



RURAL SCHOOL SPEED MANAGEMENT TRIAL

FINAL REPORT

Prepared for



29 April 2013

Traffic and Transportation Engineers Ltd

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PROJECT NAME: Rural School Speed Management Trial

PROJECT NUMBER: 9000056

WRITTEN BY: David Mitchell / Nicole Lee

CHECKED BY: David Mitchell

DATE: 29 April 2014

REVIEWER: Pippa Mitchell

File Ref: 130619 Rural School Trial Final Report.docx

**Traffic & Transportation Engineers Ltd
PO Box 68871
Newton
AUCKLAND 1145**

**T: +64 9 921 4190
F: +64 9 921 4191**



EXECUTIVE SUMMARY

This report has been prepared with the aim of assessing the effect of advisory speed signs as an alternative means of managing traffic in school zones. Two signage options were assessed, a static advisory 40km/h sign and an electronic 60km/h sign. Three schools were trialled with each signage type as part of the development of a suite of tools under the 'Safer Journeys' strategy.

'Safer Journeys' – New Zealand's road safety strategy to 2020 – envisions a safe road system increasingly free of death and serious injury and introduces the Safe System Approach to New Zealand. The Safe System cornerstones include Safe Roads and Roadsides, Safe Speeds and Safe Road Use. The speed of traffic past rural schools is a major concern to many rural communities due to the conflict of the school drop-off and pick-up activities with the high speed through traffic. According to the NZTA's 'Standard Operating Procedure for Rural School Speed Management variable Speed Limits Trial', a Safe System approach should be used for improving road safety outside rural schools where the greatest risk of a high-severity crash is associated with traffic turning in and out of the school or adjacent intersections.

Generally rural schools have very few pedestrians crossing the road outside the school and therefore a 40km/h variable speed limit is not required or appropriate in these situations. Further such schools are often located on roads with higher speed limits. This trial investigates whether an appropriate speed environment for the turning traffic risk can be achieved using 60 or 70km/h variable speed limits signs, which are activated before and after school times only. The trial also includes one urban school, Halsey Drive, to provide a comparison.

In order to assess the efficacy of the two proposed school signs, pre and post-implementation observations were conducted. These observations were undertaken one month prior to the signs installation and one month following the installation. Of the two styles of signs installed the electronic 60km/h speed limit sign was trialled at schools situated on roads with a permanent 80km/h, while the static signs used in lower speed areas. The schools in the trial were;

- Halsey Drive Primary School (40km/h static signs)
- Dairy Flat School (60km/h active signs)
- Ramarama School (40km/h static signs)
- Ararimu School (60km/h active signs)
- Puni School (60km/h active signs)
- Glenbrook School (40km/h static signs)

A number of individual components were considered to assess the impact of the signs, including:

- Site observations and video recordings of general traffic and pedestrian patterns.
- Traffic Speed Profiles
- Consultation with parents

This information will be used to determine the benefits of two potential signage systems. The outcomes of the report include conclusions relating to the impacts of the trials, but not to make definitive recommendations around a preferred choice, given that the sample size is not overly large.

Electronic '60' Sign Trial

The three schools involved in this trial were Dairy Flat, Ararimu and Puni Schools. These are all rural schools.

All of the school pre-implementation workshops identified speed as an issue in one form or another. The key change observed was that once the signs were activated there was an immediate change in driver behaviour. This was noted through both the independent observations and the parental surveys. Once the signs are activated, almost all the vehicles slowed immediately and to a consistent level. Drivers entering and exiting the school (in particular) had more time to make decisions and could better rely on the consistency of approaching vehicle speeds before making turns. In the pre-installation observations a number of vehicles exiting the schools did so with reasonably heavy acceleration to get to the speed to approaching through traffic. With the signs activated, this behaviour was not observed. Clearly there was less stress on the drivers exiting the school because of more consistent and reduced through speeds.

The independent observations support that the signs have reduced, to varying degrees, but certainly normalise the speed profile past the schools. Drivers entering and exiting a school clearly have more time to make decisions and then to execute them as well. This will result in few near miss type incidents and will reduce driving stress on parents at a time which can be inherently stressful.

The parents' post-implementation perceptions followed similar themes – generally lower speeds around the peak times at the school when the signs were active and a much more limited change when the signs were not active.

It was noted that vehicle speeds did not reduce around the schools when the signs were turned off indicating that this type of installation did not encourage drivers to change their level of awareness around schools outside of peak times. There may be times when children are around and outside their school grounds on the local road network e.g. for class trips (although not observed as part of this trial). In these circumstances the signs would not be activated and it is unlikely that drivers would slow down.

With the electronic signs there is a need to ensure the activation times coincide with the peak periods of arrival and departures from the school. This gives the vast majority of parents and caregivers a safer and less stressful drive to and from school. Coordination with the school, pre-installation observations and post installation observations are essential to achieve this outcome.

Overall the operational speed results supported the observations, with the possible exception being on Waiuku Road at Puni School. The observations highlighted a much more consistent speed pattern through this area, but the speed results reflected a small drop in the mean speeds, which was surprising.

Advisory '40' Sign Trial

The three schools involved in this trial were Halsey Drive, Ramarama and Glenbrook Schools.

The advisory signs had a noticeably different effect on traffic behaviour in the areas around the schools. In general, it appeared speeds were reduced slightly at all times observed, compared to pre-trial observations. However, even during the periods of the heaviest school drop off and pick-ups the through speeds remained well above 40km/h. This was particularly the case in the rural areas where approach speeds are high (70 and 80km/h). Observations showed an inconsistency with through speeds, with a small number observing the 40km/h limit but most above this. The inconsistency resulted in most exit manoeuvres from the school that were similar to those of the 60km trial, with drivers able to pull away from the school in a smooth and controlled manner. There

were several times however when through vehicles that were travelling well above 40km/h had to brake to slow down for vehicles turning from the school, or vehicles exiting the school had to stop suddenly. None of these situations were considered as being dangerous, only inconvenient.

A common theme in the feedback from the parents' questionnaire was that the signs had a relatively small effect on reducing speeds past the respective schools. This was particularly the case at Halsey Drive School and was an expected result given that school related traffic dominates driver behaviour at peak school times in front of this school and speeds are already slow at these times.

Overall the perception from the parental surveys was that the installation of the static trial signs had not made them feel they needed to alter their driver behaviour. However, all school results identified a perception that the behaviour of other (school and non-school related) drivers had changed, resulting in lower speeds past the school.

Overall Results

The results from all the schools identified both perceived and actual changes to driver behaviour and speeds. The possible exception to this was Halsey Drive School where the situation around the school is already slow and congested, additional signage therefore had little effect.

The morning and afternoon speed results showed that both signage trials had demonstrable reduction in mean speeds. However, independent observations identified a 'finer grained' and distinctive difference on the consistency of vehicle speeds. The electronic signs clearly produced a more regular and predictable speed on adjacent roads whereas the static 40km/h advisory signs led to some higher and some lower speeds. Providing a consistent environment is important and a key aspect of the way that road networks are designed and developed. The trials clearly demonstrated that the electronic sign installations were more effective at achieving this consistency.

The static 40km/h signs reduced speeds although not as significantly as those from the active signs. However, there was a greater general reduction in speeds outside of the peak hours of the school something that the electronic signs did not achieve. It could be argued whether this is a benefit or not to the school safety and operation of the frontage roads.

As well as considering speeds, the effect on children walking or cycling to school was also reviewed. Of the six schools observed, only Puni had almost no activity or interaction with the adjacent road. This school has a separate off street area that drivers use to board or alight children and no children were observed walking to school. For the remainder of the rural schools (Ararimu, Ramarama, Glenbrook and Dairy Flat), drivers made use of roadways to park and walk across the road with children or children walked to school from nearby residences. Halsey Drive has a different situation to most of the schools as it is in an urban area with footpaths on both sides of the road and has a number of children walking to school. The only rural school that had similar footpaths was Ararimu School where all pick-up and drop-off parking is done on the street.

It is important to acknowledge that these signs are not the only solution for schools wishing to improve road safety outside the school. The signs are only one of tools available to schools and can be used in conjunction with other treatments. Combining the results of this study with others around the country will help advise technical experts making recommendations as to the most effective signage strategy to use.

TABLE OF CONTENTS

1.	INTRODUCTION	1
1.1	Strategic Context/Background	1
1.2	Project Description and Objectives	1
2.	Methodology.....	3
2.1	Traffic Speed Counts	3
2.2	Site Observations and Video Recordings	3
2.3	Consultation	4
3.	Ararimu School	5
3.1	Site Description.....	5
3.2	School Consultation	6
3.3	School Observations.....	7
3.4	Speed Survey Results	11
4.	Dairy Flat School	14
4.1	Site Description.....	14
4.2	School Consultation	15
4.3	School Observations.....	17
4.4	Speed Survey Results	19
5.	Glenbrook School	21
5.1	Site Description.....	21
5.2	School Consultation	22
5.3	School Observations.....	24
5.4	Speed Survey Results	26
6.	Halsey Drive School	28
6.1	Site Description.....	28
6.2	School Consultation	29
6.3	School Observations.....	31
6.4	Speed Survey Results	33
7.	Puni School	34
7.1	Site Description.....	34
7.2	School Consultation	35
7.3	School Observations.....	36
7.4	Speed Survey Results	39
8.	Ramarama School	42
8.1	Site Description.....	42
8.2	School Consultation	43
8.3	School Observations.....	45
8.4	Speed Survey Results	47
9.	MAJOR FINDINGS OF THE TRIAL.....	49
10.	CONCLUSION.....	52
11.	APPENDICES.....	53

List of Figures

<i>Figure 1-1 Locations of Rural Schools Trial</i>	<i>2</i>
<i>Figure 3-1 Ararimu School, Ararimu Road</i>	<i>5</i>
<i>Figure 3-2 Ararimu School.....</i>	<i>6</i>
<i>Figure 3-3 Northbound on Ararimu Road (South of Steel Road)</i>	<i>11</i>
<i>Figure 3-4 Southbound on Ararimu (South of Steel Road)</i>	<i>11</i>
<i>Figure 3-5 Northbound on Ararimu Road (South of Steel Road)</i>	<i>12</i>
<i>Figure 3-6 Southbound on Ararimu Road (South of Steel Road).....</i>	<i>12</i>

Figure 3-7 Eastbound on Steel Road	12
Figure 3-8 Westbound on Steel Road	12
Figure 3-9 Eastbound on Steel Road	13
Figure 3-10 Westbound on Steel Road	13
Figure 4-1 Dairy Flat School, Dairy Flat Highway	14
Figure 4-2 Dairy Flat School.....	15
Figure 4-3 Northbound on Dairy Flat Highway	20
Figure 4-4 Southbound on Dairy Flat Highway	20
Figure 4-5 Northbound on Dairy Flat Highway	20
Figure 4-6 Southbound on Dairy Flat Highway	20
Figure 5-1 Glenbrook School, Glenbrook-Waiuku Road.....	21
Figure 5-3 Northbound on Glenbrook-Waiuku Rd.....	26
Figure 5-4 Southbound on Glenbrook-Waiuku Rd.....	26
Figure 5-5 Northbound on Glenbrook-Waiuku Rd.....	27
Figure 5-6 Southbound on Glenbrook-Waiuku Rd.....	27
Figure 6-1 Halsey Drive School, Halsey Drive, Lynfield.....	28
Figure 6-2 Halsey Drive School.....	29
Figure 6-3 Eastbound on Halsey Drive	33
Figure 6-4 Westbound on Halsey Drive	33
Figure 6-5 Eastbound on Halsey Drive	33
Figure 6-6 Westbound on Halsey Drive	33
Figure 7-1 Puni School, Waiuku Road	34
Figure 7-2 Puni School.....	35
Figure 7-3 Eastbound on Waiuku Road	40
Figure 7-4 Westbound on Waiuku Road	40
Figure 7-5 Eastbound on Waiuku Road	40
Figure 7-6 Westbound on Waiuku Road	40
Figure 7-7 Northbound on Aka Aka Road	41
Figure 7-8 Southbound on Aka Aka Road.....	41
Figure 7-9 Northbound on Aka Aka Road	41
Figure 7-10 Southbound on Aka Aka Road.....	41
Figure 8-1 Ramarama School, Ararimu Road.....	42
Figure 8-2 Ramarama School	43
Figure 8-3 Eastbound on Ararimu Road.....	48
Figure 8-4 Westbound on Ararimu Road.....	48
Figure 8-5 Eastbound on Ararimu Road.....	48
Figure 8-6 Westbound on Ararimu Road.....	48

1.0 INTRODUCTION

1.1 Strategic Context/Background

'Safer Journeys' – New Zealand's road safety strategy to 2020 – envisions a safe road system increasingly free of death and serious injury and introduces the Safe System Approach to New Zealand. The Safe System cornerstones include Safe Roads and Roadsides, Safe Speeds and Safe Road Use. The speed of traffic past rural schools is a high concern to many rural communities due to the conflict of the school drop-off and pick-up activities mixed with the high speed traffic of through traffic.

Local and regional authorities throughout the country have for some time battled to find appropriate mechanisms to improve safety around schools. Different thresholds and strategies have been created in local situations that have worked to various degrees. The differences between urban and rural schools have made such strategies more complicated. Rural schools are generally located on high speed routes with little or no pedestrian facilities. Urban schools tend to have a more significant pedestrian presence, higher traffic volumes and lower speeds.

According to the NZTA's 'Standard Operating Procedure for Rural School Speed Management variable Speed Limits Trial', a Safe System approach for improving road safety outside rural schools is important. In these situations the greatest risk of a high-severity crash is associated with traffic turning in and out of the school or adjacent intersections. Generally rural schools have no or few pedestrians crossing the road outside the school and therefore a 40km/h variable speed limit is not required or appropriate. This trial investigates whether an appropriate speed environment for the turning traffic risk can be achieved using 60km/h variable speed limits, which are activated before and after school times only.

Urban schools in the Auckland region have tended to use the 40km/h electronic school zone sign and electronic warning signs, which have been very useful in those situations. Rural schools have been treated by each local authority individually, prior to the formation of the 'Supercity' and Council Controlled Organisations (CCO's). Several different designs have been used around the region, with other authorities throughout the country grappling with the same issue.

This trial will carry out a systematic pre and post-installation assessment including speed measurements and observations of driver behaviour. This will be used to determine the benefits of two potential signage systems. The outcomes of the report include conclusions relating to the impacts of the trials, but not to make definitive recommendations around a preferred choice, given that the sample size is not overly large.

1.2 Project Description and Objectives

The purpose of the trial is to:

- Evaluate the effectiveness and safety of traffic signs that differ from those specified in Schedule 1 of the Rule;
- Assess the effect of two types of speed signs (electronic and static) as alternative means of managing traffic in school zones; and
- Evaluate the effectiveness of these two types of school zone signs in urban areas, on roads with moderate traffic volumes in rural areas and finally to provide a different geographical area of New Zealand from the other work that has been conducted.

Six schools were identified by AT as part of the trial as follows. The location of these schools is demonstrated in Figure 1-1

- Halsey Drive Primary School (40km/h static signs)
- Dairy Flat School (60km/h active signs)
- Ramarama School (40km/h static signs)
- Ararimu School (60km/h active signs)
- Puni School (60km/h active signs)
- Glenbrook School (40km/h static signs)



Figure 1-1 Locations of Rural Schools Trial

These schools were initially investigated to determine if they could warrant the installation of 40km/h school zones as used elsewhere throughout the region. These initial investigations showed that due to not meeting one or more of the evaluation criteria, 40km/h zones or electronic warning signs were not appropriate. Following this, Auckland Transport (AT) identified an on-going need to have some form of speed management at these schools to assist in the overall safety of children getting to and from school.

2.0 Methodology

In order to assess the efficacy of the two proposed school signs, pre and post-implementation trials were undertaken. These trials were undertaken one month prior to the signs installation and one month following the installation.

There were two styles of signs installed, a static advisory 40km/h sign and an electronic 60km/h sign. The electronic 60km/h speed limit sign is being trialled at schools situated on roads with a permanent 80km/h, while the static signs are used in lower speed areas.

