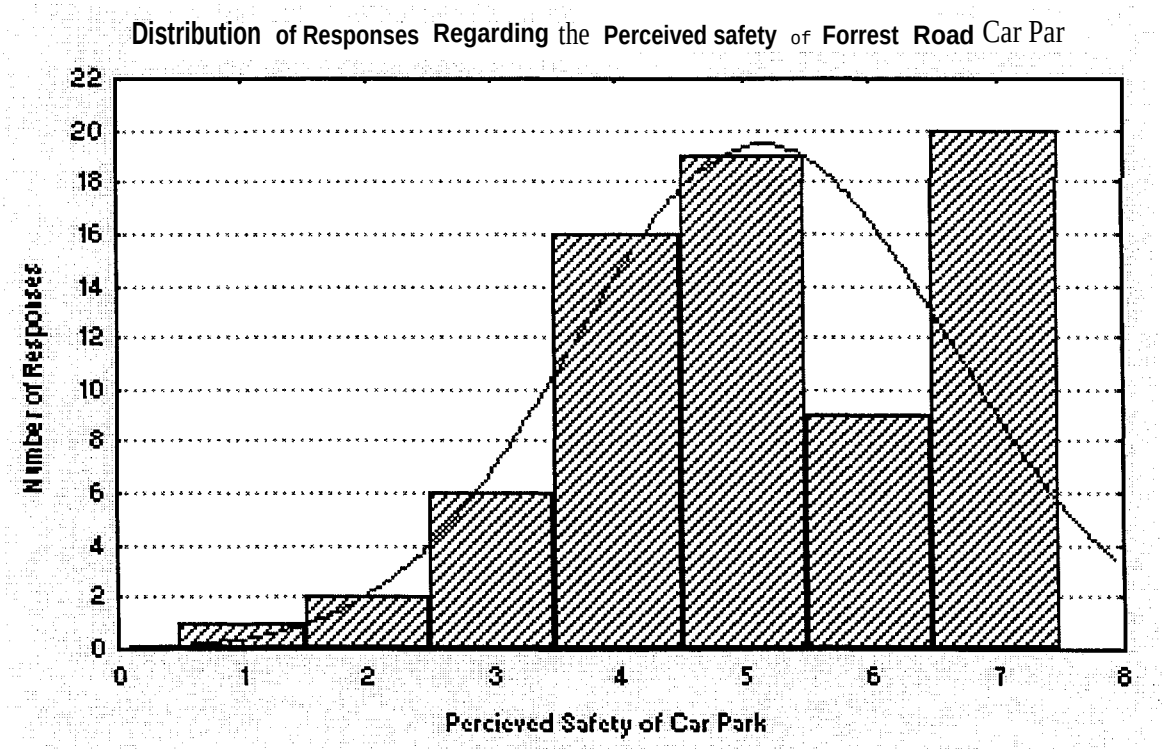
Figure 4.



The perceived accessibility of the school was affected by the car-parking facilities at the school. As previously mentioned the car-park consisted of 22 parking spaces and on average there were 80 daily users. This has largely come about by the increasing number of children attending Hautapu School and the increasing trend of parents taking their children to school in cars.

Figure 5. shows the distribution of Likert scale responses regarding the safety of the Forrest Road car-park. This scale ranged from one to seven, with one being the very safe and seven not very safe. The mean response was five. The distribution of responses was positively skewed, suggesting that the majority of parents view the car-park as being somewhat unsafe. With 20 parents perceiving the car-park as being very unsafe, 16 perceiving it as reasonably safe, and only one respondent regarding the car-park as very safe.

Figure 5.



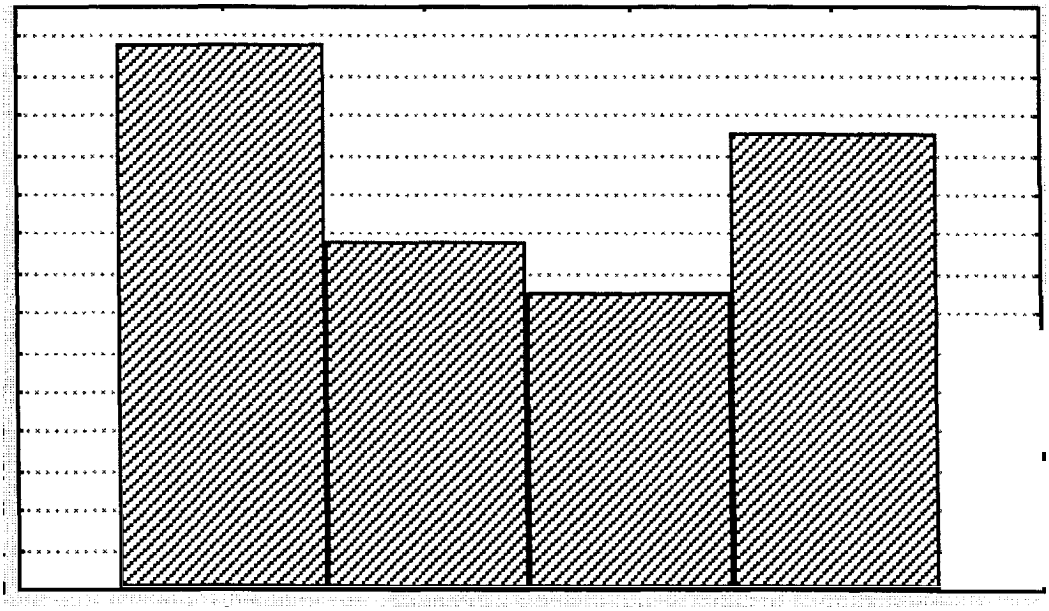
Factors identified which reduced the safety included: insufficient car-park spaces, distance between the car-park and the Forrest and Hautapu Road intersection, the width of Forrest Road, traffic turning onto Forrest Road from Hautapu Road, "inconsiderate"

driving behaviour of other parents, traffic congestion and unsupervised children crossing For-rest Road.

Figure 6. provides a representation of the most commonly identified factors affecting the safety of Hautapu School's car-park. This figure clearly shows that the lack of sufficient car-park spaces is the most commonly identified factor reducing safety in Forrest Road car-park, with 55 respondents acknowledging parking facilities as problematic. This was followed by traffic factors. This category includes, turning traffic, traffic congestion and driver behaviour. Comments made concerning driver behaviour were often emotive (e.g. "irresponsible, ignorant drivers!!") and calls were made to improve the driving behaviour of parents. In addition to the concerns expressed about driver behaviour were concerns about the lack of attention paid by parents to their children crossing Forrest Road when dropping off or collecting children from school. This lead to calls being made by parents for teacher supervision of children, the need to speak to the parents causing the hazards and for letters to be sent home to parents who put others at risk in the car-park by not observing basic road safety rules.

Fi nre 6.

The Number of Responses who identified Factors Affecting the Safety of Forrest



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Factors Affecting Safety of Forrest Road Cu **park**

1 = Lack of car-park spaces 2 = Car-park too close to intersection
3 = Narrowness of Forrest Road 4 = Turning Traffic

The distance of the car-park from the Hautapu Road and Forrest Road intersection was also identified as a safety hazard, with 35 respondents identifying it as a safety risk. The width of Forrest Road was also of major concern to parents, with 30 respondents identifying this as a factor which reduced the safety of the school's car-park.

Respondents to the questionnaire were asked to identify changes which they thought would improve access to the school. Increasing the size of the car-park was the main suggestion for improving school access, with 60 respondents calling for the size of the car-park to be increased. This was followed by 44 calls to reduce the speed limit on Hautapu Road as a means of increasing school access.

Other suggestions for improving access, were to re-locate the car-park behind the school so that children would not be accessing the school from the road. Suggestions were also made regarding the size and number of access points, with calls being made towiden and increase the number of gates that children entered and left the school through. Further common suggestions were to increase the supervision of children in the car-park area by parents and teachers and to reduce the number of students leaving the school grounds at the same time. It was suggested that a system be developed whereby school finishes at different times for the senior and junior schools, thus reducing the number of cars at the school at the same time, and thereby reducing the problems associated with inadequate parking facilities, visibility in the car-park and driving behaviour. Visibility within the car-park was identified as a road hazard for driversas many parents drove large four wheel drive vehicles or vans which reduced the visibility of smaller cars within the car-park area. Parents suggested that special designating parking facilities be made available for these large vehicles in an attempt to increase the visibility within the car park.

4.1.3Visibility

Visibility of Hautapu School from Hautapu Road and Forrest Road was identified as a safety hazard facing the pupils of the school. Figures 7. and 8. show the distribution of Liken scale responses regarding school visibility on Hautapu and Forrest Roads. The scale ranged from one to seven, with one being very visible, four being reasonably visible and seven being not very visible. The distribution for both sets of responses was

positively skewed suggesting that the majority of parents have some concern in regard to the visibility of the school. With most parents identifying the school visibility along Hautapu and Forrest Roads as being somewhere between reasonably visible to not very visible. Of these 19 respondents reported that the school zone was not very obvious to motorists on both roads. Overall the visibility on Forrest Road was viewed as being marginally poorer than the visibility on Hautapu Road, as more responses fell within the higher range of the Likert scale. Only one person identified the school as being very visible from both roads, and had previously indicated that they had no concerns about child pedestrian safety at Hautapu School. The factors which reduced visibility of the school were identified within the survey as being, poor signage, fencing of Hautapu School, and the neighbouring hedge. Of the respondents 89% believed that increasing visibility of Hautapu School would improve child pedestrian safety.

Figure 7.

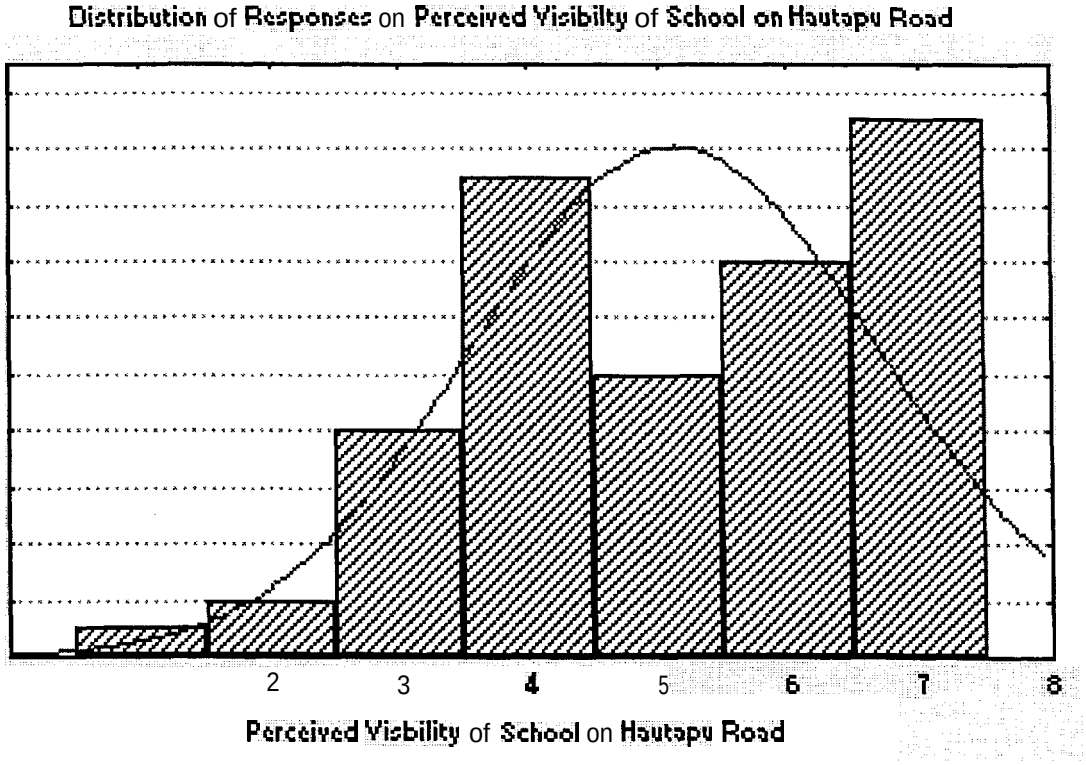
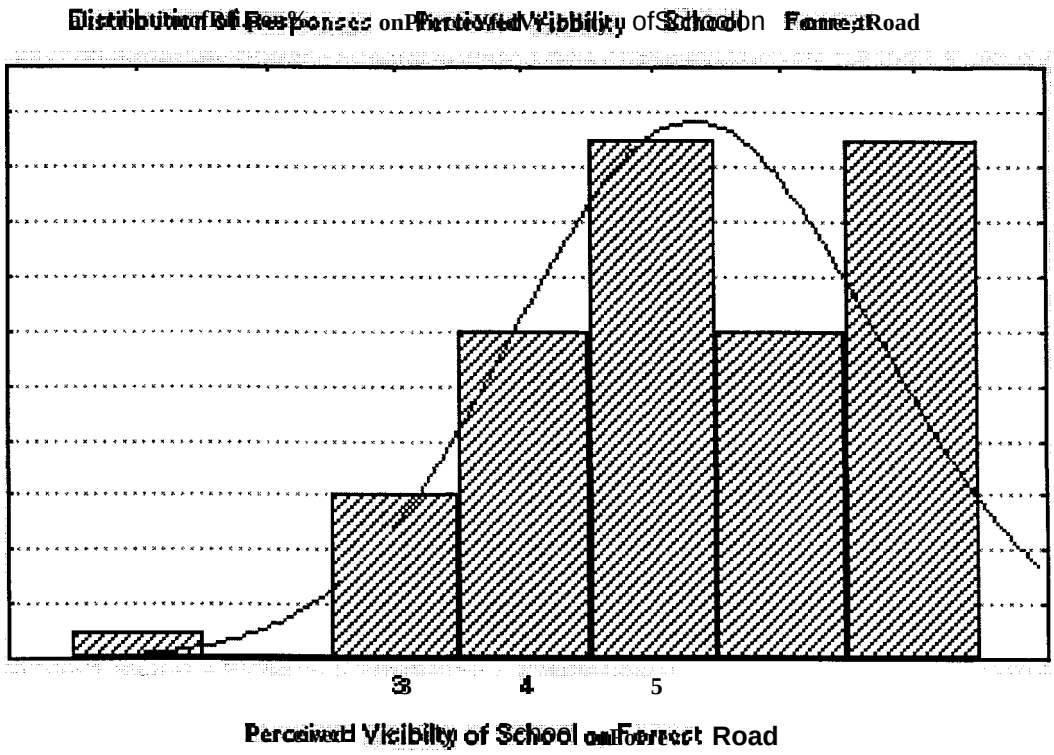


Figure 8.



The suggested means for increasing visibility included: more road markings, more signs, larger signs, different signage, cutting neighbouring hedge and trimming grass verges on a regular basis, painting the fence and increasing the amount of time that the pink "children crossing" sign is out. It was said in a number of questionnaires that a school pupil who lives near the school is responsible for closing the sign and does so on the way home, this means that the sign is only out until the child walks past which is sometime before all the children have been picked up from the school (before 2.45).

The most common requests for increasing visibility of the school included: the introduction of different signs, increasing the size of the road signs and maximising road markings, with 84% of respondents calling for different signs to be erected on Hautapu and Forrest Road outside the school grounds in order to increase visibility of the school and reduce the risk of child pedestrian injury. The most often requested signs were "Slow Down" and "Children Crossing" although not all respondents indicated the type of sign that they wished to see erected. Additionally, 60% of respondents called for the size of the signs to be increased and 40% of respondents also requested that additional road markings be painted outside the school on Forrest and Hautapu Road, to make it clearer to motorists that they were entering the school zone.

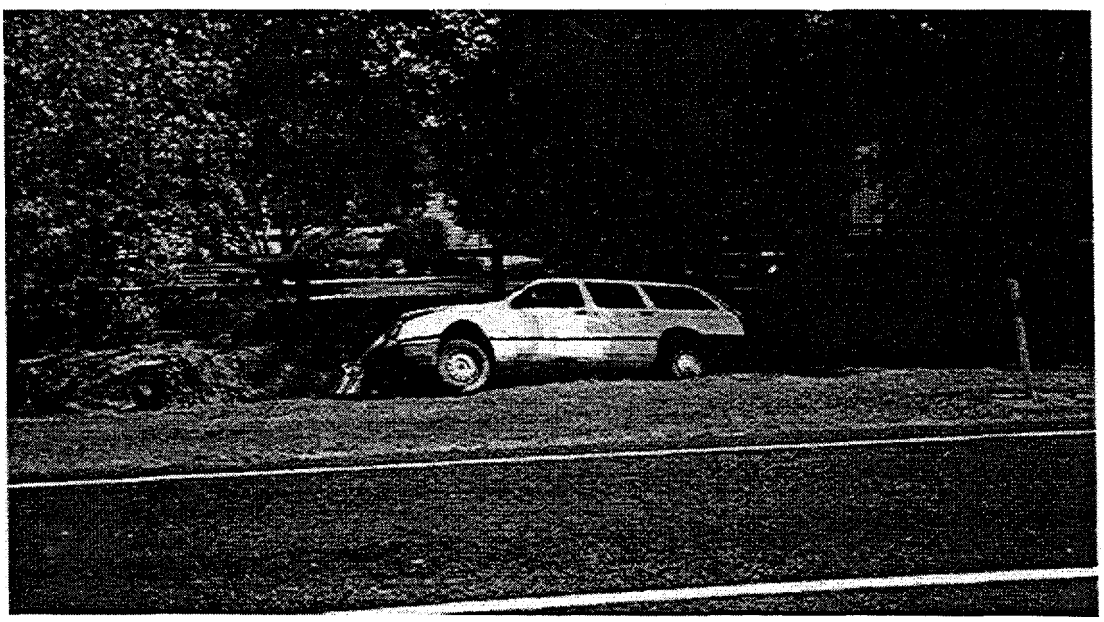
4.2 CLASSROOM DISCUSSION

The results from the classroom discussion are of a more qualitative nature than those of the parent survey. These results are thematic and indicative rather than quantitative. Each set of results is presented for each of the questions that the children were asked to discuss and answer. The responses presented in this section are in the form they were written with alterations in brackets that have been made for reasons of coherence. These quotes are presented in italics.

4.2.1 Incidents and Effects

The first question asked the children what were the traffic incidents they had experienced in the vicinity of the school, and how those incidents made them feel. Every group noted the incident where two children were hit by a car outside the school and reported that it made them feel "sad", *"angry ", "scared"* and *"worried"*. Another incident that all the groups noted was a car crashing into the ditch outside the school (see Photograph 1. below). One group noted that this was annoying, another noted that it was disturbing but that they were "proud *that the ditch is there "*. This photograph shows that if the ditch was not there the car would most likely have crashed into the school grounds.

Photograph 1.



Speeding was also regarded as an incident by four of the five groups. Feelings toward speeding included fear, anger and annoyance.The children also indicated that this annoyance and anger was because speed makes it *"Unsafe to bike to school".* Speeding cars and trucks were noted and one group noted how *"vehicles pass each other too fast and don't slow down at the `children walking' sign"* and that this makes them *`feel angry".*

Other incidents that these children had experienced in the general vicinity of the school included one of the girls in a group being hit while biking to school when she was rounding a corner on Hannon Road and Racecourse Road because the driver did not see her when they were backing out. Another participant was nearly hit by a car while rounding a corner when biking to school because the driver did not give way to her.

Other incidents include two trucks crashing on the corner of Peake and Hautapu Road, a car crashing into the school bus and a rugby ball that ended up on Hautapu Road from the school grounds and was crushed by a truck which made those who were there feel angry and annoyed.

4.2.2Causes

The second question asked the children to identify the possible causes of the incidents they had identified in the previous question. However, unlike the previous question the students were not that clear on exactly what was required. Instead of outlining the causes of the incidents they had outlined in question one, most groups outlined causes of traffic accidents in general.Nevertheless the children did outline several causes of traffic accidents in general which have also contributed to accidents they have experienced while travelling to and from school.

All the groups identified speeding as a cause of traffic accidents. The five groups identified *"speed", "speeding"* and *"the speed limit"* generally.Two of the groups offered more specific causes identifying drivers *"Passing each other too fast"* while another explained that *"The trucks are slow when they go down Hautapu Strait and people majorly speed up to pass"* and that *"they are going too fast to be able to slow down enough".*

Drivers ignoring and disobeying road signs were noted by four of the five groups. This was defined as *"not looking at", "ignoring", "disobeying"* and *"don't slow down at"* the road signs. One group also identified the lack of road signs as a cause of traffic accidents. As well as ignoring road signs, four of the groups also found attention to other factors was a cause of accidents. *"Not enough awareness in the kids", "distraction from kids ", "not watching people walking"* and *"not paying attention to the road"* were all identified as causes of road accidents based on attention and awareness.

Three of the groups identified drivers' ignorance of cyclists as a safety hazard. One group stated that *"when you're biking and cars don't slow down"* another noted *"not pulling out while passing a person on a bike"* as another cause, while another group signalled drivers *"not watching people biking" as* a cause of traffic accidents. One group went further still to identify apathy itself as a cause of accidents, identifying *"Stupid people that don't care "*.

Four of the groups identified weather and drivers responses to it as a cause of traffic accidents. The *"sun's glare", "Wet weather", "rain"* and more precisely, *"people not driving to the conditions. Like driving really fast in the* fog, *rain and at night"* were all responses identifying weather, and drivers responses to it, as a cause of traffic accidents.

Two of the groups identified the use of mobile phones as a possible cause of traffic accidents. *"Mobil[e] phones"* and *"talking on the phone"* were identified as specific causes. One of the groups identified that the road width is a possible cause of traffic accidents, stating that the *"Road [is] not wide enough "*.

4.2.3 Counter-measures

The final question asked the participants to devise possible counter-measures to the identified hazards. Although the responses to this question appeared to be more specific in their relation to incidents in the vicinity of the school, some seemed to apply to accidents in general.