Glenbrook, Halsey Drive and Ramarama schools had the static signs installed while Ararimu, Dairy Flat and Puni schools had electronic signs. Specific details of each installation are discussed later in this report.

The trial included a number of individual components including:

- Site observations and video recordings of general traffic and pedestrian patterns.
- Traffic Speed Profiles
- Consultation with parents

2.1 Traffic Speed Counts

Tube counts were used to measure operational traffic speeds past the schools. These were undertaken one month before and one month after the installation of the signs. These counters recorded each individual vehicle and did not record in speed bins (or different ranges of speed). The count locations were confirmed with AT prior to installation. The tube counts were in place for approximately one week for each count period.

The speed data was analysed by taking the morning and afternoon periods for each school and grouping the data into five minute intervals over an hour period. The exact times of the observations varied for each school due to the varied start and finish times of the schools. The data produced for each direction and each period included both volume and speed data to provide a quantitative assessment of each signage trial.

2.2 Site Observations and Video Recordings

In addition to traffic speed profiles it was necessary to undertake site observations at each school. These were done both pre and post-implementation of the signs. These observations provided an understanding of road user behaviour and enabled an analysis of the signs and whether they were having the desired effect. This qualitative analysis was undertaken using video recordings of driver behaviour prior to and post installation of the signs. In addition, a road safety expert undertook a series of site visits to evaluate the effectiveness of the signs. These site visits were undertaken at the start and end of the school day when the weather was reasonable.

The video recordings were undertaken over the same time periods, but didn't coordinate with the days the site visits were undertaken. Between one and three camera positions were used, depending on the location of the schools and the surrounding roads.

The on-site and video observations were compared to ensure there was consistency between the various times and dates. No anomalies were found and it was concluded that all observation periods were consistent with 'normal' school and road operating periods.

2.3 Consultation

Pre and post-implementation school focus group meetings were held. This provided information on concerns parents had about safety around the school and also provided feedback about the effects of the signs on speeds. In addition, parents were surveyed on their perceptions of safety and speeds around the school.

3.0 Ararimu School

Ararimu School is located in a rural setting on the corner of Ararimu Road and Steel Road. It is approximately 7.5km from the Ramarama exit on the Southern Motorway, as shown in Figure 3-1. Ararimu Road is a long, straight road which is classified as a collector road in the Auckland Council District Plan (Franklin Section) (the District Plan) and has a 100km/h speed limit through this section. The five day average daily traffic volume (ADT) on Ararimu Road is 1,760 vehicles per day (vpd), as recorded for this project.

Steel Road is classified as a local road and is approximately 1.5km long. It is a dead-end road. The speed limit on Steel Road is also 100km/h although the operating speeds are well below this. The five day ADT as recorded for this project is 370vpd. Most of the school activity occurs on Steel Road at several different areas. Beyond the school, there is little activity on Steel Road with mainly residential/farming properties and a poultry farm.

Ararimu School has a roll of 100 students from Year 1 to Year 8. The school day starts at 8:50am and finishes at 3pm



Figure 3-1 Ararimu School, Ararimu Road

3.1 Site Description

The main accesses to the school are on Steel Road where there are several parking areas, these are listed below:

- A parking area on the western edge of the school with access from Steel Road, referred to in this report as the 'western car park'.
- A parking area comprising 90° spaces on the school side of Steel Road. This area is accessed directly off Steel Road.
- An area of angle parking (60°) directly opposite the school on Steel Road, outside the community hall.

- The community hall's car park is also used as a parking area by parents and school buses (not necessarily those associated with this school).
- Occasionally the on-street parking is used near the intersection of Steel Road and Ararimu Road on the school side. This area is not marked.

The various parking areas and school layout is shown in Figure 3-2.

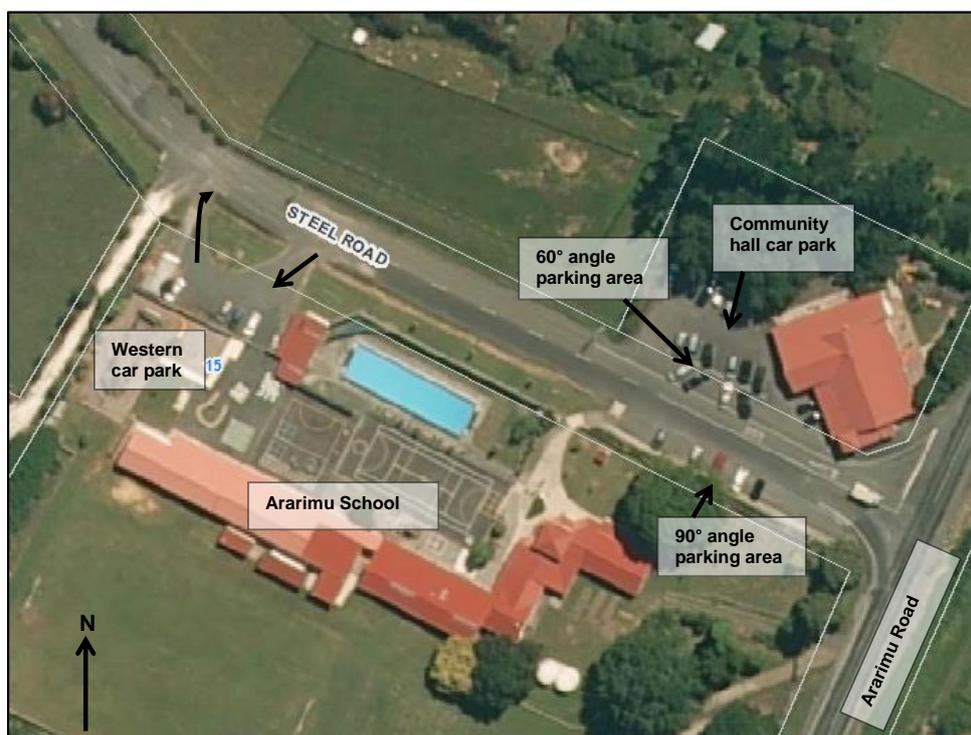


Figure 3-2 Ararimu School

3.2 School Consultation

3.2.1 Pre-Implementation Consultation

As part of the consultation process, surveys were distributed to parents by the school prior to the signs being installed. Twenty parents responded to the survey. The response rate for this school was approximately 15 per cent (based on a school roll of 130 pupils). This is only an approximate response rate, as some families will have more than one child at the school. It is notable that Ararimu School's role has increased from 89 pupils only a year ago. The survey results are detailed in full in Appendix A.

A summary of parents' responses have been listed below:

- 95% stated that the average speed they drove past the school on Ararimu Road was between 60-80km/h. 5% said their average speed was less than 60km/h.
- There was a near even split between parents who believed that the safe speed for traffic passing the school is between 50-60km/h and those that believe that speeds lower than 50km/h were safe for passing this school (55% and 45% respectively).

- 45% observed other drivers slowing when children were in the vicinity of the school. 25% observed that other drivers did not slow down when driving past the school. 20% had observed drivers lowering their speed limit near the school regardless of whether there were children around. 10% had observed other drivers slowing during school hours on school days.
- 65% had not observed crashes or near misses on the road outside the school. 32% state they had observed crashes or 'near misses'. These incidents were listed as being caused by several factors, including a blind spot turning into Steel Road, vehicles slowing to turn into Steel Road, pedestrian conflict with vehicles and dangerous overtaking.
- Additional comments were made by parents regarding the lack of pedestrian facilities, poor parent driving behaviour, dangerous overtaking manoeuvres and the need for improved signage.

More detailed information from these surveys is provided in Appendix A.

3.2.2 Post-Implementation Consultation

Post-implementation consultation took place at each school. Sixteen parents responded to the post-implementation survey. A summary of this survey is detailed below:

- 63% of parents stated that the average speed they drove past the school on Ararimu Road was below 60km/hr. 37% said their average speed was between 60-80km/hr.
- 38% of respondents had observed drivers slowing down whether or not children were present. 33% observed that other drivers reduced their speeds when the illuminated speed signs are operating. 25% observed that other drivers reduced their speed when children were in the vicinity. 4% observed that other drivers did not reduce their speed within the school zone.
- 81% of parents stated that they slowed down regardless of children being present. 19% stated they slowed down only during school hours and on school days.
- Additional comments from parents included the need for a crossing and footpath, that speed limits should be lowered further and that regardless of the signs drivers are still travelling faster than 80km/h.

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3.2.3 Summary of Pre and Post Implementation School Consultation

The installation of the activated signs appears to have had an effect on parents' perceptions of speeds outside Ararimu School.

Firstly, prior to the installation of the signs, 95% of parents stated their average speed past the school was between 60-80km/hr. Post-implementation 63% of parents stated that their average speeds past the school were below 60km/hr. Pre-implementation, fewer than 5% of parents stated their average speed was less than 60km/hr.

Prior to the installation of the signs, 25% of parents stated they observed other drivers did not slow down when driving past the school. Post-implementation, 4% of parents observed that other drivers did not slow down past the school. Thirty-three per cent of parents had observed other drivers slowing down when the illuminated speed signs were operating.

3.3 School Observations

3.3.1 Pre-implementation Observations

The morning site visit took place on Friday 21 September 2012 between 7-9:10am and the afternoon site visit was undertaken on Wednesday 19 September 2012 between 2-3:30pm. The

video recording was undertaken on Thursday 13 September 2012 between the hours of 7-9:15am and 2-4pm. The location of the video cameras is provided in Appendix A.

Like all schools, there are pronounced peaks just before the start and end of the school day. The morning period was busiest between 8:25-9am. The afternoon peak was busiest between 2:50-3pm. The specific observations from the site visit and the video recordings are detailed in Appendix A.

There were several safety concerns identified from the site visits and video observations:

- The 90° parking area in particular is in close proximity to the intersection with Ararimu Road at times created conflict with vehicles turning into Steel Road. This typically involved vehicles turning into Steel Road being confronted with stationary vehicles or those manoeuvring into or out of parking spaces.
- The angle parking on Steel Road (both outside the school and the community hall) created some safety concerns, particularly because at times it appeared drivers were not checking properly before entering or exiting these car parks. In particular, there was conflict between drivers reversing out of (or into) these car parks at the same time on both sides of the road.
- There is a significant amount of pedestrian activity during the morning and afternoon periods across Steel Road from the community hall to the school and back again. Several children were observed to be crossing Steel Road outside the community hall without an adult present.
- Drivers also parked on the narrow shoulder of Steel Road. This resulted in the vehicles protruding into the adjacent traffic lane. Overtaking vehicles had to cross the centre line in order to pass these vehicles. This was exacerbated by children and adults opening car doors into the traffic lane (as opposed to the verge).

3.3.2 Automatic speed counts

Automatic speed counts were undertaken on site from Thursday 13 September 2012 until Wednesday 19 September 2012. There were two sites for the speed counts at Ararimu School. The first automatic speed counter was on Steel Road, west of Ararimu Road and the second counter was located on Ararimu Road. An aerial photo illustrating these locations is provided in Appendix A.

Table 3-3 and Table 3-4. Below summarise the operational speed counts on Steel Road.

Steel Road	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Westbound	182	98	90
Eastbound	180	98	88

Table 3-1 Steel Road Traffic Volumes

Steel Road 85 th Percentile Speed	Km/h
5 Day	54
8-9am	48
2-3pm	50.2
3-4pm	39.2

Table 3-2 Steel Road Average Speeds

Table 3-3 and Table 3-4 below summarise the speed counts on Ararimu Road.

Ararimu Road	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Northbound	884	636	566
Southbound	893	658	527

Table 3-3 Ararimu Road Traffic Volumes

Ararimu Road 85 th Percentile Speed	Km/h
5 Day	87.2
8-9am	82.4
2-3pm	84.2
3-4pm	82.6

Table 3-4 Ararimu Road Average Speeds

A more detailed table containing the five day Average Daily Traffic volumes and 85th percentile speeds at peak times on both roads are detailed in Appendix A.

3.3.3 Post-Implementation Observations

The post-implementation site visit was carried out on the morning of Tuesday 26 March and afternoon of Thursday 14 March 2013. The video observations were carried out on 5 March 2013 between 7-9:15am and 2-4pm.

Ararimu School has had a combination of electronic and static signs installed. A plan detailing the locations of these signs in relation to the school can be found in Appendix A. It must be noted that red patches were installed on both Ararimu Road and Steel Road as threshold treatments but the word 'Slow' was not marked on these despite being proposed on the construction plans. The electronic signs are activated from 8:25-9am and 3-3:20pm.

No signs were installed on Steel Road facing the school. This means that parents that have arrived at the school and spent some time there may not be aware of the speed restrictions in force as they leave the school. This issue was also highlighted in several other of the schools observed.

During the morning peak, the through traffic vehicle speeds on Ararimu Road appeared to be the same as during the pre-implementation observations. However, the through traffic volumes were very light, with periods of up to one minute with no vehicles at all.

Several school buses pick up from this location in the morning. The first bus observed arrived at 7:40am and parked across the intersection on Steel Road and waited for normal pickups. The bus was parked in this position for around five minutes and partially blocked the intersection such that only the right hand lane from Steel Road can be used.

Prior to 8:25am, three overtaking manoeuvres were observed with southbound vehicles on Ararimu Road, which was not the case with the pre-implementation observations.

The school drops off period started at around 8:10am and continued to increase to a peak around 8:45-9:00am. From 8:25am the through speeds on Ararimu Road were noticeably lower, but associated with low through flows. Flows and operating conditions on Steel Road were largely unaffected by the installation of the trial speed signage.

It was noticeable that the lower through vehicle speeds on Ararimu Road appeared to have improved the operation of the intersection as it meant there was more time for people to make decisions and utilise gaps in the through traffic.

Unlike the initial observations four children were observed walking to school, including a group of three with reflective jackets on walking with an adult. One child cycled from the south along Ararimu Road crossing over from the eastern to western side at the bridge to access the school.

In general, the video observations were similar to the site observations. It was noted that when compared with the pre-implementation recording the post-implementation video recording captured fewer parents parked on the shoulder on Steel Road. This resulted in less overtaking manoeuvres along this road.

3.3.4 Summary of Pre and Post-Implementation Observations

An immediate change in driver behaviour was observed after the installation of the electronic signs. Once the signs were activated almost all through-vehicles slowed down. Vehicle speeds were also observed to be more consistent. This consistency in speeds improved the overall operation at Ararimu School as there appeared to be more time for drivers wishing to turn into or exit from the school on Steel Road. In addition, drivers could rely on the consistency in the speed of the approaching vehicle and therefore could make the turn with increased confidence.

In the pre-installation observations, a number of vehicles exiting the Steel Road intersection did so with reasonably heavy acceleration to meet the speed of the approaching through-traffic. Post-implementation, once the signs were activated, this behaviour was not observed. It appears there was less stress on the drivers exiting the school as a result of reduced through-speeds.

It was noted that vehicle speeds did not reduce around the schools when the signs were turned off indicating that this type of installation did not encourage drivers to change their level of awareness around schools outside of peak times. There may be times when children are around and outside their school grounds on the local road network e.g. for class trips (although not observed as part of this trial). In these circumstances the signs would not be activated and it is unlikely that drivers would slow down. Therefore it is important to ensure that the signs are activated at times that are appropriate for each school.

3.4 Speed Survey Results

An analysis and comparison of the pre and post-implementation speed and traffic counts for Ararimu Road (south of Steel Road) and Steel Road were undertaken. The times analysed were between 8:15-9:15am and 2:35-3:35pm to coincide with the school peaks. Appendix A contains the full speed survey results and a comparison in volume profiles. This ensures that the comparative speed results were being assessed.

3.4.1 Ararimu Road

Results from the count taken on Ararimu Road (south of Steel Road) show a reduction in through speeds during the morning peak of typically 9-10km/h for northbound traffic and 5-6km/h for southbound traffic. These changes are summarised in Figure 3-3 and Figure 3-4 below, with the 2012 speeds recorded pre-implementation and the 2013 speeds recorded post the implementation of the signs. The mean speed for both directions during the period that the signs are activated is below the advisory 60km/h, although it clearly rises to pre-survey speeds following deactivation of the signs.