Speed reduction was the most prominent theme in the children's responses and they offered many counter-measures to achieve this. In relation to speed, four of the five groups believed that speed needs to be reduced, while the other stated that there should be speed cameras which tends to imply the goal of speed reduction. These groups stated specifically that an effective counter-measure would be to *"lower [the] speed limit", "slow them down", "Reduce speed",* and *"Put the road speed down".* Trucks were singled out by one group which noted that an effective counter-measure would be to *"make trucks go really slow ". A* response from one group made a wider suggestion to *"change the speed limit in cars from 180 & 220 to 120ks [sic] ".*

Four of the five groups identified speed cameras as an effective counter-measure. Two were more specific with one stating that the cameras should be hidden and the other stating that they should be placed on both roads. Other devices to reduce speed include *"Speed bumps around to slow them down or else smooth holes on the road to do the same just by the school where the road changes to Forrest Road", or "judder bars", as* offered by two of the groups. Another of the groups suggested a roundabout as another speed reduction device.

Two of the groups identified counter-measures that specifically target crossing the road. One group identified an *"underground crossing " and "pedestrian crossings "* as possible counter-measures. The other group suggested a *"Pedestrian crossing on both roads"* and *"teachers helping people cross".*

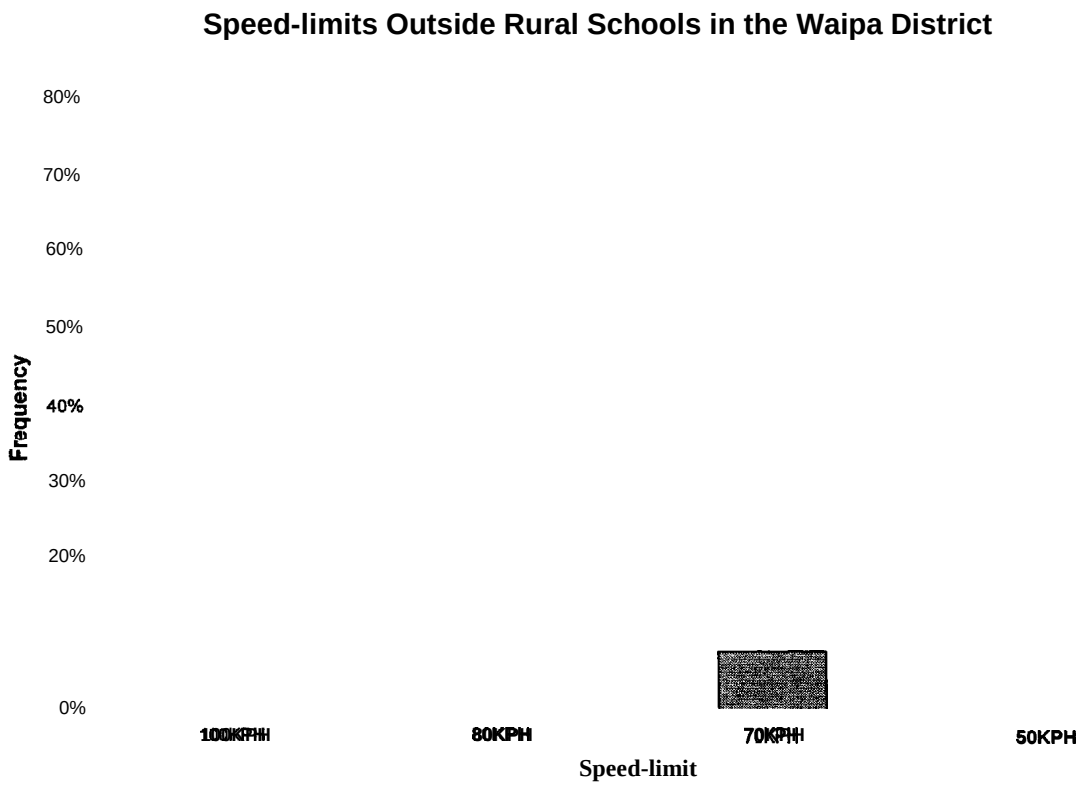
Widening the road was suggested by four of the five groups, this is despite the fact that only one group identified the width of the road as a cause of accidents. Two of the groups suggested *"widen[ing] the road"* and *"Make roads wider"* as a counter-measure. More specifically, the other groups suggested that the road *"Needs double-lanes ",* a *"side lane for turning cars to pull on to"* and that it should *"have a special lane on the road for cyclists ".* One of the groups suggested "A *bypass ".*

Signs were suggested as counter-measures by four of the five groups. These suggestions included *"more BIG signs ", "Bigger Brighter signs ", "bigger signs ",* and *"Put better signs up saying a school is around".*

4.3 PRINCIPAL INTERVIEWS

There are 22 rural schools in the Waipa District, all of which had principals who expressed concern about the road and traffic hazards facing their pupils on their way to and from school. Of these schools 14 expressed particular concern about child pedestrian safety.Of these 14 schools there was a wide variation in the numbers of pedestrians, but most (including Hautapu School), had very few child pedestrians. Eight schools did not have concerns relating to child pedestrian safety as none of their pupils walked or cycled to school because the road conditions surrounding the school meant that it was too unsafe for children to come to school by these modes of transport. As well as a variation in the number of pedestrians there was also a variation in the number of car-parks available and the speed limits outside rural schools in the district. Figure 9. provides an illustration of the variation of speed limits outside the schools in the Waipa District.

Figure 9.



All of the schools expressed concerns regarding traffic safety hazards facing their pupils on the way to and from school. Speed of traffic was a universal concern with all

of the schools identifying speed of traffic along the school's road frontage as being a safety hazard for the pupils outside their school. It was of particular concern for the 17 schools with 100km/h zoned zones outside their school grounds. Many of the principals from these schools reported that traffic often exceeded the speed limit, travelling at speeds estimated at between 120 and 140km/h outside the school grounds[z].One such school had to make the front section of the schools grounds out of bounds because of the risk of speeding vehicles losing control and crashing into it. The road in front of this school had been the site of many accidents, including several with fatalities.

Another common concern expressed by rural schools in the Waipa District was the volume of traffic using the roads, with 45% of the schools commenting on the volume of traffic travelling past the school (often at speed). This was of particular concern to those schools situated on main highways, on a route to life-style blocks or ski resorts and on milk-tanker or stock truck routes. Related to the volume of traffic were specific concerns regarding the number of heavy vehicles such as milk-tankers and stock trucks and the routes of traffic. Principals of schools with concerns about the volume of traffic commented that their schools were situated on roads which were used as through roads to life-style blocks or as short-cuts by road users because they are not monitored by speed cameras.

Visibility of schools was also identified as a road safety hazard with 45% of rural school principals commenting on the lack of visibility of their school.All these principals believed that poor visibility increased the potential risks facing students travelling to and from school.

The concerns relating to school visibility, the volume of traffic, and the speed of traffic, coupled with the lack of a full bus service, served to encourage parents to drive their children to school as walking or cycling were perceived to be too dangerous. The number of parents driving their children to school compounded the problems schools faced by not only increasing the volume of traffic but also leading to congestion outside the school premises which in some instances also reduced the visibility.

z These estimations were based on school children's mathematical equations that measured time and distance.

The problem of congestion was compounded by the lack of available car-parks with half of the schools identifying congestion as a problem also identifying the lack of available car-parks as road safety hazard. The problem of traffic congestion outside the school was worse in the afternoon when all the parents arrived at the same time to pick up their children.To overcome this problem some schools in the district staggered home times in an attempt to encourage parents to arrive at different times rather than all at once.All three of these schools found this to be a reasonably effective counter-measure to the hazard of congestion at the school gate.

Two other schools with inadequate parking facilities for parents driving their children to school were able to overcome this problem by increasing their parking facilities. These two schools are situated beside town halls whichthey use for school activities. Both schools approached the council to build car-parks for the halls. This enabled them to access funding and have the car-parks built. Both car-parks belong to the town halls and were therefore paid for by the council. However, due to their close proximity to the school they are used on a daily basis by parents dropping off and picking up their children from school.

Other concerns that rural schools in the Waipa District had included the number of children needing to cross rural roads, a lack of footpaths in rural areas to indicate safe walking routes along dangerous rural roads and no universal bus service for school children.To overcome the lack of footpaths one school mowed a strip of grass along the road side verge (the remaining grass was left long) to encourage the pedestrians to walk along the designated safe path.

Of the principals interviewed 14 expressed concerns especially related to child pedestrian safety, eight others did not have any concerns. This was because they did not have any pedestrians because, as one principal noted, "the roads are too dangerous how can we expect our children to bike or walk".Consequently these schools organised their own bus services to ensure that all children had transport to school. These bus services were organised in various ways. In some instances the parents were expected to meet the full cost of transporting their children to and from school. In other instances parents paid a fee to the school if their children were not eligible to travel on the bus and the school organised a bus service, other schools paid for the bus service

themselves. One school had purchased a bus and the Board of Trustees employed a driver and the cost of running was subsidised by the virtue of those children who were eligible under the specifications of the Ministry of Education's school transport assistance policy.

All of the schools were active in taking measures to reduce the risk of road and traffic-related injuries. All provided education for children in school and through national traffic safety units which are run in participation with the Police. All of the schools rated the Police Youth Education Officer's performance as being good to excellent. They also found her to be very approachable and flexible in response to their specific needs which were outside the standardised traffic safety units. Many also commented that the Police Youth Education Officer went beyond her official role of providing education and training for specific road safety practises.

Many of the schools also attempted to educate parents about the road safety hazards facing their pupils. This was achieved through weekly newsletters which highlighted specific issues or problems and on occasions by principals standing at the school gate and speaking to parents. The principals who spoke face to face with parents found this to be very effective, however, these principals were at relatively small rural schools. Principals found the education of parents and children was an ongoing process, which constantly had to be worked at and strategies reinforced as the underlying traffic safety hazards remained and problems continually had to be addressed. As well as this education all schools provided supervision by teachers at the school gate for pupils travelling on buses and for children crossing roads, with the exception of Hautapu School which did not provide supervision due to their policy to dissuade children from crossing Hautapu Road.

5. POLICIES, REGULATIONS AND GUIDELINES

Road safety is the responsibility of both central and local government (Bush, 1995). Of the central government agencies that have a responsibility for traffic safety, the LTSA is primary. The LTSA is a stand-alone Crown Entity that was established on 20 August 1993 by the Land Transport Act and replaced the old Land Transport Division of the Ministry of Transport. The LTSA is the government's primary advisor on land transport safety.

The role of the LTSA is "to promote land transport safety at reasonable cost" (LTSA Web Page, 1999). Its aim is to save lives on New Zealand's roads and lessen the trauma resulting from road and rail crashes. Its Ultimate objective is for New Zealand to have the lowest road toll in the world, compared to countries with similar levels of motorization. This includes undertaking regular reviews of systems and standards to improve safety levels, analysing and monitoring people's behaviour on the roads, and the promotion of safety within all sectors of society (LTSA, 1999).

The LTSA prepares and manages the National Road Safety Programme (NRSP). This plan outlines and funds road safety activity undertaken by the LTSA, the New Zealand Police, community groups, and regional and local authorities. One of the highlights of the NRSP has been the development of analytical tools to determine the best level and mix of measures for improving road safety.