Morning Peak Ararimu Road

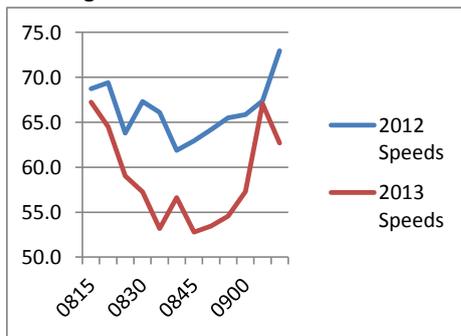


Figure 3-3 Northbound on Ararimu Road (South of Steel Road)

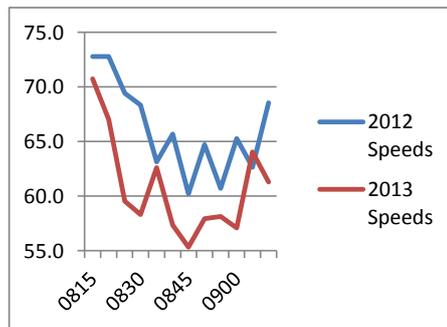


Figure 3-4 Southbound on Ararimu (South of Steel Road)

The afternoon school peak showed a similar pattern, with higher reductions for northbound traffic speeds. Both morning and afternoon mean speeds were well below 60km/h during the time when the signs are active (see Figure 3-5 and Figure 3-6). The one anomaly was northbound speeds, which did not recover to pre-installation speeds until well after the signs were switched off. By this time however, traffic volumes were low and this data could have been influenced by a particularly slow vehicle.

Afternoon Peak Ararimu Road

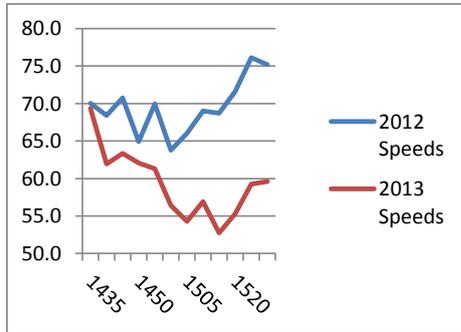


Figure 3-5 Northbound on Ararimu Road (South of Steel Road)

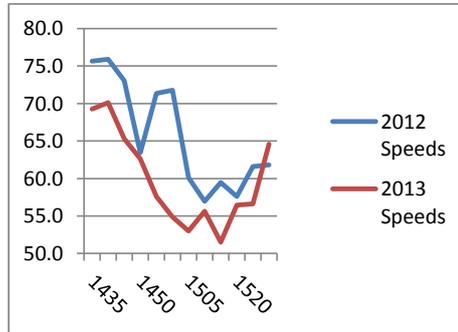


Figure 3-6 Southbound on Ararimu Road (South of Steel Road)

3.4.2 Steel Road

The results for morning and afternoon peak periods on Steel Road show that speeds are essentially unchanged after the inclusion of the electronic signs (see Figure 3-7 to Figure 3-10). This is not surprising as traffic on Steel Road at these periods is almost entirely composed of school related vehicles that are manoeuvring into or around on road parking spaces.

Morning Peak Ararimu

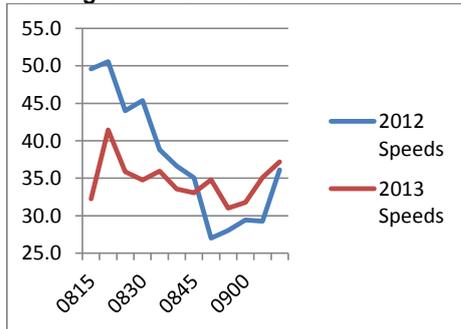


Figure 3-7 Eastbound on Steel Road

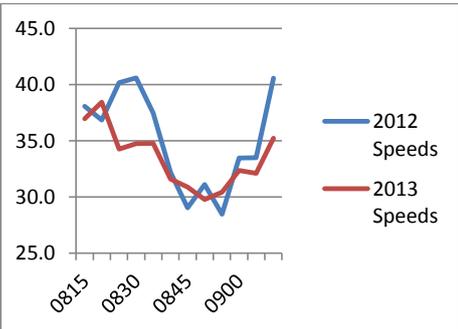


Figure 3-8 Westbound on Steel Road

Afternoon Peak Steel Road

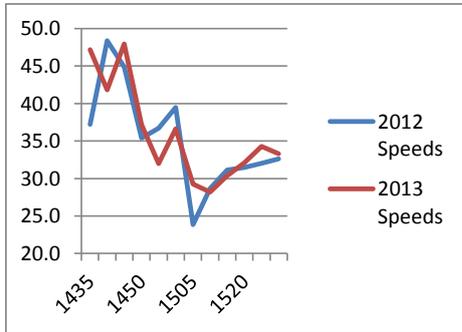


Figure 3-9 Eastbound on Steel Road

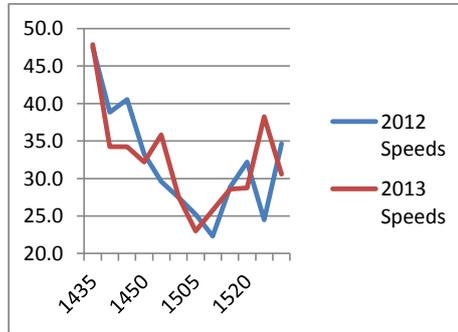


Figure 3-10 Westbound on Steel Road

4.0 Dairy Flat School

Dairy Flat School is situated on Dairy Flat Highway (State Highway 17), approximately 14.5 km from the Auckland-Waiwera Motorway (see Figure 4-1). Dairy Flat Highway had its State Highway status revoked in 2012 and is now classified as a regional arterial road. The school is located approximately 60m from Landfill Access Road. As the name suggests, this road leads to a landfill that serves the greater Auckland region. This generates a significant amount of truck traffic past the school and serves to slow the through traffic as trucks either slow to turn left into Landfill Access Road or are making the right turn out of Land Fill Access Road and take time to pick up speed.

The posted speed limit along the majority of the Dairy Flat Highway is 100km/h. However, in the section around the school this reduces to 80km/h.

Dairy Flat School has a roll of 220 children from Year 1-8. The school day starts at 8:55am and finished at 2:55pm.



Figure 4-1 Dairy Flat School, Dairy Flat Highway

4.1 Site Description

On Dairy Flat Highway in front of the school there is a flush median and right-turning lane for access into the main car park from the south. There is also a wide shoulder which vehicles turning left into the school can use to access the school car park without delaying the through traffic. There are separate right and left-turning lanes for vehicles exiting the school car park.

The school car park is reasonably well hidden from the road behind earth mound and planting. During observations there was a mobile dental surgery parked at the southern end of the school car park, which may have affected the parking availability but only to a minor degree. Figure 4-2 shows the layout of Dairy Flat School.



Figure 4-2 Dairy Flat School

4.2 School Consultation

4.2.1 Pre-Implementation Consultation

As part of the consultation process surveys were distributed to parents by the school. Ninety parents responded to the survey. The response rate was for this school approximately 41% (based on a school roll of 220 pupils). This is only an approximate response rate, as some families will have more than one child at the school. The survey results are detailed in Appendix B.

A summary of parents' responses are provided:

- Eighty-two per cent of parents stated their average speed past the school was between 60-80km/h, with 14% of parents travelling below 60km/h past the school. Four per cent of parents stated their average speed was above 80km/h.
- Most parents (60%) believed that between 50-60km/h was a safe speed for traffic passing the school. Thirty-seven per cent believed that below 50km/h was a safe speed and 3% believed more than 60km/h was safe.
- Thirty-four per cent stated that other drivers did reduce their speed within the school zone,

but only during school hours on school days. Twenty-nine per cent stated that other drivers did reduce their speed but only when there were children in the vicinity. Twenty-six per cent said that other drivers did reduce their speed within the school zone regardless of whether children were present. Eleven per cent stated that other drivers did not reduce their speed within the school zone.

- Sixty-one per cent reported that they had observed crashes or 'near misses' outside the school. Thirty-nine per cent reported that they had not observed any crashes or near-misses outside the school. Of those that have observed incidents, all of these were recorded as near misses. These were mostly related to parked cars obscuring the view of other vehicles and high traffic speeds when entering/leaving the school gates.

Parents made additional comments about road safety at Dairy Flat School. These included concerns about vehicle speeds past the school, high traffic volumes, the need for school buses, parking facilities and pedestrian facilities. More detailed information from these surveys is provided in Appendix B.

4.2.2 Post-Implementation Consultation

Thirty parents responded to the post-implementation survey. The survey results are summarised below:

- Fifty-seven per cent stated their average speed was between 60-80km/h. Forty-three per cent stated their average speed was below 60km/h
- Fifty-three per cent had observed other drivers reducing their speed only when the electronic speed limit signs are operational. Thirty-three per cent stated that they had observed other drivers reducing their speed whether or not children were present. Seven per cent had observed other drivers reduce their speed only when children were present. Seven per cent had not observed other drivers reducing their speed within the school zone.
- Parents were asked if they reduced their speed while driving in the school zone. Ninety-seven per cent stated that they did slow down, regardless of whether they see children or not. Three per cent stated they slowed down only during school hours on school days. For parents that did reduce their speed, they were asked what speed they slowed down to. Sixty per cent stated they slowed down to below 60km/hr. Forty per cent stated they slowed down to around 60km/hr.

Additional comments were made from parents about road safety at Dairy Flat School. These included comments about the effects of the signs on vehicle speeds past the school, the need for lower speed limits in front of the school, concerns about parking and concerns about some drivers tailgating those who slow down to the speed limit.

4.2.3 Summary of Pre and Post Implementation School Consultation

It appears that parents perceptions of speeds past the school has changed with the implementation of the signs. Pre-installation, 82% of parents stated their average speed past the school was between 60-80km/h. This had reduced to 57% post implementation. Pre-installation, 14% of parents stated they travelled past the school at below 60km/h. Post-installation, 43% of parents stated they travelled past the school at less than 60km/h.

There was also a difference in the parents' perception of other drivers' speeds past the school. Pre installation 11% of parents thought that other drivers did not reduce their speed while travelling past the school. Post installation this had reduced to 7%.

4.3 School Observations

4.3.1 Pre-Implementation Observations

The site observations were undertaken on Wednesday 26 September 2012 with video recording taking place on Thursday 13 September 2012 between the hours of 7:30-9:30am and 2:30-4:30pm. The location of the video cameras is detailed in Appendix B. The busiest times in the morning peak were between 8:25-9am. The afternoon peak was busiest between 2:40-3:10pm. Detailed observations from the site visits and video recordings are in Appendix B.

There were several safety concerns identified from the site visits and video observations:

- The through-traffic speeds and traffic volumes were high.
- Vehicles parking to the south of the school exit appeared to reduce the sight lines of vehicles turning right out of the exit. This resulted in parents having to creep onto the road space to check if the way is clear.
- Through vehicles were using the shoulder and right turning bay to overtake trucks slowing to turn into Landfill Access Road.
- In the afternoon peak many parents parked on the road outside the school. This resulted in more pedestrian activity across the Highway and manoeuvring into and out car parks. Several parents did 'U' turns to leave these on-street parking spaces.

4.3.2 Automatic speed counts

Automatic speed counts were undertaken on site from Friday 14 September 2012 until Thursday 20 September 2012. Only one location was used for the speed counts and this was directly in front of the school. A summary of the speed counts is identified in Table 4-1 and Table 4-2 below.

Dairy Flat Highway	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Northbound	3254	2545	1984
Southbound	2768	2434	1935

Table 4-1 Dairy Flat Highway Traffic Volumes

Dairy Flat Highway 85 th Percentile Speed	km/hr
5 Day	85.2
8-9am	81
2-3pm	81
3-4pm	81

Table 4-2 Dairy Flat Highway 85th Percentile Speeds

A more detailed table containing the five day Average Daily Traffic volumes and 85th percentile speeds at peak times are detailed in Appendix B.

4.3.3 Post-Implementation Observations

The post implementation site visit was carried out on 22 March 2013. The video observations were undertaken on 5 and 6 March 2013.

The signage installed at Dairy Flat School included double gated electronic signs on both main approaches from the Dairy Flat Highway. There is one additional approach to the controlled area from the Redvale Landfill. A single static sign to warn trucks leaving the landfill site was installed on this road. In addition to the signs, there are red patches and 'SLOW' markings. Please refer to Appendix B for a construction plan detailing the signage locations. The signs are active from 8:25-9am and 2:50-3:10pm.

Similar traffic patterns to those observed during the pre-implementation stage were seen prior to the sign activation, with higher through vehicle speeds that were more consistent with the 80km/h posted speed limit.

Once the signs are activated through speeds were noticeably lower. Two buses entered the school just before 8:30am, immediately after activation of the signs. The morning peak had fewer issues according to the pre-implementation observations and this was also the case with these observations. The wide shoulders and right turn bay provide areas for vehicles to pull off the Highway so as to not impede through traffic speed. The lower speeds associated with the signs also reduced the impact of turning vehicles on the Highway showing that drivers clearly had more time to make decisions.

Following the signs being switched off, through speeds returned to 'normal' in a short period of time. By 9am, when the signs were turned off, there were very few vehicles in the school car park.

In the afternoon period, vehicles started to enter the school from around 2:40pm. Unlike the morning peak vehicles also parked on the highway, with numbers building steadily with up to 12 cars parked north of the school and seven south of the school car park exit. Vehicles started to leave from 2:48pm.

Through vehicle speeds slowed significantly once the signs came on in the afternoon, which assisted with vehicles entering or leaving the school car park. The one issue that continued to cause problems were vehicles parked on the road. Vehicles exiting the school had to edge forward slowly on order to see past these parked vehicles. The lower speeds certainly made the situation safer but restricting parking near the exit would further improve safety. By 3:10pm there were only six cars parked on the road although a number of cars were still exiting the car park in both directions. The through vehicles speeds increased almost immediately upon the signs being turned off.

The morning video observations were affected by the arrival of a traffic management team, who placed "Road Works" signs and cones on the road at approximately 8:30am. The school sign would have been turning on at this time. By 9am road cones had been placed all along the road outside the school and traffic speeds were very slow. It was not possible to make any useful observations about the effectiveness of the signs during this morning observation period.

The afternoon video observations were undertaken on the day before the morning videos were taken. This was before the traffic management team had arrived. The observations recorded were similar to those from the site visit. Through vehicle speeds slowed significantly once the signs were switched on. It was also noted that parents parking on the street obscured the view of those trying to leave the car park.

4.3.4 Summary of Pre and Post-Implementation Observations

An immediate change in driver behaviour was observed in response to the activation of the electronic signs. Immediately after the electronic signs were turned on almost all through-vehicles slowed down. Vehicle speeds were also observed to be more consistent. This consistency in speeds improved the operation of the Dairy Flat School car park as there appeared to be more time for drivers wishing to turn into or exit from the school. In addition, drivers could rely on the consistency in the speed of the approaching vehicle and therefore could make the turn with increased confidence.

In the pre-installation observations, a number of vehicles exiting the school did so with reasonably heavy acceleration to meet the speed of the approaching through-traffic. Post-implementation, once the signs were activated, this behaviour was not observed. It appears there was less stress on the drivers exiting the school as a result of reduced through-speeds.

Although the effect of the electronic signs was clearly observed, it appears that they affect the speeds of drivers only while they are activated. Vehicle speeds remain at the posted speed limit levels outside of the times the signs are switched on. This indicates that this type of installation did not encourage drivers to change their level of awareness around schools outside of peak times. There may be times when children are around and outside their school grounds on the local road network e.g. for class trips (although not observed as part of this trial). In these circumstances the signs would not be activated and it is unlikely that drivers would slow down. Therefore it is important to ensure that the signs are activated at times that are appropriate for each school.

4.4 Speed Survey Results

An analysis and comparison of the pre and post-implementation speed and traffic counts for Dairy Flat Highway was undertaken. The times analysed were between 8:15-9:15am and 2:30-3:15pm. Appendix B has the full speed survey results and a comparison in volume profiles. This ensures that the comparative speed results were being assessed.

Of all the sites, Dairy Flat showed the most noticeable change in mean speed recordings. It was noted however that there were some road works happening in the vicinity of the school that may have affected the overall results.

The pre-trial implementation had mean speeds of around 60km/h for northbound and 70km/h for southbound traffic during the morning peak period. This dropped to almost 40km/h for northbound and below 55km/h for southbound vehicles. Figure 4-3 and Figure 4-4 demonstrate this with a clear difference between the pre- implementation (2012 Speeds) and the post-implementation (2013 speeds) data.

Morning Peak Dairy Flat Highway

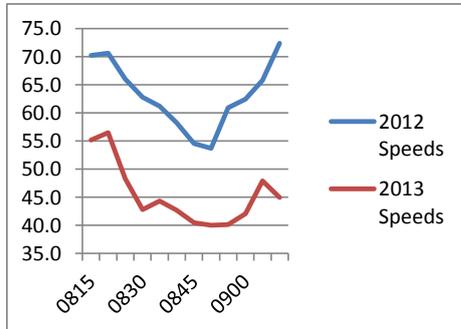


Figure 4-3 Northbound on Dairy Flat Highway

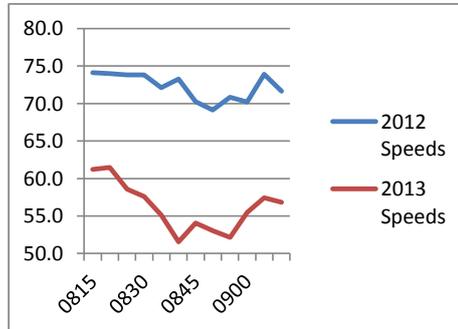


Figure 4-4 Southbound on Dairy Flat Highway

The afternoon school peak showed similar patterns to the morning, with the northbound mean reducing from 50-55km/h to 35-40km/h. The effect on southbound through traffic was less noticeable with the reduction in speeds around 6-8km/h with the post implementation mean speeds around 40-45km/h. Figure 4-5 and Figure 4-6 demonstrate this.

Afternoon Peak Dairy Flat Highway

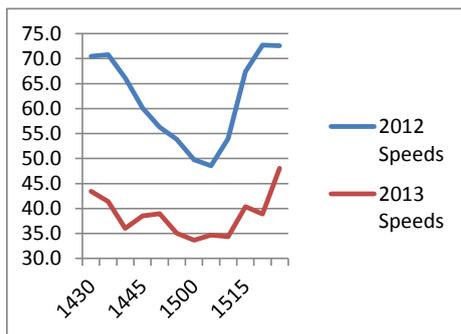


Figure 4-5 Northbound on Dairy Flat Highway

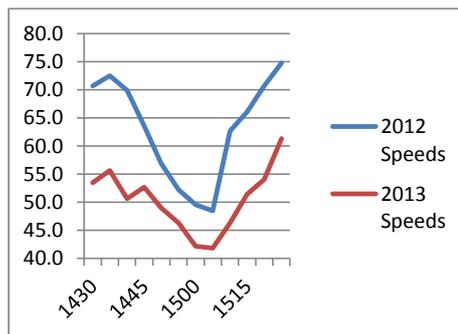


Figure 4-6 Southbound on Dairy Flat Highway

Traffic volumes at this site did not vary significantly between the two surveys.

5.0 Glenbrook School

Glenbrook School is situated on Glenbrook-Waiuku Road, approximately 20km west of Pukekohe. Figure 5-1 demonstrates this. Glenbrook-Waiuku Road is classified as an arterial road in the District Plan and carries approximately 3,125 vehicles per day. It is a major link between Waiuku and Drury. The section of road outside the school has a posted speed limit of 70km/h, although this changes to 80km/h north and south of the school. The school day begins at 9am and finishes at 2:50pm. In 2012, Glenbrook School had a roll of 203 students from Year 1 to Year 8.



Figure 5-1 Glenbrook School, Glenbrook-Waiuku Road

5.1 Site Description

Waiuku Road has one lane in each direction with a separate right turn bay provided to assist access into the school. There are white edge-lines on both sides of the road and a double yellow centre line outside the school. The school has an on-site teachers' car park at the northern end of the site outside the main administration building. There are two parking areas for, one in front of the teachers' car park (North car park) and the other further south, alongside Waiuku Road (South car park) (see Figure 5-2). The South car park is fenced from the fields, with a short 5m break on the car park side at the main entry to the school to allow children to enter and leave the school. In between the two car parks is a small island with a bus-turning bay. In addition to these formalized areas, parents driving north can pull off the road onto a wide sealed/metaled shoulder area to drop off and pick up. The layout is shown in Figure 5-2.



Figure 5-2 Glenbrook School

5.2 School Consultation

5.2.1 Pre-Implementation Consultation

As part of the consultation process, surveys were distributed to parents by the school. Thirty-three parents responded to the survey. The response rate for this school was 16% (based on a school roll of 203 pupils). This is only an approximate response rate, as some families will have more than one child at the school. The survey results are detailed in full in Appendix C.

A summary of parents' responses have been listed below:

- 91% stated their average speed past the school was between 60-70km/h, while 9% stated their average speed was below 60km/h.
- 44% of parents believed that between 50-60km/h was a safe speed to be travelling past the

school. 29% of parents believed more than 60km/h was safe, while 19% stated that between 40-50km/h was a safe speed. 8% of parents believed that less than 40km/h was a safe speed.

- 52% stated that other drivers did reduce their speed within the school zone, but only during school hours on school days. 27% said that other drivers did reduce their speed within the school zone, regardless of whether there were children there. 12% stated that other drivers did not reduce their speed within the school zone. 9% stated that other drivers did reduce their speed but only when there were children in the vicinity.
- 42% reported that they had observed crashes or 'near misses' outside the school. Of those that have observed incidents, all of these were recorded as near misses. These were related to cars pulling out of car parking areas, near misses in the car park and speeding vehicles nearly rear-ending those turning into car park.
- Additional comments were made from parents about road safety at Glenbrook School. These included concerns about parking provision and driver behaviour in the car parking areas. Several parents suggested that the 'flashing school signs' were needed.

More detailed information from these surveys is provided in Appendix C.

5.2.2 Post-Implementation Consultation

Post-Implementation consultation was undertaken and 32 parents responded mirroring a similar response rate to the pre-implementation survey. A summary of parents' responses have been listed below:

- 87% stated their average speed past the school was between 40-60km/h. 13% stated their average speed past the school was below 40km/h.
- 63% stated that had observed drivers lowering their speed only when there are children in the vicinity. 18% stated that they had observed other drivers reducing their speed regardless of whether there are children there. 12% stated that they do not observe other drivers reducing their speed within the school zone. 6% stated other drivers slow down only when the speed limit signs are operational.
- 63% of parents stated they slowed down during school hours on school days. 28% state they slow down whether children were there or not. 9% state they slow down when they see children in the vicinity. Of the parents who stated they did slow down, they were asked what speed they travelled past the school. 81% cent stated they slow down to around 40km/hr. Nine per cent stated they go slower than 40km/h. 9% stated they slowed down, but not as low as 40km/h.

Additional comments were made by parents about road safety at Glenbrook School. These included concerns that the speed limit was too low and it was unclear when the speed limit applies. Several parents commented that the electronic signs would have been better and the new speed limit was not obeyed.

More detailed information from these surveys is provided in Appendix C.

5.2.3 Summary of Pre and Post Implementation School Consultation

Although the overall perception of parent is that speeds have reduced past the school at critical times, it is difficult to draw conclusions from the pre and post implementation surveys as some of the key questions asked in each questionnaire differed. For example, in question one the average speed options were lower in the post-implementation questionnaire than in the pre-implementation questionnaire. It is possible that this affected the parents' response.

5.3 School Observations

5.3.1 Pre-Implementation Observations

The morning site visit observations were undertaken on Tuesday 11 September 2012 with afternoon observations were undertaken on Monday 10 September 2012. Video recording was undertaken on Thursday 13 September 2012 between the hours of 7-9:15am and 2-4pm. The positions of the video cameras are detailed in Appendix C.

The busiest period for the morning peak was between 8:35–8:55am. The afternoon pick up period was observed to be more evenly spread, with steady traffic between 2:40-3:10pm. A detailed description of the site observations and video recordings are provided in Appendix C.

There were several safety concerns identified from the site visits and video observations:

- The use of the bus bay and shoulder to access/exit the North car parking area resulted in some conflicting manoeuvres. It was also used as a drop-off point by some parents.
- The use of the bus bay area for vehicles (not buses) to complete 'U' turns.
- Congestion at the South car park entrance resulted in some turning traffic waiting on the road. This may be due to limited manoeuvre room.
- No crossing facilities to access the school or footpath along the roadside parking.

5.3.2 Automatic speed counts

Automatic speed counts were undertaken from Thursday 13 September 2012 until Wednesday 19 September 2012. There was one counter used at Glenbrook School and this was in front of the South car park. An aerial photograph demonstrating the position of the counters is provided in Appendix C. A summary of the speed counts is given in Table 5-1 and Table 5-2 below.

Glenbrook-Waiuku Road	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Northbound	3585	2475	2286
Southbound	3373	2566	2258

Table 5-1 Glenbrook-Waiuku Road Traffic Volumes

Glenbrook-Waiuku Road 85 th Percentile Speed	km/hr
5 Day	75.6
8-9am	69.6
2-3pm	72.8
3-4pm	74

Table 5-2 Glenbrook- Waiuku Road 85th Percentile Speeds

A more detailed table containing the five day Average Daily Traffic volumes and 85th percentile speeds at peak times are detailed in Appendix C.

5.3.3 Post-Implementation Observations

The post implementation site visit was carried out on the Wednesday 20 March 2013 with video observations undertaken on 3 March 2013 between 7:15-9:15am and 2:50-4pm.

The signage implemented outside Glenbrook School included static 40km/h signs with red patches and 'SLOW' markings at each end of the school. There are no other side roads that needed to be signposted. Please refer to Appendix C for a construction plan detailing the signage locations.

During the morning peak, the through traffic speeds were similar to the pre-implementation speeds, this being around the 80km/h speed limit. As the number of vehicles arriving at the school started to increase the through speeds decreased correspondingly but only to around 60km/h. This made turning manoeuvres into and out of the two parking areas easier. However, the slightly erratic nature of the through vehicle speeds affected the general continuity of this traffic flow.

As there is no time restrictions identified on the signs, the through speeds tended to fluctuate with the volumes of traffic using the two car park areas. Drivers seemed to judge how they should approach the school based on this aspect and as the car park occupancy reduced through speeds increased significantly.

Prior to the afternoon school peak the through vehicle speeds appear slightly lower and more consistent than the pre-implementation observations. Vehicles appear to slow slightly as they approached the school and then accelerated past the main vehicle entrances. As turning manoeuvres into the school increased the through vehicle speeds started to decrease, although somewhat erratically with the occasional higher speeds observed. Observations suggest that speeds were in the order of 50-60km/h but certainly not close to the 40km/h suggested on the signs.

The peak parking demand started at around 2:50pm but by 3:05pm the peak was essentially over. By 3:15 there were very few vehicles parked in the car park and through vehicle speeds had returned to pre-peak speeds, typically around 70-80km/h.

The lower through speeds during the peak pick-up period made entering and exiting from the car park easier. Visibility from the two car parks at Glenbrook has always been relatively good but the deceleration and acceleration was less dramatic with more controlled changes in speeds observed.

For the entire morning video observation period there was a vehicle parked in the South car park with its hazard lights on. This appeared to cause through traffic to slow, as the speeds were significantly lower than those observed on the site visit and brake lights could be seen coming on as the vehicles approached the vehicle with hazard lights on. It is also possible that these vehicles were slowing due to the presence of the video camera which was clearly visible.

The vehicle with hazard lights on was still present for the first five minutes of the afternoon video recording. However, through traffic speeds remained significantly lower than 80km/h even after this vehicle had left. It appeared that many through vehicles were travelling at between 40km/h and 60km/h, even outside the school pick up times. It often appeared as though drivers are braking when they saw the camera.

As was observed in the site observations, through speeds tended to be lower when the school appeared busy.

5.3.4 Summary of Pre and Post-Implementation Observations

The static 40km/h signs appeared to reduce through speeds at all times when compared to pre-trial observations. The reduction in speed overall meant that drivers were able to exit the school in a more smooth and controlled manner.

However, it is important to note that even during the busiest school drop off and pick-ups times the through speeds remained well above 40km/h. Inconsistencies in speed were still apparent, with only a small number of drivers observing the 40km/h speed limit. There were several times when through vehicles travelling well above 40km/h had to brake for vehicles turning out from the school. These situations were considered to be inconvenient rather than dangerous.

5.4 Speed Survey Results

An analysis and comparison of the pre and post-implementation speed and traffic counts for Glenbrook-Waiuku Road was undertaken. The times analysed were between 8:15-9:15am. Appendix C has the full speed survey results and a comparison in volume profiles. This ensures that the comparative speed results were being assessed.

The speed survey results showed a reduction in vehicle speeds during both the morning and afternoon peak periods. The morning peak speeds reduced by 8-10km/h in each direction, with the mean speeds dropping to below 50km/h for northbound and 60km/h for southbound vehicles. Figure 5-3 and Figure 5-4 demonstrate this with a noticeable difference between the pre-implementation (2102 Speeds) and post-implementation (2013 Speeds) data.

Morning Peak on Glenbrook-Waiuku Road

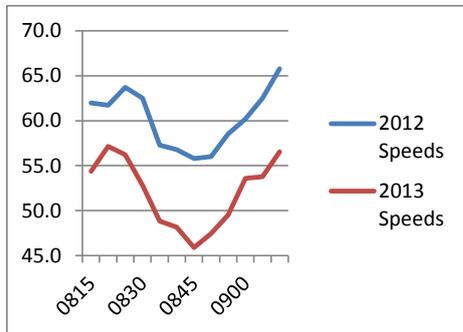


Figure 5-3 Northbound on Glenbrook-Waiuku Rd

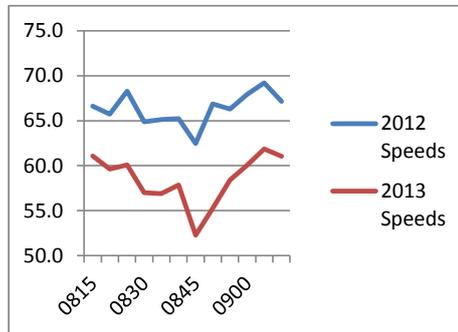


Figure 5-4 Southbound on Glenbrook-Waiuku Rd

The afternoon peak showed a similar pattern, with northbound mean speeds reducing to below 50km/h at the lowest point and below 55km/h for southbound vehicles at the corresponding time. Figure 5-5 and Figure 5-6 demonstrates this. The typical reductions in comparison to the pre-implementation speeds were 6-8km/h reduction for both directions.

Afternoon Peak on Glenbrook-Waiuku Road

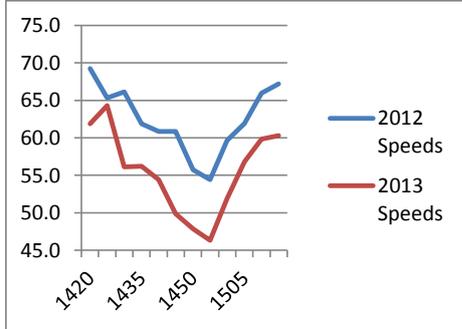


Figure 5-5 Northbound on Glenbrook-Waiuku Rd

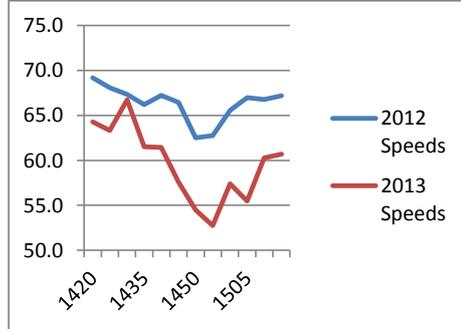


Figure 5-6 Southbound on Glenbrook-Waiuku Rd

6.0 Halsey Drive School

Halsey Drive School is situated on Halsey Drive in Lynfield and is the only school trial site located within an urban area. Halsey Drive is classified as a local road and has low traffic volumes with a five day AADT of 1,400vpd and is in a 50km/h zone.