There are other government agencies that have an interest in traffic safety but which may not have traffic safety as a specified objective. These include the Ministry of Education, health funding authorities and the Accident Rehabilitation and Compensation Insurance Corporation. Transit New Zealand has road safety as an objective under its role as a road controlling authority (RCA) for state highways, a role also shared by Territorial Local Authorities (TLAs).

Both Transit New Zealand and TLAs are Road Controlling Authorities (RCAs). Transit New Zealand is responsible for state highways while TLAs are responsible for all public roads within their territory, excluding state highways. As road controlling authorities this government agency (Transit New Zealand), and these local governments (TLAs), are responsible for many aspects of road safety in their particular jurisdictions. Signage, speed limits and road maintenance are the responsibility of these RCA's. Yet although these bodies are responsible for these areas they do not formulate the regulations that regulate these areas.

There are many different acts and regulations governing land transport safety in New Zealand. This large and complex body of legislation is currently being simplified. The many Acts have been restructured into a single Land Transport Act and regulations are being converted into Land Transport Rules. These rules consolidate requirements from many legislative sources, including regulations, Gazette notices, Orders and policy directives. The key focus for each rule is on improving safety, which must also be economically viable, technically accurate and legally correct. All rules are being written in plain language to ensure the widest possible audience (LTSA, 1999). These rules will not replace all current land transport legislation. The overall framework, allocation of functions and responsibilities will remain in Acts, in addition to major offences and penalties. Other offences, penalties and fees will remain in regulations. Regulations will also identify breaches of rules that constitute offences (LTSA, 1999).

Ordinary rules become law by being signed by the Minister of Transport (the Director of Land Transport Safety has the power to make emergency rules). Rules do not have to be scrutinised or approved by legislative bodies, like caucus, Cabinet and select committees. However, ordinary rules undergo an extensive public consultation process before being signed by the Minister. Rules, like regulations, after being made into law must be tabled in Parliament, and can be referred to the Regulations Review Committee for scrutiny. This committee can recommend to Parliament that a particular rule that it finds unacceptable be disallowed. Rules currently under development include *Land Transport Rule: Setting of Speed Limits* (LTSA, 1999). At present the "rules" for setting speed limits are outlined in the *Guidelines For Setting Speed Limits.*

5.1 SPEED LIMITS

Of all the policy relating to this research the *Guidelines For Setting Speed Limits* are the most important. Developed for use by RCAs and the LTSA the *Guidelines For Setting Speed Limits* is a comprehensive and systematic outline of the guidelines, criteria and procedures for setting speed limits. It provides speed limit definitions, procedures to follow when reviewing speed limits, and the requirements of a speed limit warrant, which all encompass specific mention in relation to the focus of this research. The overall philosophy behind these guidelines is that speed limits should be based primarily on the level of roadside development, with the higher the level of roadside development, the lower the speed limit. However, some recognition is given to road geometry, but this is secondary to development.

Speed limit definitions are clearly outlined in these guidelines. These definitions include the urban and rural, and the 50, 60, 70, 80, 100 km/h and seasonal speed limits. Of these limits 80 km/h speed limit guidelines are of the greatest relevance to this research, in that the stretch of Hautapu Road in front Hautapu School meets the criteria for this limit. The guidelines state that all speed limits should be monitored to ensure that they comply with the appropriate standards, that the signposting is correctly located and to an appropriate standard, that motorist compliance with the restriction is within acceptable limits, and that comments from the community should also be monitored, as complaints from the local community may indicate a need to review a speed limit.

When reviewing a speed limit, or considering imposing a new speed limit, the guidelines outline the steps that should be taken. The area should be surveyed according to the procedures in the guideline, and the results compared with the warrant contained in Appendix 2 of the guideline. A rating survey should be carried out according to the instructions in Appendix 2 of the guideline, using a survey form as illustrated in Appendix 3 of the guideline. This survey involves a relatively simple method of quantifying those land use and geometric factors which affect driver's

speed? Data that aids the decision on which speed limit is the most appropriate should also be collected and should be done in parallel with the rating survey.

This data includes; lane widths, number of lanes, lighting, intersection controls, pedestrian and cycle facilities, and signs and markings, set back off the property boundary from the edge of the roadway, and other roadside development features which may be inappropriate for the speed limit prevailing or under consideration. [4] Suitable points for changes in speed limit should be ascertained and if there is doubt about vehicle speeds conforming to the proposed speed limit, speed checks should also be undertaken.

Where practicable, differences in adjacent speed limits of more than 30 km/h, should be avoided (eg. 100 km/h to 60 km/h or 50 km/h). A buffer zone can provide a transition area in these circumstances. A buffer zone must be warranted under this policy, and should meet the development, length and operating speed requirements. Where a buffer is not warranted by the roadside development, consideration should be given to installing a threshold. Alternatively, an oversize sign on each side of the road may be appropriate.

All boundary points between speed limits should be at or close to a point of significant change in the roadside development, or the road environment, to emphasise the change in speed limit. Appropriate locations would include: a marked change in the level or type of roadside development, clusters of farm buildings, hedges, patches of trees, a change in the road geometry, a bridge, or any feature that affects vehicle speed, e.g., a roundabout or curve. Once the value and extent of proposed speed limits are determined, and any other matters (e.g., pedestrian facilities, special end treatments such as thresholds, etc), considered, consultation should take place with all organisations and individuals necessary or desirable.

Speed limits affect many people and organisations. Because of this, wide consultation should take place, and if possible, agreement reached, before a speed limit is installed.

[3] Of the various forms of development and the rating points they correspond to, schools rate the highest, with the rating increasing as the number of children does (one rating point for every 15 children).
[4] A suitable form for recording this data is included in Appendix 3 of the guidelines.

The guidelines state that as a minimum, the District Commander (New Zealand Police), the District Manager (Automobile Association), the Regional Engineer (Land Transport Safety Authority), the Regional Manager of Transit New Zealand (if a State highway is involved), and the Chief Executive of the Territorial Local Authority, should be consulted.The view the guidelines take is that the Territorial Local Authority represents the views of the local people, and the Automobile Association represents the views of the road users. In particular circumstances it may be desirable to include local residents' groups, or other special interest groups in the process. However, consultation should take place, and agreement should be reached, between the aforementioned five national organisations and government bodies before the matter is put to the wider consultative group.

Some Territorial Local Authorities already have their own consultation network. These networks include making use of community notices in local newspapers, or handout sheets delivered to residents. The guidelines contend that such community involvement, while it may slow the process, is likely to lead to wider community acceptance of a speed limit. The guidelines also state that if a speed limit is warranted across a boundary between two Territorial Local Authorities then both of the affected Authorities should be included in the consultation process.

When agreement has been reached, the speed limit should be imposed, either by gazetting, (for 50 km/h, 70 km/h, or derestriction), or by bylaw, (for 60 km/h and 80 km/h). If an underlying gazetted speed limit is less than the proposed by-law speed limit, the Gazette notice imposing the gazetted limit must be amended. A Gazette notice sets a maximum speed limit on a road, as does a by-law. Section 199 (6) of The Transport Act 1962 requires that where a by-law is inconsistent with or repugnant to a regulation, the regulation takes precedence. The gazetting process is administered by the Land Transport Safety Authority, while the by-law process is the responsibility of the Road Controlling Authority. Once a speed limit is imposed a number of traffic and other surveys should be undertaken to ensure the speed limits imposed meet the appropriate standards.

The guidelines recommend that where there is doubt that a posted speed limit is appropriate, or is not being adequately complied with, a concealed speed check should

be carried out. Speed surveys should be carried out according to Road and Traffic Standards Information 14, July 1993, "Standard Method for Conducting Manual Speed Surveys (Speed Survey Methodology)". Appendix 4 of the guidelines is a summary of this Information Sheet.

The guidelines suggest that the following conditions should be used as a guide to verify when a speed limit is operating successfully:

- The mean speed should not be significantly greater than the speed limit.
- The 85 percentile speed should be not more than 15% above the speed limit.
- The operating speeds should match the expectation of non-motorised road users, and local residents.
- The accident rate on the road should not be significantly greater than the national average for roads of similar geometry and traffic flow.

Regular reviews of speed limits should be carried out to ensure they are appropriate to the level of development on the abiding land, and to the geometry of the road. The rationale behind this procedure is that this will ensure that a consistent standard is maintained throughout the country.

For the standard 50 km/h limits and the open road 100 km/h limits, monitoring should not involve more than ensuring that the signposting is correctly installed and maintained, and the monitoring of any comments from residents and road users. For the other speed limits an appropriate monitoring/auditing program should be undertaken. Quality monitoring should cover six main areas; roadside development, road environment, operating speeds, accidents, signposting and documentation.

Three months after the installation of the new speed limit, an operational audit should be undertaken. This audit will cover operating speeds, and the signposting requirements of the guideline. Two years after installation a review of the speed limit should be undertaken. This review should cover all mailers included in the guideline. The two year average accident rate on an arterial road before the installation of a 60 km/h or an 80 km/h "route" speed limit should not increase after the change.

5.2 SIGNAGE

The Manual of Traffic Signs and Markings contains the regulations for erecting roadside signage. The requirements in the Manual are recommended, and as with the *Guidelines For Setting Speed Limits,* these regulations are followed by Transit New Zealand and TLAs. In relation to child pedestrian safety at rural schools the relevant regulations within this manual include those pertaining to speed limit signs and public warning signs.

In regard to speed limits, signposting must be correct to ensure a speed limit is enforceable. Regulation 122 of the Traffic Regulations 1976 requires every controlling authority to provide, at or near the point on the road where the speed limit changes, the appropriate sign to advise drivers of every change in speed limit. It is noted that the regulation is worded to allow a small measure of flexibility when erecting the sign. This is to avoid the sign being too close to a driveway, or restrict visibility, etc. Commonly, changes of restriction are located at a given distance from a side road. It has been suggested that this allows up to twenty metres flexibility in the sign location, as most road reserves are twenty metres wide. This interpretation has applied for some time without any problem. Where the operating speeds are high, or the change in speed limit is more than 30 km/h, additional or oversize signs may be appropriate.

The Manual of Traffic Signs and Markings gives guidance on the choice of sign size appropriate to the location. Guidance is also given on the lateral placement and visibility requirements. Repeater signs are desirable in all speed limit areas to remind drivers of the speed limit in force, especially:

- Soon after the start of a speed limit.
- Where the speed limit may be inconsistent with the surrounding development, eg, a short length of sparse development in a fully urban environment.
- At either side of a major intersection on a "route speed limit", and
- At not more than 1 km intervals on 60 km/h or 80 km/h "route speed limits".

Apart from speed limit signage the *Manual of Traffic Signs and Markings* also provides regulations for other signage in relation to child pedestrian safety. Public Warning (PW) signs are those that are used to indicate the presence of children, pedestrians, schools etc. These regulations outline:

- Policy relating to the sign which explains where and why the sign should be erected and the supplementary sign that may be attached to it
- *Sign Size* which details the size requirements, and
- *Location,* which outlines the operating speed of the road the sign will be placed on and the corresponding distance from the hazard area.