Halsey Drive has a regular (approximately every 15 minutes) bus service (route 267). The bus stops are shown in Figure 6-2. There are no NSAAT's before or after the bus stops.

Figure 6-1 shows the location of Halsey Drive School in terms of the wider network.

School starting time is 8:55am and finishes at 3pm. Halsey Drive School has a roll of 429 pupils from Year 1-6.

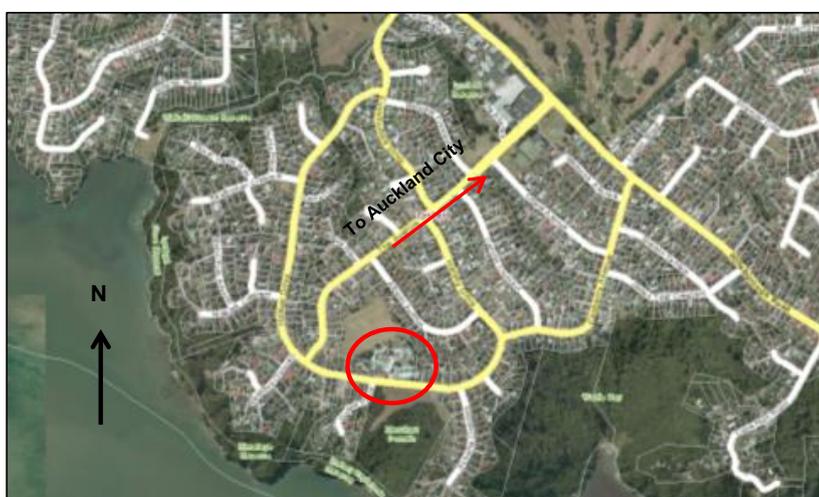


Figure 6-1 Halsey Drive School, Halsey Drive, Lynfield

6.1 Site Description

Halsey Drive School is located on Halsey Drive which is classified as a Local Road in the District Plan. Along the length of the school frontage on both sides of the road are areas of P2 parking signs with the supplementary stating '8 – 9am and 3 – 3:30pm school days only'. Figure 6-2 demonstrates this. There is a pedestrian crossing outside the school and a kindergarten east of the school. There is no street lighting specifically for the crossing and it therefore intended purely for school use. There is a school patrol which operates on the pedestrian crossing located immediately in front of the school. The patrol is comprised of an adult and two children and is present between 8:25-8:55am and 2:50-3:10pm.

There is a teachers' car park on site. The entrance to this car park is just west of the pedestrian crossing. This is also near where children enter the school after being dropped off in the P2 area on the northern side of Halsey Drive. The car park exit is further west just before the northern P2 area and crossing visibility can be blocked here by parked vehicles. It was observed that teachers 'gave way' to children walking across the car park entrance.

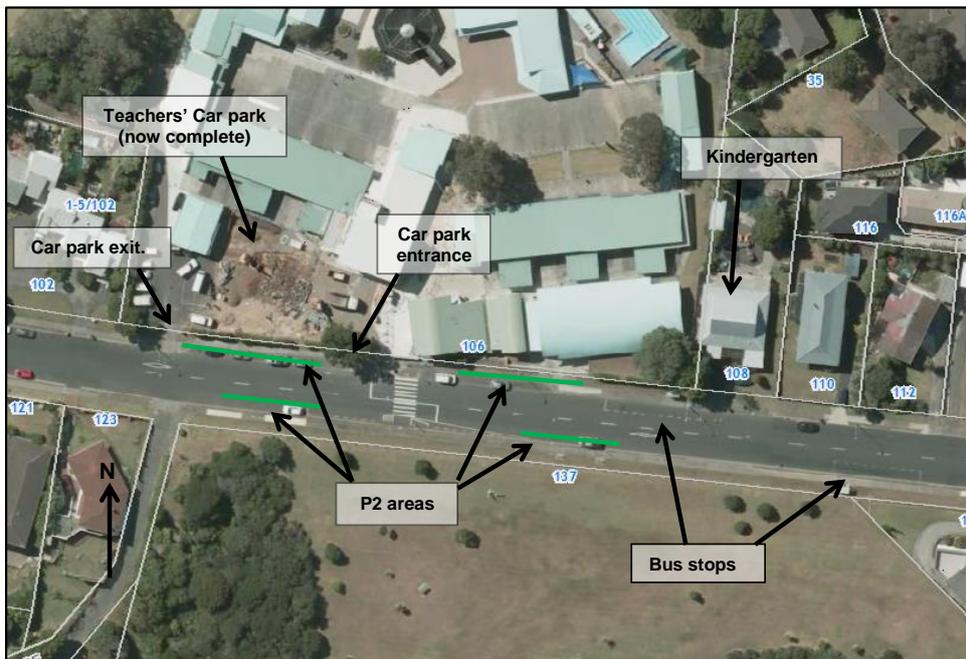


Figure 6-2 Halsey Drive School

6.2 School Consultation

6.2.1 Pre-Implementation Consultation

As part of the consultation process surveys were distributed to parents by the school. A large number of responses were received from parents at this school (260 responses). The response rate for this school was approximately 55% (based on a school roll of 429 students). This is only an approximate response rate, as some families will have more than one child at the school. The survey results are detailed in full in Appendix D.

A summary of parents' responses have been listed below:

- 73% of parents stated they drove past the school at less than 40km/h. 27% stated they drove past the school at between 40-50km/h. 1% stated they drove past the school at faster than 50km/h.
- 84% of parents believed that a safe speed to drive past the school at was less than 40km/h. 15% believed that travelling at between 40-50km/h past the school was safe and 1% believed that travelling past the school at more than 50km/h was safe.
- 42% stated that they had observed other drivers reducing their speeds within the school zone when there were children in the vicinity. 32% observed other drivers reducing their speeds only during school hours on school days. 15% stated that they had observed other drivers reducing their speeds regardless of whether there were children present. 11% of parents have not observed other drivers reducing their speeds outside the school at any time.

- 76% have not observed any crashes or near misses outside the school. 24% have observed crashes or near misses outside the school. Of these, all were recorded as 'near misses'. Parents believed that these incidents were the result of poor driving behaviour from parents - especially when entering or leaving a car parking space. Drivers' failing to stop at the pedestrian crossing was also identified as a cause of some near misses.

Additional comments made about road safety at Halsey Drive School related to poor parking behaviour, parking availability and vehicle speed. Active travel options were suggested in addition to the variable speed limit sign with warning lights and a road safety education campaign for students.

More detailed information from these surveys is provided in Appendix D.

6.2.2 Post-Implementation Consultation

Post-Implementation surveys were undertaken and approximately 170 parents responded. A summary of the survey results is provided below;

- Seventy-three parents stated that their average speed when driving past the school was less than 40km/hr. Twenty-six parents stated their average speed was between 40-50km/hr. One parent stated their average speed was more than 50km/hr.
- 51% stated that had observed drivers stated that they had observed other drivers reducing their speeds within the school zone when there were children in the vicinity. 29% observed other drivers reducing their speeds regardless of whether there were children present. 12% stated that they had observed other drivers lowering their speed only when the speed limit signs were operational. 8% stated they had not observed other drivers reducing their speed within the school zone.
- 72% stated they slow down whether or not they see children. 22% only slow down during school hours on school days. 6% stated that they only slow down if children are in the vicinity.
- 60% stated they go slower than 40km/hr. 39% stated they slow down to around 40km/h. 1% stated they slow down a bit, but not as low as 40km/h.
- Additional comments from parents were regarding poor parent parking behaviours, people not using the pedestrian crossing and buses travelling too fast.

More detailed information from these surveys is provided in Appendix D.

6.2.3 Summary of Pre and Post Implementation School Consultation

There was little change in parents' perception of their driving behaviour following the installation of the static sign. Pre- and post-installation seventy-three per cent of parents stated they drove past the school at less than 40km/hr. Pre-installation, twenty-seven per cent of parents stated they drove past the school at between 40-50km/hr. Post-installation this was twenty-six per cent.

Parents' perceptions of other drivers' behaviour was altered post implementation. Prior to the installation, forty-two per cent of parents had observed other drivers reducing their speed within the school zone when children were present. This had increased to fifty-one percent post implementation. Initially, fifteen per cent of parents had observed other drivers reducing their speeds regardless of whether children were present. This had increased to twenty-nine per cent post-installation. Pre-installation, eleven per cent of parents had not observed other drivers reducing their speeds outside the school at any time. This had decreased to eight per cent post installation.

In terms of general comments about safety at the school, parents were reporting the same issues pre- and post-implementation. Concerns about driver parking behaviour were mentioned multiple times in both the pre-and post-implementation. This is to be expected, as it is not likely that the static signs would influence parent parking behaviour outside the school.

6.3 School Observations

6.3.1 Pre-Implementation Observations

The site observations were undertaken on Tuesday 25 September 2012 between 7:10-9:05am and on Thursday 27 September 2012 between 2-3:30pm. The video recording was undertaken on Wednesday 12 September 2012 between the hours of 7:30-9am and 2:15-4pm. The location of the video cameras is provided in Appendix D.

There is a school patrol at the pedestrian crossing in the morning and afternoon peaks. The busiest times were between 8:30-8:50am and between 3-3:15pm. There were a mixture of recreational and commuter pedestrians noted throughout the observations. The bus stops were regularly blocked by parents parking partially in the bus stop. Buses often protruded into the through lane while stopped at the bus stop because of this. A detailed description of the site observations and video recording are provided in Appendix D.

There were several safety concerns identified from the site visits and video observations. In general speeds past the school at school start and finish times were low largely due to the volume of vehicles outside the school. Although the large number of parents driving to the school helped to reduce through traffic speeds, it caused other problems as detailed below:

- Parents were observed parking too close to the zebra crossing and obstructed through-traffic's view of the crossing.
- Parents were observed to ignore the P2 parking restrictions – some staying between five and ten minutes. This caused congestion on the road as parents were unable to park easily
- 'U' turns were made without proper checks for traffic and several near-collisions were observed.
- Parents slowing to find and manoeuvring into car parks caused delay and confusion for other vehicles.

6.3.2 Automatic speed counts

Automatic speed counts were undertaken from Friday 14 September 2012 until Thursday 20 September 2012. There was one counter on site and this was in front of the kindergarten on Halsey Drive. An aerial photo demonstrating the locations of the video camera and the traffic counters is provided in Appendix D. A summary of the speed counts is given in Table 6-1 and Table 6-2 below.

Halsey Drive	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Eastbound	659	387	341
Westbound	661	432	355

Table 6-1 Halsey Drive Traffic Volumes

Halsey Drive 85 th Percentile Speed	km/hr
5 Day	53
8-9am	42.6
2-3pm	45.2
3-4pm	47.6

Table 6-2 Halsey Drive 85th Percentile Speeds

A more detailed table containing the five day Average Daily Traffic volumes and 85th percentile speeds in both directions at peak times are detailed in Appendix D.

6.3.3 Post-Implementation Observations

The signs implemented at Halsey Drive School were static 40km/h signs, with the addition of 'SLOW' words marked adjacent to the signs. Red patches marked on the road were not used at this school. Please refer to Appendix D for a construction plan detailing the signage locations.

The post implementation survey involved automatic speed counts, a video recording of peak periods and site observations during the peak periods. The post implementation site visit was carried out on the morning of Wednesday 27 March and the afternoon of Thursday 21 March 2013. The video observations were undertaken on Tuesday 5 and Wednesday 6 March 2013.

Prior to the morning school peak, through volumes were low and speeds were typical for a 50km/h urban area.

School drop-offs started at approximately 8:10am, and increased significantly from 8:20am. The difference with this school to the other schools in this trial is that drop offs occurred on the road and not within the school grounds. This made vehicles and children very visible to through vehicles. As the numbers of parked vehicles increased general speeds decreased, although most movements related to school drop-off vehicles. During the peak drop off times from 8:30–8:55am through vehicle speeds were almost entirely regulated with school related traffic either entering or leaving the on-street spaces.

Between 8:55-9am the numbers of drop-off vehicles reduced slightly, although there were still a number of cars parked on the road. From 9am this number dropped off rapidly and through vehicle speeds increased but still only to around 50km/h.

Through volumes were generally low on Halsey Drive and the speeds were largely unaffected by any signs outside of the build-up of cars for the afternoon peak pick up. As the volumes of cars parked on the road increased the through speeds dropped to match the increased manoeuvring and congestion. As with the pre-implementation observations speed issues were related more to parents parking behaviour rather than anything to do with through vehicles.

From 2:50pm the patrolled crossing raised awareness of the school even further. Through speeds were affected almost entirely by parents manoeuvring into and out of the spaces and not by any overall reduction in through vehicle speeds. By 3:25pm almost all of the on-street parking had dissipated and through vehicle speeds had returned to normal.

The video observations showed similar results to the site visit observations. The congestion around the school at pick up times is high enough that it slows through traffic. The vast majority of the traffic on Halsey Drive in the peak times was school related.

6.3.4 Summary of Pre and Post-Implementation Observations

The static 40km/h signs appeared to have little impact on through speeds past Halsey Drive School. Traffic volumes past the school outside of school drop-off and pick-up times is low and was observed to be within the posted speed limit.

At school drop-off and pick-up times, when the number of vehicles on the street increased significantly, through speeds decreased to match the increased manoeuvring and congestion.

An analysis of the pre-and post-implementation observations suggests that speed issues were related more to parents parking behaviour rather than anything to do with through vehicles.

6.4 Speed Survey Results

Traffic volume and speed counts were carried out on Halsey Drive outside the school. An analysis and comparison of the pre and post-implementation speed and traffic counts was undertaken. The complete results can be found in Appendix D.

The initial and post installation observations identified that speeds were controlled by school traffic and not through traffic and hence little if any change in operating speeds at the critical times was expected. Figure 6-3 to Figure 6-6 show the results with little difference between the pre-implementation (2012 Speeds) and post-implementation (2013 Speeds) data.

Morning Peak on Halsey Drive

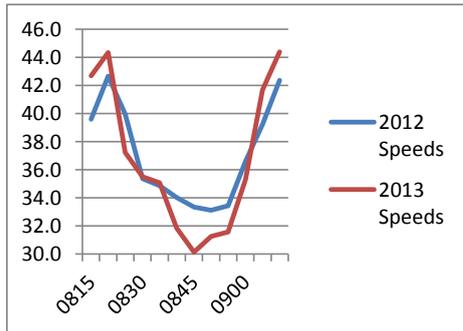


Figure 6-3 Eastbound on Halsey Drive

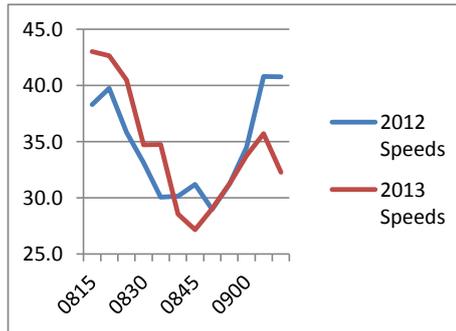


Figure 6-4 Westbound on Halsey Drive

Afternoon Peak on Halsey Drive

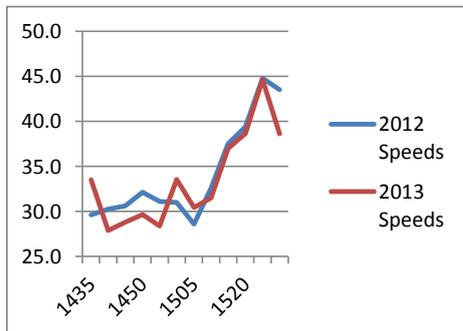


Figure 6-5 Eastbound on Halsey Drive

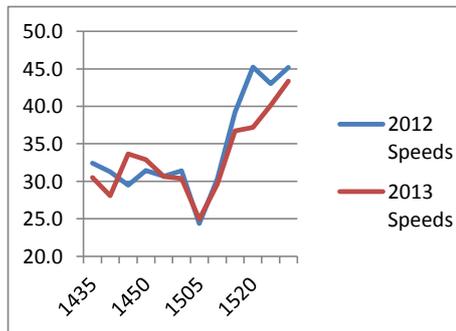


Figure 6-6 Westbound on Halsey Drive

7.0 Puni School

Puni School is situated on the corner of Waiuku Road and Aka Aka Road, approximately 7km south-west of Pukekohe town centre. Waiuku Road is classified as an arterial road in the District Plan and carries approximately 6,900vpd. It is the main route from Pukekohe to Waiuku. The school is located on a straight section of road with good visibility and a posted speed limit of 80km/h outside the school. Figure 7-1 shows the location of Puni School. School starts at 8:30am and finishes at 2:30pm. In 2012, Puni School has a roll of 202 students from Year 1 to Year 6.



Figure 7-1 Puni School, Waiuku Road

7.1 Site Description

Puni School is situated on the corner of Waiuku Road and Aka Aka Road and tends to blend into the rural landscape. There is virtually no pedestrian interaction or visibility of the school from the road except for vehicles turning in and out of the site. Consequently, there is little incentive for through vehicles to slow down. Figure 7-2 demonstrates the site layout.

Two car parking areas are provided, one off Waiuku Road (North car park) and one off Aka Aka Road (South car park). There is generally good visibility to both car park driveways with one restriction for northbound through vehicles. The North car park has a one-way loop access. High speeds were observed outside the school on Waiuku Road. Speeds are lower on Aka Aka Road primarily due to the school being close to the intersection. Waiuku Road has wide shoulders and Aka Aka Road, narrow shoulders. The only possible visibility is to the west on Waiuku Road when there are vehicles travelling at high speeds. There is a relatively long vertical curve that can restrict visibility.



Figure 7-2 Puni School

7.2 School Consultation

7.2.1 Pre-Implementation Consultation

As part of the consultation process surveys were distributed to parents by the school. Forty-two parents responded to the survey. The response rate for this school was approximately 21% (based on a school roll of 202 pupils). This is only an approximate response rate, as some families will have more than one child at the school. The survey results are detailed in full in Appendix E.

A summary of parents' responses have been listed below:

- 91% stated they drove past the school at speeds between 60-80km/h. 9% stated they drove past the school at speeds below 60km/h. 64% believed that between 50-60km/h was a safe speed for traffic passing the school. 31% believe that travelling at less than 50km/h is a safe speed for traffic to be passing the school. 5% believed that it was safe to travel past the school at above 60km/h.
- 43% believe that other drivers do not reduce their speeds at all. 26% believe that other drivers reduce their speeds during school hours on school days. 21% believe that other drivers do reduce their speeds but only when there are children in the vicinity. 10% believe that other drivers reduce their speed whether or not there are children in the vicinity.
- 46% have not observed any crashes or near misses on the road outside the school. 54% have observed crashes or near misses on the road outside the school. One of these incidents was a crash at the intersection of Waiuku and Aka Aka Roads. The remaining incidents of near misses were related to the parking manoeuvring, queuing to enter/exit the car parking areas, gap perception issues.

Additional comments made about road safety at Puni School related to parking and the need for more restrictions, high speeds past the school and the need for warning signs.

More detailed information from these surveys is provided in Appendix E.

7.2.2 Post-Implementation Consultation

Post-Implementation consultation was undertaken. Thirty-two parents responded to the survey. A summary of parent's responses have been listed below:

- 56% stated they drove past the school at below 60km/h. 44% stated they drove past the school at between 60-80km/h. No parents stated they drove past the school faster than 80km/h.
- 43% observed that other drivers slowed down only when the illuminated signs were operating. 30% stated that other drivers slowed down regardless of whether there were children present. 12.5% stated that other drivers slowed down when there were children in the vicinity. 12.5% stated that other drivers did not slow down at all when in the school zone.
- 84% stated they reduce their speed in the school zone whether or not they see children. 16% stated they slow down only during school hours on school days. If parents did reduce their speed sixty-six per cent stated they slowed down to around 60km/h and thirty-four per cent stated they slowed down to below 60km/h.

Additional comments made about road safety at Puni School were related to access to the parking areas and speeds past the school still being high. One parent commented that things were much improved and another commented on the need for footpaths outside the school.

7.2.3 Summary of Pre and Post Implementation School Consultation

It appears that parents perceptions of speeds past the school has changed with the implementation of the signs. Pre-installation, 91% of parents stated they drove past the school at speeds between 60-80km/h. Post-implementation this had changed to 44%. 56% of parents now stated that they drove past the school at below 60km/h. Pre-installation only nine per cent of parents stated they drove past the school at below 60km/h.

There was also a difference in the parents' perception of other drivers' speeds past the school. Pre installation, 43% of parents believed that other drivers did not reduce their speeds at all. This had decreased to only 12.5% post-implementation.

In addition, pre-installation, only 26% of parents observed other drivers slowing down during school hours on school days. Post-installation, 43% observed other drivers slowing down when the signs were operating.

7.3 School Observations

7.3.1 Pre-Implementation Observations

The morning site visit was undertaken on Wednesday 12 September from 7-8:45am and the afternoon site visit on Tuesday 11 September between 2:10-3:30pm. The video recordings took place on Thursday 13 September between 7:30-9:30am and 2:30-4:30pm. The busiest period for the morning period was between 7:55-8:35am. The afternoon was busiest between 2:25-2:50pm, although the two car parks appeared to have slightly different patterns of peak usage. A detailed description of the site observations and video recordings is provided in Appendix E.

There were several safety concerns identified from the site visits and video observations;

- Traffic speeds past the school were observed to be high.
- Parents' gap perception may be an issue when leaving and entering the school. This combined with high through-traffic speeds is a safety concern.
- Congestion in the north car park driveway caused vehicles wanting to make a left turn to enter to wait on the road. Through traffic was observed to overtake by crossing the centre line. Congestion in the driveway caused right turning traffic to have to wait in the traffic lane.

7.3.2 Automatic speed counts

Automatic speed counts were undertaken from Thursday 13 September 2012 until Wednesday 19 September 2012. There were two automatic counters at this site. The first counter was located on Waiuku Road, east of Aka Aka Road and the second counter was situated on Aka Aka Road, south of Waiuku Road. An aerial photograph demonstrating the position of the counters is provided in Appendix E. A summary of the speed counts and traffic volumes on both roads is provided in Table 7-1 to Table 7-4.

Waiuku Road

Waiuku Road	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Eastbound	3827	2939	2328
Westbound	3732	2957	2392

Table 7-1 Waiuku Road Traffic Volumes

Waiuku Road 85 th Percentile Speed	km/hr
5 Day	82.2
8-9am	77.8
2-3pm	79.2
3-4pm	80.8

Table 7-2 Waiuku Road 85th Percentile Speeds

Aka Aka Road

Aka Aka Road	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Northbound	595	444	398
Southbound	591	444	396

Table 7-3 Aka Aka Road Traffic Volumes

Aka Aka Road 85 th Percentile Speed	km/hr
5 Day	89.2
8-9am	88.4
2-3pm	86.4
3-4pm	90

Table 7-4 Aka Aka Road 85th Percentile Speeds

A more detailed table containing the five day Average Daily Traffic volumes and 85th percentile speeds on both roads at peak times are detailed in Appendix E.

7.3.3 Post Implementation School Observations

The post implementation survey involved automatic speed counts, a video recording of peak periods and site observations during the peak periods. The post implementation site visit was carried out on Thursday 21 March 2013. The video observations were undertaken on Tuesday 5 March 2013 between 7:30-9:30am and 2-4pm.

Puni School has had electronic 60km/h signs installed on both main approaches to the school and static signs on Aka Aka Road. In addition to the electronic signs, red patches and 'SLOW' markings have also been installed at the thresholds. The signs are activated from 8-8:35am and 2:25-2:45pm. Please refer to Appendix E for a construction plan detailing the signage locations.

Prior to the signs being activated, the morning period had heavy through traffic, particularly towards Pukekohe, with high speeds. Traffic movement seemed to be unaffected by the signs when they were off.

Drop-offs at the school started from 7:50am but were relatively low until after the sign activation period had started.

Following activation of the signs there was an immediate change in operating conditions. Vehicles speeds were lower and consistent in front of the school. Also from 8am there was a police car on site for around 20 minutes enforcing the speed limit. During that time one car was pulled over by the police.

Two benefits were noted from the lower speeds. Firstly, there were effects from vehicles entering or leaving the school. These vehicles had more time to pick gaps in the traffic flow and did not have to accelerate quickly to get into the through vehicle streams. These vehicles also created fewer issues for through vehicles as evidenced by the lack of through vehicle brake lights to change speed. The second benefit was at the intersection of Aka Aka Road where turning vehicles were able to more seamlessly integrate with through vehicles as turning and through vehicle speeds were similar.

From 8:35am when the signs were turned off, the change was immediate, with an increase in through vehicle speeds.

The afternoon peak showed a similar pattern with high speeds before the sign activation, reducing almost immediately at 2:25pm.

There were many cars pulling into school from 2:15pm, with the same impact on through traffic as noted with the initial surveys. Slowing vehicles caused through cars to break relatively heavily or swerve to go around them.

Once the signs were active, speeds reduced and turning movements to and from Aka Aka Road were easier. Exiting vehicles had lesser impact on through traffic and there were fewer instances of braking and swerving around manoeuvring vehicles.

After 2:45pm the return to higher through speeds was almost immediate. This would be expected as with the signs off, there is no obvious visual queue to through traffic. It was noted that the school bus, which had arrived while the signs were active, did not leave the school until around 2:50pm and made a right turn from Aka Aka Road. The time activation of the signs could be lengthened to accommodate the bus.

In general, the video observations were similar to that of the site visit. Traffic was travelling fast along Waiuku Road, until the variable signs were activated. Traffic speeds were significantly lower while these signs were activated. This made accessing the school easier for parents, with less incidents of heavy braking of through traffic as parents left the car park.

The second camera was placed on Aka Aka Road. Through speeds did not appear to be different from the initial survey and it was difficult to determine from the camera position what was happening at the intersection of Waiuku Road and Aka Aka Road.

7.3.4 Summary of Pre and Post-Implementation Observations

An immediate change in driver behaviour was observed with the activation of the electronic signs. Immediately after they were turned on almost all through-vehicles slowed down. Vehicle speeds were also observed to be more consistent. This consistency in speeds improved operation at Puni School as there appeared to be more time for drivers wishing to turn into or exit from the school. In addition, drivers could rely on the consistency in the speed of the approaching vehicle and therefore could make the turn with increased confidence.

In the pre-installation observations a number of vehicles exiting the school did so with reasonably heavy acceleration to meet the speed of the approaching through-traffic. Post-implementation, once the signs were activated, this behaviour was not observed. It appears there was less stress on the drivers exiting the school as a result of reduced through-speeds.

Although the effect of the electronic signs was clearly observed, it appears that they affect the speeds of drivers only while they are activated. Vehicle speeds remain at normal levels outside of the times the signs are switched on. This indicates that this type of installation did not encourage drivers to change their level of awareness around schools outside of peak times. There may be times when children are around and outside their school grounds on the local road network e.g. for class trips (although not observed as part of this trial). In these circumstances the signs would not be activated and it is unlikely that drivers would slow down. Therefore it is important to ensure that the signs are activated at times that are appropriate for each school.

7.4 Speed Survey Results

Traffic volume and speed counts were carried out on Aka Aka Road and Waiuku Road outside the school. An analysis and comparison of the pre and post-implementation speed and traffic counts at peak times for Aka Aka Road and Waiuku Road was undertaken. The peak times which were analysed at this site were between 7:45-8:45am and 2:10-3:05pm.

The following sections summarise the main findings. For more detail on the results refer to Appendix E.

7.4.1 Waiuku Road

The morning peak results showed a reduction in mean speeds for westbound vehicles, with reductions of 4-6km/h for traffic in both directions. The mean speeds for westbound traffic dropped to around 60km/h and below 55km/h for eastbound vehicles. Figure 7-3 and Figure 7-4 demonstrate the comparative results with some differences between the pre-implementation (2012 Speeds) and post-implementation (2013 Speeds) data.

Morning Peak Waiuku Road

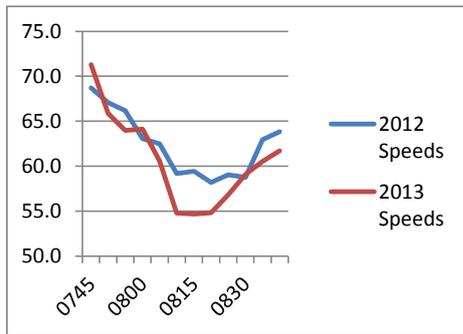


Figure 7-3 Eastbound on Waiuku Road

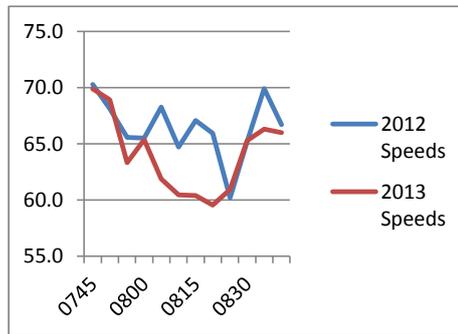


Figure 7-4 Westbound on Waiuku Road

The afternoon peak data showed a similar pattern. Westbound speeds dropped by 6-8km/h to a mean of below 60km/h when the signs were activated. Eastbound speeds reduced by a lesser degree at around 2-4km/h, with the profile following a very similar reduction in speeds during the school peak period, as shown in Figure 7-5 and Figure 7-6

Afternoon Peak Waiuku Road

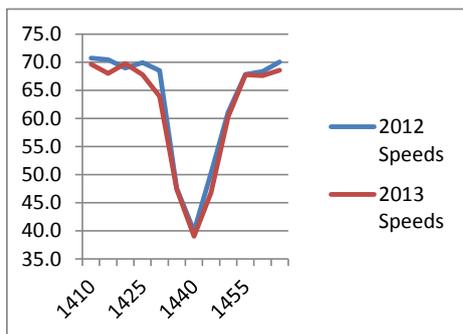


Figure 7-5 Eastbound on Waiuku Road

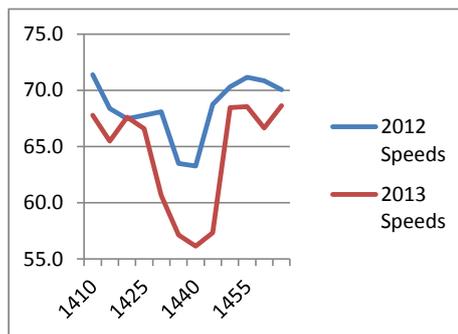


Figure 7-6 Westbound on Waiuku Road

7.4.2 Aka Aka Road

The morning peak results on Aka Aka Road showed a small but consistent reduction on vehicle speeds of 2-4km/h in each direction, as shown in Figure 7-7 and Figure 7-8

Morning Peak on Aka Aka Road

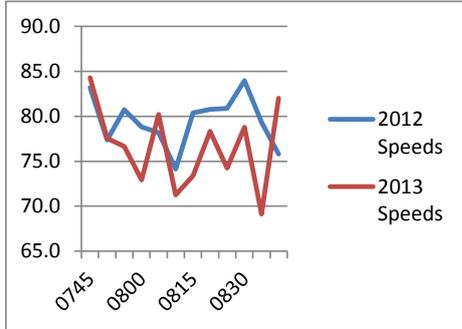


Figure 7-7 Northbound on Aka Aka Road

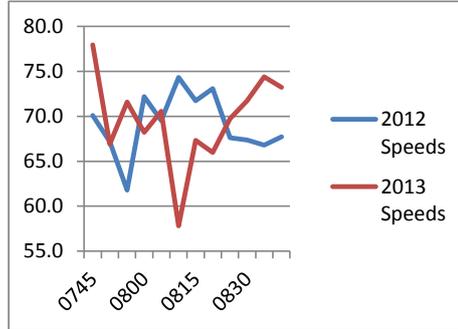


Figure 7-8 Southbound on Aka Aka Road

The afternoon results showed more fluctuation, with some speeds actually increasing at specific comparative time periods. The mean speeds in both directions during both time periods were typically at or above 70km/h, even though the counter was located between the signs and the intersection with Waiuku Road. Figure 7-9 and Figure 7-10 show the relative results.