Hautapu School has PW-31 signs with PW-32 signs attached as a supplementary sign (see photo 2 below). The PW-32 SCHOOL sign is the only supplementary sign that can be attached to a PW-31 sign under these regulations. However, there is an avenue for the "experimentation to establish effectiveness of a proposed alternative device" (LTSA, 1998). This avenue is a document produced by the LTSA entitled *Application for LTSA Approval of Traffic Control Devices.*

Photograph 2. A Photograph of PW-31 and PW-32 Signs

5.3 EDUCATION

The Ministry of Education's policy on traffic safety is outlined in the health and physical education part of the curriculum. Through this part of the curriculum the Ministry of Education sets a clear direction for schools (boards of trustees, teachers, and principals) to address critical health and physical education issues. This curriculum acknowledges that "[h]ealth is vitally important for personal and social well-being and achievement" (Ministry of Education, 1993:6). The way in which this is achieved is outlined in the achievement objectives that are encompassed within the broad aims of each of the four strands that make up the health curriculum. Of these four strands, section 3. of strand A. is of particular importance.

Section 3 of Strand A, developing and maintaining personal health and physical development, of the Health Curriculum, states that "[i]n learning to develop and maintain personal health and physical development, students will meet and manage challenges and risks in a positive, health-enhancing way. This is part of one of the objectives of this strand that "aims to equip students with the knowledge, understanding, skills, and attitudes to take care of their health and physical activity needs, both now and in the future". Another objective of this strand is that "students will learn about influences on their total well-being and develop self-management skills to enhance their health status" (Ministry of Education, 1997: 37).

Traffic safety is explicitly covered in Level 1. Achievement Objective 3. and Level 2. Achievement Objective 3. of Strand A. Level 1. Achievement Objective 3. states that "Students will: describe and demonstrate simple health care and safety procedures, e.g., *physical challenges, activating emergency systems, during illness, in relation to fire, road, sun, and water, playing games, simple hygiene practices, unwanted touching, water entries and exits".* Level 2. Achievement Objective 3. states that students will: identify and use safe practices and basic risk-management strategies, e.g., *for outdoor activity, road, water, or food safety, basic life support, simple first aid, evacuation drills, assistance around water environments, phoning for assistance, passive smoking, managing success, disappointments, shyness, and embarrassment, speaking out* (The Ministry of Education, 1997:38). The road safety aspect of these objectives are to a large extent met by Police Youth Education Officers.

5.4 FUNDING

The bulk of road safety spending in New Zealand is funded from the Land Transport Fund and is allocated to safety enforcement and road safety engineering. The agencies primarily responsible for the various activities are the NZ Police, Transit NZ and the local Road Controlling Authorities. The LTSA plays a central co-ordinating role, in particular carrying out monitoring and research toward determining the level and mix of road safety programmes to ensure they produce the greatest benefit to all New Zealanders (Bowie, 1997).

The Land Transport Act 1993 requires the Land Transport Safety Authority, "to undertake activities that promote safety in land transport at a reasonable cost". Subsequently, the LTSA has been the linchpin of a major work effort on how to allocate the safety dollar in such a way as to maximise the reduction in the social cost of crashes (Bowie, 1997). This approach is based on a marginal analysis of benefit-cost ratios. Using this analysis "Resources are allocated to regions and road types, beginning with the one with the highest benefit-cost" (Bowie, 1997).

Over recent years, LTSA has worked towards developing a method for optimally allocating road safety resources (Bowie, 1997). The method is built on economic theory and has the potential to identify and justify how much money should be spent on road safety, where the money should be spent, and in what way. The twin goals of efficiency and equity are central to the framework.

For all New Zealand, the 1998/99 National Roading Programme allocates the following amounts to Safety Maintenance and Minor Safety Projects.

	1998/99
Local Roads	$34.30 million
State Highways	$39.38 million
Total	$73.68 million

(LTSA, 1998)

5.5 THE SCHOOL TRANSPORT ASSISTANCE POLICY

The Government's School Transport Assistance Policy is outlined in School *Transport: What you need to know* published by the Ministry of Education. This policy provides assistance mainly for primary and secondary students in rural areas who meet the established distance criteria and have no suitable public passenger services available. This outline notes that "school transport is a form of assistance only" (Ministry of Education, 1997:3).

The school bus service is a large operation and carries about 100,000 students to school daily. Those students who are eligible for this service under the school transport assistance policy are students under 10 who live more than 3.2 kilometres from the nearest school and students 10 and over who live more than 4.8 kilometres from the nearest school, where no suitable public passenger services are available. Eligible students are required to make their own way or be taken by the parents up to 1.6 kilometres at least, to a school bus service.

Under this policy assistance will not be provided where suitable public passenger services are available. To be unsuitable, a public passenger service must:

- be more than 2.4 kilometres from the students home; or
- travel no closer than 2.4 kilometres from the school nearest to the student's home; or
- have a timetable that prevents the student from arriving at school by the school commencing time or from leaving soon after the school day officially closes. For example, leaving school 45 minutes after a closing time of 2.30 p.m. would be unsuitable; or
- require the student to change buses more than once on a journey.

Most students in urban areas are not eligible for assistance. They either live within the distance criteria of the nearest school, or have suitable public passenger services available. The policy states that the Ministry of Education will provide services only for the number of eligible students requiring assistance. However, school bus operators

may allow ineligible students to travel on the bus as long as eligible students are not disadvantaged. School bus operators may charge ineligible students a fare.

Road safety issues are a consideration in the policy. It states that;

> Services can be extended for reasons of road danger if boards of trustees request this. The Ministry may provide additional assistance on the grounds of exceptional road danger after the ministry or its agent has received reports from the New Zealand Police (traffic safety branch where available) and/or the local district engineer that exceptional road danger exists. Assistance will be in the form of extending an existing school bus route for eligible students exposed to the danger (Ministry of Education, 1997:8).

However, the policy also states that "Services cannot be extended for reasons of road danger for ineligible students. School transport assistance is provided only for students who meet the criteria" (Ministry of Education, 1997:8).

The Police and schools work together to run school traffic safety teams which include bus wardens. The bus warden system is set up to make it safer for students who travel on either Ministry of Education contracted or school administered bus services. The bus wardens help other students to travel to and from school more safely. Bus wardens are usually chosen from senior students who have the longest distance to travel, and receive training from the Police Youth Education Officer. The Police and the LTSA publish manuals for the school traffic safety team, one of which is the bus warden operation manual.

5.6 THE WAIPA DISTRICT COUNCIL

The primary objectives of the Waipa District Council are clearly outlined in their Mission Statement.

> To fulfil the statutory and regulatory obligations of the elected representatives of Waipa District, and promote the well-being of the people of Waipa District through timely provision of services and sustainable management of natural and physical resources.

It is this commitment to "promote the well-being of the people of Waipa District" that is central to child pedestrians safety at schools in this district.This promotion is achieved through one of the council's `Significant Activities'; Roading Network Management. This Significant Activity stems from the fact that the council controls the use of public road reserves in the District (excluding State Highways), including construction and maintenance of roads, footpaths, bridges and streetlights. This role as an RCA is a mandatory function of the council's pursuant to Part XXI of the Local Government Act 1974. However, the council maintain that they have discretion on the betterment projects and level of maintenance of the assets.

The Council states that the objective of this significant activity is"[t]o provide a safe and efficient roading network". In achieving this objective the Council has put forward Alternatives considered for provision of this service:

- Do nothing is not an option; legal obligation to preserve the service potential of the asset.
- Reduce level of service; keep up maintenance levels but subject new works betterment to more rigorous cost-benefit analysis.
- Increase level of service; improve maintenance levels, apply less rigorous cost benefit analysis to betterment works.
- Status quo; maintain roading network to Transfund New Zealand standards and make optimum use of Transit New Zealand.

The council also acknowledges that as a general rule, physical works to the road structure are termed asset management and works for the benefit of the road users, i.e. drivers and pedestrians are termed customer service.

TheWaipa District Council gives their Roading Network Management a priority ranking of 3. which indicates that it is "very important' to their operation and development (Waipa District Council, 1998).

The Waipa District Council like most district councils works closely with LTSA to make New Zealand roads safer. Urban speed limits are set with input from TLA's and LTSA's regional managers and traffic engineers work with local authorities to identify traffic black spots.Like most local authorities Waipa District Council employs a road safety co-ordinator whose work on local road safety issues is partly funded by LTSA.

6. DISCUSSION

This discussion involves examining the findings from each set of results and relating these back to the problem of child pedestrian safety at rural schools. By drawing these areas together this synthesis will enable an identification of where links do and do not exist, and where they should and should not exist. This synthesis of the dimensions of the problems identified will provide a comprehensive overview of the situation and helps in the formulation of practical counter-measures to the problems, hazards and risks identified.

6.1 RISKS

The findings of this research indicate that child pedestrians on their way to and from schools in the Waipa District are at great risk of suffering a traffic accident. This risk is illustrated by their over-representation in the epidemiological statistics for pedestrians nationally. Firstly, as pedestrians they are the most vulnerable group of road users as evidenced by the severity of injuries they suffer (the most severe), the length of time they spend in hospital (the longest), and the cost of the injuries they suffer (the highest) (Langley et al., 1991).

Secondly, as child pedestrians between the ages of 5-9 they are within the age group that experiences the largest number of pedestrian casualties per capita (Roberts, 1994, LTSA, 1998). Thirdly, these children are highly at risk because Hautapu School and the majority of the rural schools in the Waipa District are on roads that have 100 km/h speed limits, and as accident statistics indicate, the higher the speed limit the greater the chance of death. These figures show that the probability of being killed are increased with commensurate increases in speed as the higher the speed, the longer the stopping distance, and the shorter the time to react.

Fourthly, Jones and Nguyen's (1988) research has shown that the highest number of child pedestrian accidents occur in the hour before and the three hours after school. This tends to imply that the journey to and from school is a particularly dangerous one for child pedestrians as it is undertaken within these most dangerous timeframes. Fifthly, as rural pedestrians in the Waipa District the chance of child pedestrians being involved in accidents are above the national average (LTSA, 1998).

The epidemiological data show that children walking is the form of transport that leaves them at their most vulnerable. This simple yet crucial fact, however, is not always recognised. *The Guidelines for Setting Speed Limits,* for example, defines a rural area as having "no footpaths, except where safety footpaths have been installed for a specific reason, e.g. a school remote from the residential area." These definitions clearly miss the point that walking to rural schools increases the possibility of injury for child pedestrians.

6.2 CONCERNS

As well as the risks child pedestrians from Hautapu School face are the concerns to which these risks give rise. The results from this research show that concerns are commensurate to risks, the higher the risks the greater the concerns. The results from the survey of parents of children from Hautapu School, consultation with the principal, a representative from the board of trustees, and the children themselves, illustrate these concerns and how deeply they are held. These concerns reflect the risks the children face.

The survey of the parents illustrates the causes of their concerns, and what could be done to address these concerns. This survey, through its quantitative nature, showed which hazards the parents were most strongly concerned about. Consultation with the principal, a member of the Board of Trustees, and the classroom discussion with the children from Hautapu School provided an understanding of what hazards and incidents caused concerns (without measuring their strength), and what feelings characterised these concerns. These feelings included anger, frustration, sadness, vulnerability, anxiety and powerlessness.