Afternoon Peak on Aka Aka Road

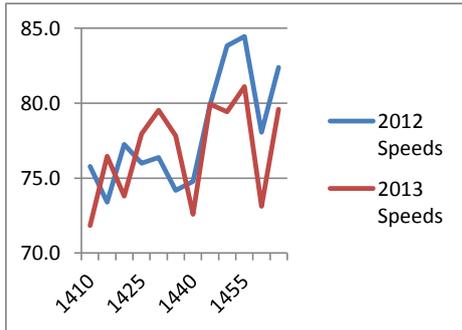


Figure 7-9 Northbound on Aka Aka Road

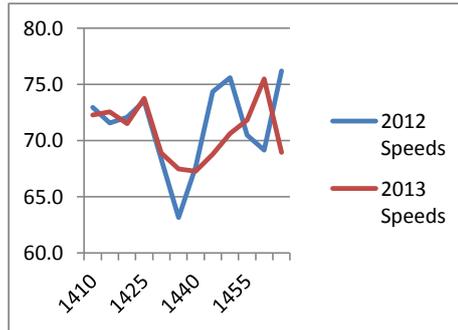


Figure 7-10 Southbound on Aka Aka Road

8.0 Ramarama School

Ramarama School is situated on a slight to moderate curve on the corner of Ararimu Road, Hilview Road and McEldownie Road, as shown in Figure 8-1. The school is approximately 200m east of the Ramarama exit on the Southern Motorway. Ararimu Road is classified as a Collector Road in the District Plan and carries approximately 2,900vpd. School starts at 8:50am and finishes at 2:50pm. Ramarama School has a roll of 220 students, from Year 1 to Year 8.



Figure 8-1 Ramarama School, Ararimu Road

8.1 Site Description

There are three parking areas provided at Ramarama School. The first area is on-road parking on the southern side of Ararimu Road, at the eastern end of the school. This has room for approximately five cars and there is a footpath which leads up to the school. On the westbound approach to the school approximately 300m east of this parking area is a PW-31 'Non motorised Users Children' sign with a school supplementary which helps increase the school's visibility to approaching traffic. Along the northern side of Ararimu Road no stopping at all times markings have been installed the length of the school frontage.

The other two parking areas are located on the school grounds. There is an upper car park which is accessed via a driveway just in front of the on-road parking spaces mentioned above. This driveway is also the entrance for the smaller, lower car park (adjacent to the road). Vehicles wishing to access the upper car park do so by using a driveway which goes around the back of the lower car park. It is not possible for vehicles wishing to use the upper car park to see if it is full from the driveway. To leave the upper car park vehicles use the exit driveway, which is at the western end of the upper car park. This exit driveway reaches the road at the eastern end of the lower car park. Figure 8-2 shows the layout for Ramarama School.

The lower car park is separated from the road by a small unlit island, which has signs for 'entry' and 'no entry' at its eastern and western ends respectively. The width between the island and the road is 3m. The exit area for both upper and lower car park is wide enough for cars from the upper and lower car park to exit at the same time. There is a 'no right turn' sign from the exit area near the island. There is no school bus for this school and the school operates in a 70km/h zone

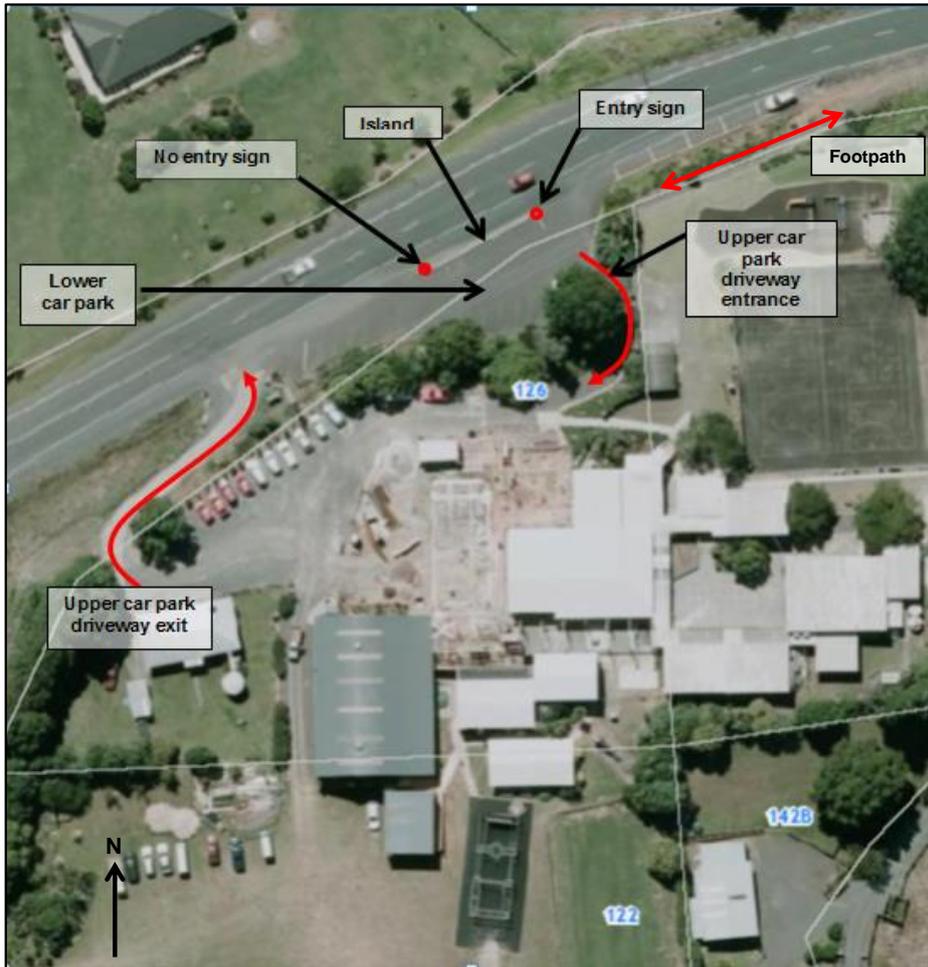


Figure 8-2 Ramarama School

8.2 School Consultation

8.2.1 Pre-Implementation Consultation

As part of the consultation process, surveys were distributed to parents by the schools. Parents' responses have been recorded and are summarised in this section.

Thirty-seven parents responded to the survey. The school has a role of 220 pupils. The response rate for this school was approximately 17%. This is only an approximate response rate, as some families will have more than one child at the school.

Parents' responses to the survey are detailed as follows:

- 62% responded that their average speeds past the school were below 60km/h. 38% stated that their average speeds past the school were between 60-70km/h. No parents stated they travel past the school at speeds above 70km/h.
- 30% believed that speeds less than 40km/h were safe for traffic passing the school. 62% believed that speeds between 40-50km/h were safe for traffic passing the school. 5% of

parents believed that speeds between 50-60km/h were safe for traffic passing the school. 3% believed that speeds above 60km/h were safe for traffic passing the school.

- 38% have observed that other drivers do not reduce their speed at all. 31% have observed other drivers reducing their speed within the school zone, but only when children are in the vicinity. 31% have observed other drivers reducing their speed within the school zone, but only during school hours on school days. No parents had observed other drivers reducing their speed within the school zone, regardless of whether children are present.
- 61% have not observed any crashes or near misses on the road outside the school. 39% have observed crashes or near misses on the road outside the school. Of these, all were recorded as 'near misses'. These were identified by parents as being related to high speeds of through traffic and conflict with those entering or exiting the car parking areas.

Additional comments made about road safety at Ramarama School were related to speed, inadequate pedestrian facilities, difficult turning conditions and lack of enforcement.

More detailed information from these surveys is provided in Appendix F.

8.2.2 Post-Implementation Consultation

Post-Implementation consultation was undertaken. Nineteen parents responded to the survey. The survey results are summarised below:

- 61% stated the average speed they drove past the school was between 40km/h. 39% stated the average speed they drove past the school was between 40-60km/h.
- 50% stated they had observed other drivers reducing their speed whether or not there are children present. 39% stated they observed other drivers reducing their speed only when there are children in the vicinity. 7% stated that they had not observed other drivers slowing down within the school zone. 4% stated they had observed other drivers reducing their speed only when the speed limit signs are operational.
- 50% stated they slow down whether or not children are present. 47% stated they slow down only during school hours and on school days. 3% stated they slow down only when children are in the vicinity. Those parents that said they did slow down were asked what speed they slowed to when driving in the school zone. 83% stated they slow down to around 40km/h. 17% stated they go slower than 40km/h.

Additional comments from parents about road safety at Ramarama School were related to not enough cars slowing down to 40km/hr and the signage not being clear enough. Some parents commented that the electronic signs and lines on the road to show where the school zone starts would be useful.

More detailed information from these surveys is provided in Appendix F

8.2.3 Summary of Pre and Post Implementation School Consultation

It is difficult to draw conclusions from the pre and post implementation surveys as the questions asked in each questionnaire differed. For example, in question one, the average speed options were lower in the post-implementation questionnaire than in the pre-implementation questionnaire. It is possible that this affected the parents' response.

One question that was comparable related to parents' perceptions of other drivers' speeds past the school. Pre-installation, no parents observed other drivers slowing down in the school zone regardless of whether children were present. Post-installation, 50 per cent of parents had

observed other drivers reducing their speed regardless of children being present. Post-installation only four per cent had observed other drivers reduce speed when the signs were operating. It appears that from the parents' perspective the static sign is having a general speed reducing effect on drivers passing the school, rather than a specific effect at school times.

8.3 School Observations

8.3.1 Pre-Implementation Observations

The morning site visit was undertaken on Wednesday 19 September 2012 with afternoon observations on Tuesday 19 September 2012. The video recording took place on the 13 September 2012 between the hours of 7-9:15am and 2-4pm. A detailed account of the site observations and video recordings is provided in Appendix F.

There were several safety concerns identified from the site visits and video observations

- Through-speeds were higher than desired – the 85th percentile ranged between 75-81km/h.
- The layout of the car parking entrance and exits are potentially a safety concern. In particular, the exit area for both upper and lower car park is wide enough for cars from the upper and lower car park to exit at the same time. Some cross-over conflict was observed at the exit, with left turning vehicles from the lower car park crossing paths with right turning vehicles from the upper car park.
- Several drivers did not obey the 'no entry' signs and entered the lower car park using the exit.
- Some vehicles were observed doing U turns on Ararimu Road.
- Congestion in the car park entrance caused traffic to be backed up onto the road.
- Several exiting drivers appeared to only make a cursory check for through traffic.

8.3.2 Automatic speed counts

The automatic speed counts were on site from Thursday 13 September 2012 until Wednesday 19 September 2012. The counter was located on Ararimu Road, just east of the school. An aerial photo demonstrating the locations of the video camera and the traffic counters is provided in Appendix F. A summary of the speed counts is given in Table 8-1 and Table 8-2 below.

Ararimu Road, Ramarama	5 Day Average Daily Traffic	Saturday Average Daily Traffic	Sunday Average Daily Traffic
Eastbound	1362	1050	870
Westbound	1359	997	896

Table 8-1 Ararimu Road, Ramarama Traffic Volumes

Ararimu Road, Ramarama 85 th Percentile Speed	km/hr
5 Day	79.6
8-9am	75
2-3pm	75.4
3-4pm	76.4

Table 8-2 Ararimu Road, Ramarama 85th Percentile Speeds

A table containing the five day Average Daily Traffic Volumes at peak times is provided in Appendix F.

8.3.3 Post-Implementation Observations

The trial at Ramarama School used the static 'Selwyn 40' signs at each end of the school area. The signs were gated and included 'SLOW' markings on the road, but no red patches, which were used at other schools. No other physical changes had occurred since the initial site visits and general traffic conditions appeared similar to those of the initial pre-implementation surveys. Please refer to Appendix F for a construction plan detailing the signage locations.

The post implementation observations involved automatic speed counts, a video recording of peak periods and site observations during the peak periods. The post implementation site visit was carried out on the morning of Wednesday 13 March and afternoon of Tuesday 12 March 2013. The video observations were carried out on Tuesday 5 March 2013.

The morning peak vehicle speeds appeared to be slightly slower than the pre-implementation surveys. However, it was clear that very few vehicles were doing speeds around the 40km/h mark suggested by the signs. Only one to two vehicles were identified that were travelling at a speed expected to be in the 40km/h range and these both had queues of four to six vehicles behind them.

Visibility to the parking areas may be impacting on the speed people choose as they approach the school. For westbound traffic travelling towards the southern motorway there is limited visibility around the bend this couple with the PW-31 school warning sign and the uphill gradient meant speeds appeared to be relatively consistent and lower than for eastbound vehicles. The exception to this were some larger trucks that had to maintain some speed on the uphill approach to avoid considerable slowing and would have been travelling in the order of 50-60km/h past the school. Eastbound drivers were less consistent in the way they approached the school. Some drivers were slower and consistent through the busy period, while others approached the school at a higher speed and then braked as they reached the parking area itself – although this latter category were the minority.

As with the other schools the morning peak is less pronounced in terms of the arrival pattern. This means that the upper parking area is more heavily utilised and this is visually screened from the road. Drivers therefore receive fewer visual cues that there is activity on the school grounds. The lower parking area was only busy for around 10-15 minutes from 8:40-8:55am.

A difference in the post-implementation morning observations was the amount of traffic using the side roads to the west of the school, and in particular Hillview Road to the south. Hillview Road

appeared to have more traffic using this road in both directions, although there was no particular reason why this should be the case.

The afternoon observations noted that even prior to the build-up of vehicles to collect children from school there were variations in traffic speed along Ararimu Road. The build-up of vehicles in the afternoon reflected the pre-implementation surveys, with a lot of traffic turning right into the school and filling both the upper and lower parking areas. However, the westbound uphill speeds were lower. This meant turning manoeuvres from Ararimu Road appeared to be easier, with drivers having more time to assess the relative situation resulting in fewer vehicles showing heavy acceleration to make turns.

It was noted that there were more vehicles making the right turn into the school using the exit lane than with the pre-implementation observations – against the 'No Entry' signage. There were also three vehicles that parked on the northern side of the road opposite the school behind the no stopping markings on the shoulder.

During the peak period, from around 2:50-3:10pm, the numbers of vehicles having to slow to turn into the school created congestion on the road that helped regulate through vehicle speeds. This occurred in the pre-implementation observations as well but the signs produced a more consistent operating environment with fewer occurrences of heavy braking.

By 3:20pm most of the vehicles had exited the school and the lower parking area had very few vehicles. Operating conditions on the main road returned to pre-peak conditions very quickly, although there remained some variation in through vehicle speeds for some time after the school peak had finished.

In general the video footage matches the observations seen during the site visit. Speeds were inconsistent for east bound vehicles, with some approaching the school at speed and then braking when they observed the camera.

8.3.4 Summary of Pre and Post-Implementation Observations

The static 40km/hr signs appeared to reduce through speeds at all times when compared to pre-trial observations. At Ramarama School there was observed differences between eastbound and westbound traffic speeds. For westbound traffic travelling towards the motorway, there is limited visibility around the bend and as a result the uphill speeds appeared to be relatively consistent and lower than for eastbound vehicles.

The reduction in speed overall meant that drivers were able to exit the school in a more smooth and controlled manner. However, it is important to note that even during the busiest school drop off and pick-ups times, the through speeds remained well above 40km/h. Inconsistencies in speed were still apparent, with only a small number of drivers observing the 40km/hr speed limit. There were several times when through vehicles travelling well above 40km/h had to brake for vehicles turning from the school. These situations were considered to be inconvenient rather than dangerous.