These concerns arose out of perceived hazards and risk, and therefore when these are reduced, concerns should be too. In this way counter-measures appear to have a dual function of reducing both risks and concerns. Primarily safety counter-measures are implemented to avoid physical harm but they also help create security and wellbeing by relieving concerns. The Waipa District Council's objective of "promoting the well-being of the people of Waipa District" is therefore possible through its Roading Network Management activities in the area of child pedestrian safety at rural schools.

Although it focused specifically on child pedestrians this research has found that biking, or the inability to do so because of traffic hazards, is a major concern to the children respondents.The children recognise how vulnerable it is to cycle to Hautapu School.As one respondent from the classroom discussion expressed "cars should care more about cyclists because the people in the car if the[y] have a crash I don't [think] that the[y']re gonna be killed but if a bike had a crash with a car they could die".

6.3HISTORICALLY BASED POLICY DISCREPANCIES

When examining safety policy and planning it must be acknowledged that as an old school,Hautapu School existed before much of today's modern technology.The School itself was established 14 years before cars were even invented (1886). Since then there have been many changes. When the School was moved to its present site in 1910 there were 1,463 people living in Cambridge whereas now there are 12,363. The Waipa District has also had a marked increase in inhabitants over that period of time. In 1910 there were 6,971 people living in the Waipa District whereas now there are 37,031. This increasing number of inhabitants, if they are representative of the rest of New Zealand, are also driving more than they ever have. Both technologically and demographically the Waipa District has altered dramatically. This must be considered when examining the policy and regulatory context it is located within.

Unlike planning and regulations relating to schools to be constructed, the schools in this study already exist, several have existed for over a century, therefore these cannot be planned and can only be adapted or accommodated. One key informant responsible for implementing regulations stated that the planning of these schools was poor, but it is not the planning of the schools as they have existed prior to present development. The

planning at the time these schools were established may well have been sensible, but it is the planning since then that has been poor, as this planning has not adequately accommodated these schools.Planning can determine future development or accommodate existing developments not vice versa.

As the case study has shown, over time counter-measures must be updated and upgraded to address the technology that they are a response to. In the case study the children at these schools need to be protected from an increase of cars per unit of population and an increase of that population, problems that did not exist when the school was established.

6.4 HAZARDS AND COUNTER-MEASURES

The hazards child pedestrians on their journey to and from rural schools, and the counter-measures to these hazards are inextricably linked. Hazards necessitate counter-measures, and counter-measures negate hazards. Safety levels are directly determined by the juxtaposition of hazards and counter-measures. Therefore this analysis includes analysing the results in relation to both hazards and counter-measures.

When discussing hazards and counter-measures, it will become obvious that unsafe routes to school, such as those found through this research, do not minimise vehicle traffic use. Instead they not only encourage private vehicle use but make it essential. The serious risk of injury faced by the children discourages both cycling and walking to and from rural schools. This attempt to make the children's journey to school safer paradoxically increases vehicle numbers and therefore increases the probability of vehicle accidents. In this way hazards faced by child pedestrians are reduced but other hazards are created, or the hazards have migrated from one area to another.

6.4.1 Speed

Of all the hazards identified by the literature and respondents, speeding vehicles were identified as the primary hazard facing child pedestrians. Most of the parents surveyed believed the speed limit on Hautapu Road was the greatest traffic safety hazard facing their children.The children also identified speed as the primary hazard they face (both

as pedestrians and cyclists), as did the principal and the board of trustees. Principals from the rural schools within the Waipa District also identified speeding vehicles as a major hazard their children face. The key actors interviewed also voiced concerns about speed. This included both central and local government officials responsible for roading management, and school officials.

The fears and concerns about speed voiced by the various respondents are supported by child pedestrian accident data. This data shows that the increased probability and severity of pedestrian accidents correlates with increases in vehicle speeds. The link between speed and injury, speed and stopping distance, and speed and reaction time, show that as speed increases the possibility and severity of an accident increases. These data and the views of the respondents tend to suggest that speed is widely recognised as a major contributor to traffic accidents, however, other research has shown that this is not the case. LTSA's research shows New Zealanders do not acknowledge that excessive speed is dangerous despite the fact that 30% of road deaths last year were speed-related (LTSA, 1999). Nevertheless, the LTSA does acknowledge the dangers of speed and is now more heavily focusing on its reduction. As well as this Police are exercising "minimum tolerance" of speeding drivers and are ticketing closer to the limit (LTSA, 1999).

The parents, principal and children of Hautapu School, and many of the key actors believe that speed reduction is a sensible counter-measure to the hazards speed poses to child pedestrians. In the case of Hautapu Road the view of the respondents from the school is that the speed limit should be reduced. Decisions and steps to reduce this speed limit were taken through the course of this research, with the initiation of the bylaw process to have the speed limit on Hautapu Road reduced to 80 km/h, as it falls within the criteria set out in the speed limit warrant. When implementing this limit the Waipa District Council will erect signs specifying the limit. Signs in this instance take the form of an indicator of a counter-measure (speed limit), but signs also represent counter-measures in themselves.

6.4.2 Signage

Of the parents surveyed 84% called for different signs to be erected as a counter-measure.The children also saw signs as possible counter-measures. The key actor charged with erecting and controlling signs also views signs as an effective counter-measure as evident through his concerns voiced in interviews, and his policy of installing the maximum signage under the present regulations.However, Johansson and Rumar's (1966) research shows that drivers place a low priority on signs indicating pedestrians may be present, but that they place a high priority on speed limit signs. Their research shows that the importance drivers place on a sign determines how likely they are to acknowledge it, and that drivers do not place much importance on pedestrianwarningsigns.Therefore signs thatwarnofpedestrians are not as effective as other signs, particularly speed limit signs.

Schools signs have not changed much over the last twenty seven years. The signs now in place only vary slightly from those of twenty five plus years ago. The signs now used are the same size, use the same word (school) and have the same image of children.The only obvious difference is the colour.Where the old signs had white wording on a black background the contemporary signs have black wording and images on a yellow background. This tends to imply that these signs may be less noticeable in that their familiarity may have lessened their distinctiveness.However, to determine studies would have to be undertaken.

6.4.3Car-parks

The findings from the survey of the principals of rural schools in the Waipa District showed that a lack of car-parking spaces is a problem at many of these schools. Of these Hautapu School has a particularly serious problem with parking space. With only 22 parking spaces and approximately 80 cars there are clearly not the number of spaces to accommodate them. This lack of parking spaces creates congestion, hinders access to the school and increases the risks child pedestrians face.

A lack of car-parking space was identified by most parents surveyed as being a road safety hazard. This concern was also voiced by the principal of Hautapu School and

one of the key actors within the Waipa District Council responsible for this area who stated that there is a problem with car-parking at rural schools throughout the Waipa District. At rural schools the lack of car-parks and the congestion this causes was seen to be a problem by 50% of the principals interviewed. At the national level this problem has been identified by the LTSA as evidenced through their Chaos *at the School Gate* initiative.

6.4.4 Bussing

A major finding from the interviews with the principals from rural schools is that bussing children to school is viewed as an effective counter-measure to pedestrian hazards. The Ministry of Education acknowledges that the school bus service has a very low frequency of serious accidents, stating that there is no doubt that it has a very good safety record, and that bus operators take pride in providing a safe, reliable service (Ministry of Education, 1997). This view is consistent with the accident figures that show that "[t]here are seven times more deaths, per passenger kilometre, with car travel than with bus or coach travel" (The Public Health Alliance, *cited in* Roberts, 1994:15). The accident figures show that travelling on a bus is the safest form of land transport in New Zealand. In 1997 not one bus passenger was killed in a traffic accident. Pedestrians disembarking from schools buses are also very safe. In 1997 four passengers disembarking from school buses were injured and none were killed. These four passengers represent less than 0.5 percent of all pedestrian injuries in 1997.

Changing transportation modes from the private passenger car to alternative forms of travel such as buses should reduce road death rates. This was shown "at the time of the energy crisis when government restrictions on car use were associated with a 46% reduction in child pedestrian mortality rates" (Roberts, 1994:15). More cars equals more risk of serious accidents. The use of buses would significantly reduce traffic volumes, and therefore reduce the chance of accidents. With 112 children travelling to Hautapu School in approximately 80 cars the chances of traffic accidents in general, as well as from the increased probability of pedestrian accidents due to the congestion in the car-park area, are greatly increased.

"Reducing traffic volume has the potential to significantly reduce child pedestrian death rates. The volume of traffic throughout the road network could be reduced by introducing transportation policies which encourage a shift from the private car to public transport" (Roberts, 1994:3). This reduction through school buses carrying most of the children to school could reduce the number of vehicles travelling to and from school by 95%.

As well as the reduction in the number of potential traffic injuries, another potential benefit of a shift away from cars dropping off and picking children up would reduce the emission of greenhouse gases. Exhaust emissions from vehicles have been a cause for concern in relation to the environment for many years. Smog and other pollutants have been attributed to exhaust emissions. But not only emissions would be reduced, so too would fuel use which would be reduced by the same proportions as the emissions.

6.4.5 Education

Traffic safety education was a counter-measure employed by all the rural schools in the Waipa District. Principals from these schools all have traffic safety programmes. These programmes centre on the Police Youth Education Officer. The performance of this officer was regarded as very good to excellent by all rural schools in the Waipa District.

This research found that education was employed as a counter-measure to the hazards child pedestrians face. It also found that an "increase" in traffic safety education was not identified as a counter-measure by the respondents. The parents and children from Hautapu School did not identify "more" education as a possible counter-measure to child pedestrian hazards. The principals interviewed from the rural schools in the Waipa District, regard education as an effective counter-measure to the hazards child pedestrians face, but did not advocate its "increase" as a further counter-measure to the hazards child pedestrians face. These findings tend to imply that the education on traffic safety that these children receive is adequate in that they become appropriately aware on traffic safety issues relating to them. In this sense education cannot be "increased" as this level of awareness is either achieved or not achieved.

The education of the children provides them with the knowledge of road safety issues. However, this education only goes a certain way in countering hazards faced by child pedestrians. The mental developmental of children will always dictate how or whether knowledge will be used.

6.4.6 Synergy Not Debate in Counter-measure Approaches

The results from this research show that argument about which counter-measure is "better" is not constructive. Whether one counter-measure is "better" is beside the point, what is instead required, is an approach that takes into account as many counter-measures as possible. There is no doubt that when integrated these approaches are more effective that when employed in isolation. This integration should produce a synergetic effect, where all the counter-measures implemented reinforce and complement. Therefore what we propose is an integrated approach where as many counter-measures as possible be implemented to reduce the hazards faced by child pedestrians at rural schools a counter-measure strategy which employs all three approaches should be more effective that either one on its own.

This synergy has been recognised by McCracken and Kototailo (1995:17) who note that "[c]hild pedestrian injury prevention is a complex problem requiring complex solutions. Interventions which combine education, engineering and enforcement strategies, undertaken in a collaborative and co-ordinated fashion, are seen as having the greatest chance of success". The LTSA also acknowledge the value in all approaches when acknowledging that traffic safety "can be addressed by enforcement, education, engineering, encouragement or a combination of all four" (LTSA, 1998).

7. RECOMMENDATIONS

This research has revealed several practical and effective counter-measures to the hazards facing child pedestrians at rural schools. These safety measures arise out of all the methodologies employed. Of these counter-measures, those that appear the most practical, feasible and effective have been recommended. Some are recommendations at a national level and require legislative changes while others only require simple steps at a school level.

The counter-measures are listed and explained in order of potential effectiveness and appropriateness, from the most fundamental to the least fundamental. These explanations outline what the possible effect of the counter-measure will be, how it could be instituted, and the justification for its implementation. These outlines show that the implementation of fundamental counter-measures will to some degree negate the necessity of implementing the less fundamental ones.

7.1 RECOMMENDATION ONE

Children should not walk or ride bicycles to and from rural schools.

The primary and fundamental counter-measure recommended is that children should not walk or ride cycles to and from rural schools. This counter-measure is consistent with Kjellstrom et al.'s (1980:80), contention that "[a]n effective method for preventing child pedestrian accidents is the complete physical separation of car and pedestrian traffic". This research, however, indicates that it is not just an effective method for preventing child pedestrian accidents, but the most effective method for preventing child pedestrian accidents at rural schools.

The two most practical alternate modes of transport to and from rural schools are:

1. Bussing or;
2. Travelling by car

These two forms of transport are seen as the safest ways of transporting children to and from rural schools. However, of these two forms of transport bussing is the most appropriate and efficient way of children travelling to and from rural schools in that:

- One bus can carry many more children than one car and will therefore reduce the number of vehicles on the road which will in turn reduce the possibility of accidents. Car-pooling would increase the utility of each car but this would still not reduce the numbers of vehicles that a bus would.
- There are already bus bays provided at rural schools and this reduces the need for increased car-parks.
- Buses are required to have trained bus wardens who are responsible for safety on the buses, this is not the case for car users.
- The boarding and disembarking from school buses is protected by a mandatory speed limit, cars are not.
- The structure and organisation of bus transport exists, unlike car-pooling which would require the establishing of a structure and organisation.
- Bussing children to and from rural schools would alleviate the need for parents to transport their children to and from rural schools. This would reduce the time parents have to spend on the road and the money it costs to run and maintain a car.

Ultimately, by bussing to and from rural schools children will be transported in one of the least vulnerable forms of transportation on the road rather than the most vulnerable. However, although there are many advantages in transporting children to and from rural schools on buses, there are two potential problems that may hinder its implementation. Firstly, who will fund this form of transport, and secondly, will parents allow their children to travel on this form of transport? The first of these problems is commonly regarded as "the main barrier to doing more for the prevention of child pedestrian" (Ancliffe, 1995:25). However, these problems can be overcome with regulation and attitude changes.

The first of these problems can be overcome through changes to the School Transport Assistance Policy or cost effective school initiatives, while the second problem can be overcome through education. The School Transport Assistance Policy could be

amended and the eligibility criteria reduced from the present 3.2 kilometres from the nearest school for children under 10 and 4.8 kilometres for students 10 and over. This criterion states explicitly that the government is compelling those ineligible to receive school transport assistance to travel by other modes of transport, of which walking is an option.Those ineligible who walk greatly increase their chances of suffering a traffic accident while those who travel by car increase the number of vehicles on the road and therefore the possibility of a traffic accident, as well as using more fuel and increasing exhaust emissions.

Apart from policy changes schools themselves can take initiatives to fund their bus service. As the survey of the principals found there are several ways that schools can fund their school bus service.Another source of funding may be found if schools approach businesses to sponsor bus routes and that in return school buses provide advertising space for these businesses.Although the advertising will not be seen by as many as see advertising on buses in urban areas, the fact that it is tied to an issue that demonstrates community service may strengthen the impression and recollection of the advertising by the target market. Further research into this type of strategic marketing should reveal its potential effectiveness.As some of the children from Hautapu School live in Cambridge, and are therefore ineligible for school transport assistance, the advertising on buses that transport these children would be seen by a larger number of the target market than in a purely rural area. If these obstacles are overcome it is a finding of this research that this will significantly increase the safety of children travelling to and from rural schools.

7.2RECOMMENDATION TWO

Total supervision should be provided to those children for whom it is impractical to bus or travel to school by car.

Although it is ideal that all children travel to rural schools by means other than walking or cycling, in certain circumstances it is impractical for them to do so. In these circumstances e.g., residing opposite the school gate or very close to the school (within 100 metres) it is suggested that precautions are taken to ensure their safety. However, it is strongly recommended that children do not cycle, as their ability with this form of

transport is not as natural or simple as walking, and not as conducive to supervision as walking e.g., the ability to hold hands and lead.

It is recommended that three forms of supervision is provided for these pedestrians by

1. Parents
2. Traffic Safety Wardens
3. Teachers

Parents should provide supervision to the road that their children must cross to get to school. These parents have the responsibility to ensure the road is safe for the children to cross and instruct them when to cross. On the other side of the road, the school side, senior school students trained as traffic wardens should ensure the safety of the children who have crossed. Ideally Traffic Safety Wardens should be stationed on both sides of the road. Traffic Safety Wardens are trained by Police Youth Education Officers who will do this on request and will monitor the wardens sporadically to ensure their competency. Teachers should also help in the monitoring of these wardens. The additional counter-measure that would reduce the risks facing these children who must cross roads on their way to and from rural schools is a speed-limit reduction.

7.3 RECOMMENDATION **THREE**

Mandatory speed limits on roads outside rural schools for the one hour before and after school.

It is recommended that a mandatory speed limit for rural schools for the hour before school and the hour after school is a sensible and potentially effective counter-measure to the risks speed poses. A speed of 50 km/h would be desirable over a distance of 0.7 km (this is the recommended length for 70 km/h adjacent to 100 km/h speed limits) outlined in the *Guidelines for Setting Speed* Limits. This counter-measure will allow safer movement around the school by children when they arrive and leave school. Car-parks, bus bays and children crossing roads are all safer if the speeds of passing drivers are reduced.

This counter-measure is recommended in that it not only increases the safety of children but that it also does not inconvenience drivers any more than they have to be. The one hour before school (8 a.m. to 9 a.m.) is a time when many commute to work, the one hour after school (3 p.m. to 4 p.m.), on the other hand, is not the usual time that many finish work so therefore fewer drivers would be inconvenienced at this time.

At present the view that the guidelines illustrate is that speeds must be largely determined by the geometry of the road and the environment influencing driver behaviour. However, overseas experience has shown that drivers will reduce speed when prompted. What is needed is a mandatory speed limit outside all rural schools, this should then be widely advertised. In this way a blanket road rule will be recognised and accepted, eventually become a part of the universal rules that drivers recognise when they drive.

Drivers will adapt to new regulations primarily because they are mandatory. History shows that drivers have been adapting to new regulations to increase their safety, if not without a certain amount of resistance. Although even with a mandatory speed limit it will still be necessary in certain situations to implement safety devices such as under- or over-passes for children where traffic density dictates it.

The speed limit guidelines that are followed, as illustrated by the schools in the Waipa District, allow for various speed limits outside rural schools therefore drivers do not have a set speed that they must travel when passing rural schools. A mandatory speed limit would remedy this in that drivers would know the consistent speed at which they must pass schools rather than whatever the speed "may be" outside each particular school. The fact that the rating system gives such weight to schools is evidence that they are already major considerations when considering setting speed limits.

The phasing out of Limited Speed Zones because of their lack of effect tends to imply that the ambiguous speed signs are not successful. For this speed limit to have an effect they need to be signalled and enforced. This is achieved through signs and the police.

School Warning Signs with Speed Limit Supplementary Signs

A trial of new signs that display a suggested speed or "please reduce speed" as well as a PW- 31 school sign is recommended. This trial is possible through an Application for LTSA Approval of Traffic Control *Devices.* Such a sign should have more effect than the present sign in that it incorporates a speed limit sign, as speed limit signs have been shown to be acknowledged more than other signs, particularly pedestrian signs. This sign should also have the effect of making the school more visible in that the speed limit is linked to the school. Illustration 1. and illustration 2. below are examples of such signs used in the United States

Illustration 1.

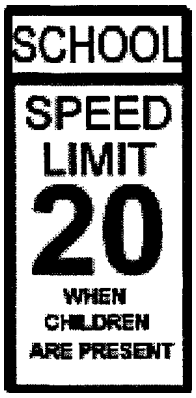
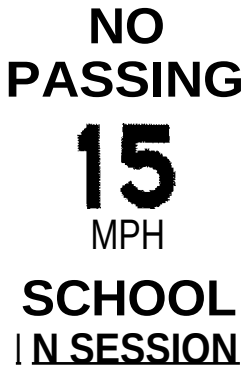


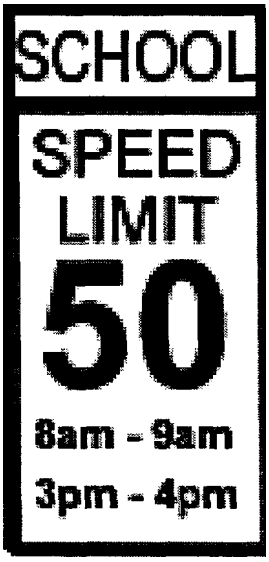
Illustration 2.



Note: These speed limits are in mph

Although these signs do combine both a school warning sign and a speed limit sign, they have been criticised because of the ambiguity as to when the speed limits apply. "When children are present" and "School in session", it is argued, do not denote a particular time frame (Machado, 1997). This would be avoided with the particular signs this report recommends, in that they would have the times the limit is in affect written on them. Illustration 3. below is an example of such a sign.

Illustration 3.



7.4 RECOMMENDATION FOUR

Increase awareness of rural schools.

The signs that would signal the mandatory speed limit would also increase the awareness of the school.

Rumble strips

As well as more imposing signs to indicate the presence of rural schools, it is also recommended that rumble strips be used in conjunction with these. Rumble strips are currently only used on markings on the edge of the road. They are used in this way to wake up drivers who may be falling asleep (LTSA, 1999). These strips and signs will allow both audible and visual stimuli to alert drivers to the fact that they are nearing a school zone. It is recommended that these strips only be used in this situation so as to give schools their own unique audible cues. The use of the strips in other situations would create ambiguity and this would diminish its effectiveness. Drivers must first be made aware of the rumble strips and how they indicate that a school is near so as to link the warning device and the school.

Other steps to increase awareness of rural schools

There are many steps rural schools can take to increase drivers awareness of their school. These steps can be quite simple and cheap. These include cutting hedges around the school and neighbouring properties, painting external fencing, or as the key actor responsible for implementing road signs and regulating road signs suggested, erect large signs that advertise the school and also asks drivers to slow down.

7.5 RECOMMENDATION FIVE

Sufficient car-parking spaces should be provided at rural schools.

If children must travel to school by car there must be sufficient car-parking spaces provided. This is possible through engineering or education. Engineering simply involves providing enough car-parks. To achieve this car-parks must be built or extended to cater for those children brought to school by car. To build these car-parks involves major funding. The LTSA describes how schools have successfully applied to their local authorities to at least partially fund changes to the roading environment outside the school. However, they also note that other local authorities are more reluctant sources of funding for such projects, seeing this as the responsibility of central government, the Ministry of Education (LTSA, 1998).

The Ministry of Education's position on funding for school drop off and pick up projects outlined by LTAS is that it recommends a Board of Trustees approach the Ministry's local District Property Manager. An application will be considered if there is a potential hazard with vehicular traffic (as supported by a report from an independent qualified person) when children are being dropped off and picked up from school. "If a sound case is presented, the Ministry will support practical and cost effective solutions such as the creation of a purpose built drop-off area or the management of traffic to divert it into a safe area" (LTSA, 1998:6). The management or education of parents dropping off or picking up children is another option to allow sufficient car-parks.

Staggering the times parents drop off and pick up their children from school is one way to match demand for a supply of car-parks. This counter-measure has one major advantage over increasing the size of existing car-parks in that it costs nothing. All that is required is the organisation and time-tabling and the explanation of the strategy to parents. This strategy is currently on trial at Hautapu School with some success in that there has been a reduction of the congestion in the car-park.

Although these counter-measures invariably have a financial cost, this must be weighed against the cost that child pedestrian accidents incur. Yet it is not only the money saved through increased road safety initiatives but also the wellbeing preserved that should also be of importance when considering the costs and benefits of these initiatives.

S. CONCLUSION

This research took a case study approach to the issue of child pedestrian safety at rural schools. Using the Waipa District and Hautapu School as selected case studies the research was able to:

- Identify what hazards rural school pupils face on their way to and from school
- Identify pre-existing risk prevention strategies that were in place to counter these hazards
- Evaluate policy and regulations that relate to child pedestrian safety and possible counter-measures
- Develop additional counter-measures that would improve the safety of rural school pedestrians.

The recommended counter-measures are listed below, and are listed from the most fundamental to the least fundamental. These counter-measures include:

1. Children should not walk or ride bicycles to rural schools.

They should instead:

1.1 Bus to and from school
1.2 Travel by car to and from school

2. Total supervision for those children for whom it is impractical to bus or travel by car to and from rural schools.

This supervision should be provided by:

2.1 Parents
2.2 Traffic Safety Wardens
2.3 Teachers

3.Mandatory speed limits on roads outside rural schools for the one hour before and after school.

This could be achieved with:

3.1Schoolwarningsign with a speed limit supplementary sign
3.2 Enforcement

4. Increase the awareness of rural schools

Strategies including:

4.1Rumble Strips

5. Increase the size of car-parks at rural schools.

As well as these counter-measures, the research had a practical benefit for Hautapu School. The results of the parent survey and telephone interviews with other rural school principal offered a relatively simple counter-measure to the congestion at the school gate. This being the staggering of the times parents arrive to drop off and pick up their children.Since the research began Hautapu School has implemented this practise which they are finding to be effective.

In addition to this, as part of the research process the speed limit regulations were scrutinised. Consequently the speed limit outside Hautapu School is now in the process of being reduced from a 100 km/h to 80 km/h speed limit. This practical outcome has greatly relieved those directly affected by the road safety hazards at Hautapu School.

This report also has the potential to assist other rural schools facing similar problems to the schools in this study. The report has outlined the organisations that have a legal obligation to address child pedestrian safety.The control that these obligations give these organisations are outlined in their policies, regulations, procedures, guidelines, recommendations, and objectives that address child pedestrian safety. Examining these directives (as outlined in this report) is useful in the assessment of potential counter-measures, and the possible improvement of present counter-measures. Therefore, this report serves as a source of information for those wanting to implementcounter-counter-measuresor assessing present current counter-measures to the hazards child pedestrians face on their journey to and from rural schools.

This research examined rural children pedestrian safety at rural schools and as such could be used in the future as the basis of a more comprehensive study of rural children pedestrian safety at rural schools or as part of wider research into child pedestrian safety in general. Further still this research could be used in comparative research into urban and rural child pedestrian safety that could help illustrate any imbalances and inconsistencies between these two areas.

Although the hazards child pedestrians face will not go away over night accident statistics show, the number of pedestrian accidents, and the deaths and injuries they cause, are declining. Initiatives and action taken by those responsible for child pedestrian safety in New Zealand must in some way be contributing to this decline. This decline is an encouraging and highly desirable trend, one that will hopefully last. However, unless regulatory upgrades and initiatives continue this trend may not continue. Hopefully this research will contribute to this promising trend in some small way.

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Appendix I

Child Road Safety Survey

This survey is being conducted as part of a report into child pedestrian safety at rural schools within the Waipa District. This research has been commissioned by The Child Accident Prevention Foundation of New Zealand, and is being conducted by Tonya Russell and Tony Westbrook from the University of Waikato. The aim of this survey is to identify particular *traffic* hazards children face at Hautapu School, and to help in the identification and design of possible counter-measures to these hazards.

All questionnaires are anonymous and will only be used in the formulation of this report. Copies of this report will be held at Hautapu School, The University of Waikato and The Child Accident Prevention Foundation of New Zealand. Completion of the questionnaire will be taken as evidence of your informed consent. If you have any queries, questions or suggestions relating to this research, please feel free to contact Tonya or Tony at The University of Waikato on extensions 8356 or 8269.

Your participation would be greatly appreciated as the higher the response rate the more reliable the results will be.

1. Do you have any concerns about child pedestrian safety at Hautapu School?

☐ Yes (go to question 2)
☐ No (go to question 3)

2. What do you think are the main road safety hazards facing the pupils at Hautapu School? (please mark the appropriate box or boxes)

Speed limit on Hautapu Road
Speed limit on Forrest Road
☐ Access to the school
☐ Visibility of the school on Hautapu Road
Visibility of the school on Forrest Road
Other, please specify... ... ...

- SPEED

3. Would you like to see the speed limit on Hautapu Straight...

❒ remain the same
❒ reduced to 80 kilometres
❒ reduced to 70 kilometres
other, please specify... ... ...

4. Would you like to see the speed limit on Forrest Road....

remain the same
❒ reduced to 80 kilometres
reduced to 70 kilometres
other, please specify ... ...

- ACCESS

5. How accessible do you find the school? ie: How easy is it for you to drop off and pick up your child/ren for school? (please indicate on scale below)

No Problem **Reasonably accessible** **Not very accessible**
Very accessible **No major problems** **Difficulties experienced**

1----------2----------3----------4----------5--------_----6----------7

6. What factors affect your access to the school? (please mark the appropriate box or boxes)

None, I /we find the school very accessible
Speed on Hautapu Straight - (not safe to drop child/ren off on this road)
Car-park on Forrest Road
Other, please specify... ... ...

7. Is the car-park on Forrest Road safe in your opinion? (please indicate how safe on the below scale)

Very safe **Reasonably sate** **Not very safe**

1----------2----------3----------4----------5----------6----------7

8. What factors do you think reduce the safety of the car-park? (please mark the appropriate box or boxes)

- ☐ Insufficient car-park spaces
- ☐ Distance between car-park and intersection
- ☐ The width of Forrest Road
- ☐ Traffic turning from Hautapu Straight onto Forrest Road
- ☐ Other, please specify... ... ...

9. How do you think that access to the school could be improved? (please mark the appropriate box or boxes)

- ☐ No improvements needed, I am happy with access to the school
- ☐ Increase the size of the car-park
- ☐ Reduce speed on Hautapu Road
- ☐ Other, please specify... ... ...

VISIBILITY

10. How visible do you think Hautapu school is on Hautapu Straight? (please indicate on scale below)

Very Visible Obvious to motorists that they are in school zone	**Reasonably visible**	**Not very visible** School zone is not very obvious to motorists

1----------2----------3----------4----------5----------6----------7

11. How visible do you think Hautapu school is on Forrest Road? (please indicate on scale below)

Very Visible Obvious to motorists that they are in school zone	**Reasonably visible**	**Not very visible** School zone is not very obvious to motorists

1----------2----------3----------4----------5----------6----------7

12. Do you think that increasing the visibility of Hautapu School will improve child pedestrian safety?

- ☐ Yes
- ☐ No (go to question 15)

13. How do you think that the visibility of the school could be increased along Hautapu Straight by having (please mark the appropriate box or boxes)...

❒ more road markings

more signs

larger signs

different signs such as; SLOW DOWN, REDUCE SPEED NOW

other, please specify..... . ...: .....

14. How do you think that the visibility of the school could be **increased along Forrest** Road by having...

more road markings

more signs

larger signs

different signs such as; SLOW DOWN, REDUCE SPEED NOW

other, please specify... ... .

15. Please feel free to comment on any other issues relating to child pedestrian safety that have not been covered in this questionnaire or make suggestions on possible counter measure to the roading hazards facing child pedestrian at your rural school

Thank you for your participation

Hey Kids, return this questionnaire and receive a Treat!

Kindly supplied by

Lesson Topic: Child Safety	**Date:** 10/12/98
Group:	**Time:** 1.00pm

Objectives:

1. Identify safety hazards and incidents
2. Identify how the incidents made the students feel
3. Devise possible counter-measures to the identified hazards

Room Layout:

Content	**Teaching Method**	**Student Activity**	**Resources**	**Time**
Introduction	Verbal outline	Listen		2 Minutes
Objectives	Verbal outline	Listen		2 Minutes
Identify safety hazards and incidents	Whole group Discussion	Student verbal responses	Whiteboard and pens	5 Minutes
Identify how the incidents made you feel	Small group Work	Write down responses	Paper and pens for the students	10 Minutes

Content	Teaching Method	Student Activity	Resources	Time
Devise possible counter-measures to these hazards Conclusion	Small Group Work	Write down responses	Paper and pens for the students	10 Minutes 5 Minutes
Evaluation:				

Appendix III

Interview Schedule

Details

School Name: ……

Address: ……

Phone Number: ……

Roll: ……

Time + Date ……

1. Would you define your school as a rural school?

YES / NO

2. Is your school intermediate, primary, or both?

INTERMEDIATE PRIMARY BOTH

3. How many roads is the school on?

( )

4. What are their names and their speed limits?

5. Have there been concerns in the past in relation to child pedestrian safety when traveling to and from school?

YES go to question 6. NO go to question 10.

6. What were they?

7. Were they alleviated?

YES go to question 8. NO go to question 9.

8. How were they alleviated?

.....
.....
.....

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.....

9. If they were not, what were the obstacles to alleviating them?

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.....
.....
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.....
.....
.....
.....
.....

10. Are there any current concerns in relation to child safety to child pedestrian safety when traveling to and from school?

YES go to question 11. *NO* go to question 12.

11. What are they?

.....
.....

12. What does your school do in regards to *traffic* safety?

13. Do Police Youth Education Officers visit your school to talk specifically about *traffic* safety?

YES **go to question 14.** *NO* **go to question 15.**

14. If yes how often?.. . . ..

15. How effective do you rate their performance when they visit?

POOR FAIR SATISFACTORY GOOD EXCELLENT

16. Would you like to have them visit more often?

YES **go to question 17.** *NO* conclude.

17. If yes, how often?..... .....