8.4 Speed Survey Results

Traffic volume and speed counts were carried out on Ararimu Road outside the school. An analysis and comparison of the pre and post-implementation speed and traffic counts at peak times on Ararimu Road was undertaken. The peak times analysed at this site were between 8:15-9:15am and 2:30-3:30pm.

The following sections summarise the main findings. For more detail on the results refer to Appendix F.

8.4.1 Ararimu Road, Ramarama

The morning peak results show a reduction in through speeds of typically 4-5km/h in both directions. The speeds at both the start and the end of this observation period are also slightly lower following installation of the signs. This is shown in Figure 8-3 and Figure 8-4 with the 2012 speeds recorded pre-implementation and the 2013 speeds recorded post the implementation of the signs

Morning Peak Ararimu Rd, Ramarama

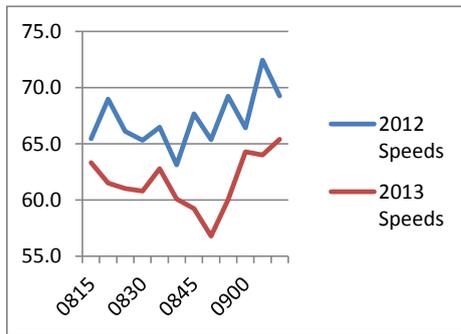


Figure 8-3 Eastbound on Ararimu Road

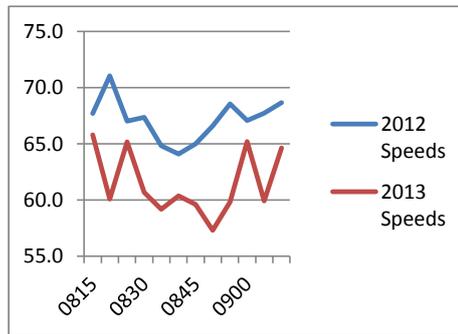


Figure 8-4 Westbound on Ararimu Road

The afternoon school peak showed a similar pattern, with reductions of around 8-10km/h recorded over the 15-20 minutes of peak activity at the school. Outside of these peak-of-the-peak periods, the speed reduction is less, typically in the 3-4km/h range. Figure 8-5 and Figure 8-6 show these relative results.

Afternoon Peak Ararimu Road, Ramarama

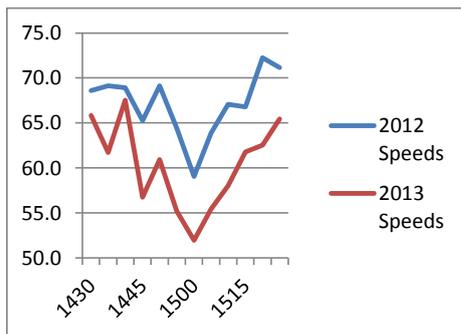


Figure 8-5 Eastbound on Ararimu Road

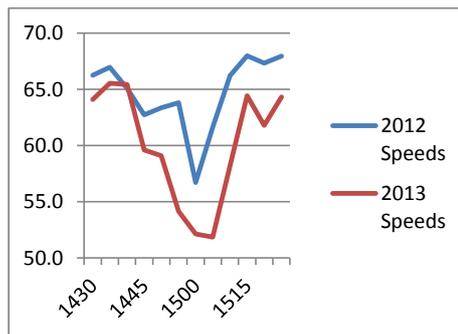


Figure 8-6 Westbound on Ararimu Road

9.0 MAJOR FINDINGS OF THE TRIAL

Following the pre and post installation observations and traffic data collection the effect of the two different signage installation types was reviewed. This analysis focused on identifying the key differences (if any) between the trial layouts and how these might have contributed to the differences observed. The aim was not to draw direct comparisons between the different signage options implemented or to determine if one was more successful than the other. Initial discussions with AT and the observations focused on speed and driver behaviour. Following on from this, the results should also be benchmarked against these items. Specifically, we consider the following factors to be materially significant to determining the benefits of each trial type:

Comment [PM1]: I'm not sure what you mean these sentences don't fit with the surrounding para

- Speed reduction
- Overall % at school time and possibly any effect outside of this period
- Speeds relative to advisory speeds
- Speeds relative to posted speeds
- Observed consistency of speed during peak times
- Crash reduction potential during school times
- Change in school access behaviour during peak periods
- Change in through driver behaviour at peak times

A separate consideration that was identified by T² through the trial was the ability to enforce either of the two options. The electronic 60km/h signs are similar to the currently used 40km/h signs throughout a number of areas in Auckland. The enforceability of these signs has been established and we consider that a fundamentally similar layout in a more rural area should be enforceable under the same rules. However, the 40km/h advisory signs do not have the same enforceability. This is a concern as even if drivers did travel a significantly more than 40km/h through the area, it would be at the discretion of Police to be able to issue offence notices under careless or reckless driving laws rather than simply breaking a speed limit.

In addition to these, a separate aspect that is likely to influence a road controlling authority's decision making on which type of signage to implement may be initial construction and maintenance costs. While the costs were not considered in this evaluation there can be little doubt that ultimately this will be a factor in influencing how quickly the preferred option could be implemented throughout the region.

Electronic '60' Sign Trial

The three schools involved in this trial were Dairy Flat, Ararimu and Puni Schools. These are all rural schools.

All of the school pre-implementation workshops identified speed as an issue in one form or another. The key change observed once the signs were implemented was that once the signs were activated there was an immediate change in driver behaviour. This was noted through both the independent observations and the parental surveys. Once the signs are activated, almost all the vehicles slowed immediately and to a consistent level. Drivers entering and exiting the schools, in particular, had more time to make decisions and could better rely on the consistency of approaching vehicle speeds before making turns. In the pre-installation observations a number of vehicles exiting the schools did so with reasonably heavy acceleration to get to the speed to approaching through traffic. With the signs activated, this behaviour was not observed.

Clearly there was less stress on the drivers exiting the school because of more consistent and reduced through speeds.

The independent observations support that conclusion that the signs have reduced speeds, to varying degrees, and have certainly normalised the speed profile past the schools. Drivers entering and exiting a school clearly have more time to make decisions and then to execute them as well. This will result in few near miss type incidents and will reduce driving stress on parents at a time which can be inherently stressful.

The parents' post-implementation perceptions followed similar themes – generally lower speeds around the peak times at the school when the signs were active and a much more limited change when the signs were not active.

It was noted that vehicle speeds did not reduce around the schools when the signs were turned off. This indicates that this type of installation did not encourage drivers to change their level of awareness around schools outside of peak times. There may be times when children are around and outside their school grounds on the local road network e.g. for class trips (although not observed in this trial). In these circumstances the signs would not be activated and it is unlikely that drivers would slow down.

With the electronic signs there is a need to ensure the activation times coincide with the peak periods of arrival and departures from the school. This gives the vast majority of parents and caregivers a safer and less stressful drive to and from school. Coordination with the school, pre-installation and post installation observations are essential to achieve this outcome.

Overall the operational speed results supported the observations, with the possible exception being on Waiuku Road at Puni School. The observations highlighted a much more consistent speed pattern through this area but the speed results reflected only a small drop in the mean speeds, which was surprising.

Advisory '40' Sign Trial

The three schools involved in this trial were Halsey Drive, Ramarama and Glenbrook Schools.

The advisory signs had a noticeable effect on traffic behaviour in the areas around the schools. In general it appeared that speeds reduced slightly at all the times observed when compared to pre-implementation observations. However, even during the periods of the heaviest school drop off and pick-ups the through speeds remained well above 40km/h. This was particularly the case in the rural areas where approach speeds are high (70 and 80km/h). Observations showed an inconsistency with through speeds, with a small number observing the 40km/h limit but most above this. The inconsistency resulted in most exit manoeuvres from the schools that were similar to those of the 60km trial, with drivers able to pull away from the school in a smooth and controlled manner. However, there were several times when through vehicles travelling well above 40km/h had to brake to slow down for vehicles turning out from the schools, or vehicles exiting the school had to stop suddenly. None of these situations were considered dangerous, only inconvenient.

A common theme in the feedback from the parents' questionnaire was that the signs had a relatively small effect on reducing speeds past the respective schools. This was particularly the case at Halsey Drive School and was an expected result given that school related traffic dominates driver behaviour at peak school times in front of this school and speeds are already slow at these times.

Overall the perception from the parental surveys was that the installation of the static trial signs had not made them feel they needed to alter their driver behaviour. However, all school results identified a perception that the behaviour of other (school and non-school related) drivers had changed, resulting in lower speeds past the school.

10.0 CONCLUSION

The trial revealed a number of safety issues at all of the schools. From the school consultation and site observations it was clear that these safety issues were often a mixture of perceptions and actual issues.

The key concerns related to the vehicles speeds and the morning and afternoon post-implementation speed results showed that both signage trials had demonstrable reduction in mean speeds. However, observations identified a 'finer grained' and distinctive difference on the consistency of vehicle speeds. The electronic signs clearly produced a more regular and predictable speed on adjacent roads whereas the 40km/h advisory signs affected driver behaviour both in and outside peak school times but resulted in more variable speeds. A significant part of driving, and certainly the way that road networks are designed and developed, is about consistency; the electronic sign installations achieved this consistency. The static 40km/h signs achieved reduced speeds, and although not as significant as those from the active signs, there was a greater general reduction in speeds outside of the peak hours of the school. It could be argued whether this is a benefit or not to the school safety and operation of the frontage roads. These findings indicate that the different signage types will be appropriate in different locations depending on whether the key issues are speed consistency or overall operational speeds.

As well as considering speeds, the effect on children walking or cycling to school was also reviewed. Of the six schools observed, only Puni had almost no activity or interaction with the adjacent road, with drivers pulling into the school to drop off or pick up children and no children were observed walking to school. For the remainder of the rural schools (Ararimu, Ramarama, Glenbrook and Dairy Flat), drivers made use of roadways to park and walk across the road with children or children walked to school from nearby residences. Halsey Drive has a different situation to most of the schools as it is in an urban area with footpaths on both sides of the road and has a number of children walking to school. Only Ararimu School is in a similar situation where all pick-up and drop-off parking is done on the street. The reduction in speeds will improve pedestrian safety and could encourage more pedestrian activity at some schools.

Another longer term consideration is the enforceability of the signage regime adopted. The electronic signage is enforceable, as was noted at Puni School where the Police were active during the morning observation period. The advisory signs are not enforceable and there is some concern that over time these signs will have less effect on drivers as they realise that there has been no change in the operation of the school entrances. This is likely to be more of an issue at schools where there is little interaction between the parking areas and the road, both in terms of cars and pedestrians. The peak pick-up and drop-off times clearly had an impact on the way drivers behaved around schools and regular users may tend to relax their compliance with advisory signs, much as they do with general advisory signs on the remainder of the roading network.

It is important to acknowledge that these signs are not the only solution for schools wishing to improve road safety outside the school. The signs are only one of tools available to schools and can be used in conjunction with other treatments. Combining the results of this study with others around the country will help advise technical experts making recommendations as to the most effective signage strategy to use.

APPENDICES

Appendix A
Ararimu School

Initial 40km/h Electronic Warning Signage Assessment

Opus International was commissioned by Auckland Transport to assess the eligibility of Ararimu School for a 40km/h variable speed limit or electronic school warning sign zone. A safety assessment was also carried out to identify any operational and safety issues.

The initial assessment was undertaken in order to understand the general operation of the street environment surrounding the school and also how this environment operated during the peak school times. The initial assessment consisted of:

- Five day speed and volume traffic counts
- Survey of pedestrian activity
- Crash history of the surrounding area.
- Extent of the school related activity or 'hazard zone' and
- Other observations relevant to the type or placement of signs

The results from the traffic counts undertaken on the 6 August 2012 are provided below.

Time	Morning Peak	Afternoon Peak
Mean Speed (km/h)	71	71
85 th percentile speed (km/h)	82	83

Table B1 Initial Assessment - Mean and 85th Percentile Speeds Araimu School

A pedestrian survey counted 73 child pedestrians in the morning peak and 76 child pedestrians crossing the road in the afternoon peak. An analysis of CAS data for the past five years (2007-2011) showed four reported crashes here. There were no crashes involving pedestrians or cyclists.

Ararimu School did not meet the warrant for application of either the 40 km/h variable speed signs or the electronic school warning signs.

Site Description – Video Camera and Counter Locations

The locations of the videos and the traffic counters are demonstrated in Figure A1.



Figure A1 Ararimu School - Location of Video Cameras

Signage Construction Plan



Pre-Implementation Consultation

Twenty parents responded to the survey. The response rate for this school was approximately 15 per cent (based on a school roll of 130 pupils). This is only an approximate response rate, as some families will have more than one child at the school. The survey results are as follows:

- Parents were asked what their average speeds were when driving past the school.
Ninety-five per cent (19 parents) stated that the average speed they drove past the school on Ararimu Road was between 60-80km/h.
Five per cent (1 parent) said their average speed was less than 60km/h.
Tube counts taken as part of this project found that the 85th percentile speeds past the school (on Ararimu Road) were 82.8km/h between 8-9am. Between 2-3pm the 8^{5th} percentile speed past the school was 84.2km/h and 82.6 km/h between 3-4pm.
- Parents were asked what they believed was a safe speed for traffic passing the school.
Fifty-five per cent (11 parents) believed that the safe speed for traffic passing this school is between 50-60km/h.
Forty-five per cent (9 parents) believed that speeds lower than 50km/h were safe for traffic passing this school.
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
Twenty per cent (4 parents) had observed drivers lowering their speed limit near the school regardless of whether there were children around.
Forty-five per cent (9 parents) observed other drivers slowing when children were in the vicinity.
Ten per cent (2 parents) observed other drivers slowing during school hours on school days.
Twenty five per cents (5 parents) observed that other drivers did not slow down when driving past the school.
- Parents were asked if they had observed any crashes or near misses on the road outside of the school.
Thirty-two per cent (6 parents) stated they had observed crashes or near misses on the road outside the school.
Sixty-five per cent (13 parents) said they had not observed any crashes or near misses on the road.

Of those that have observed incidents, all of these were recorded as 'near misses'. The details of these events are listed as follows:

- Blind spot turning into Steel Road.
- Cars slowing down to turn into Steel Road.
- Cars and pedestrians – near miss
- Car overtaking, car on other side of road and child walking
- Cars verses school buses on Steel Road

Additional comments from parents about road safety at Ararimu School are detailed below:

➤ *Pedestrian Facilities*

The lack of footpaths, combined with high traffic speeds and heavy vehicles was commented on by several parents. There are concerns that the lack of walking facilities on Ararimu Road discourages children from walking to school. Mothers with prams have been observed walking along Ararimu Road in order to get to the playground at the community hall. Other adults walk and jog up Ararimu Road. It was suggested that as there are no footpaths, the speed limit should be reduced to 40km/h.

➤ *Poor Parent Behaviour*

Parents turning fast from Ararimu Road into Steel Road, cell phone usage and inconsiderate parking were mentioned. It was suggested that parking could be restricted on the corner of Steel Road and Ararimu Roads.

➤ *Dangerous Overtaking*

When driving at the speed limit on Ararimu Road, parents note that they are overtaken by speeders (both cars and motorcyclists) outside the school. No-overtaking lines were suggested.

➤ *Improved Signage*

Clear signage of the reduced speed limit was suggested and earlier warning signs are needed for those not familiar with the area. Also, the lower speed limit on Steel Road than Ararimu Road – this was commented on a number of times.

➤ *General*

Comparisons with Bombay School were made a number of times.

Post-Implementation Consultation

A post-implementation survey was also undertaken. Sixteen parents responded to this survey. The survey results are as follows:

- Parents were asked what their average speeds were when driving past the school
Sixty-three per cent (10 parents) stated that the average speed they drove past the school on Ararimu Road was below 60km/hr.
Thirty-seven per cent (six parents) said their average speed was between 60-80km/hr.
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
Thirty-eight per cent (six parents) had observed that speeds were reduced whether or not there were children present.
Thirty-three per cent (five parents) observed that other drivers reduced their speeds when the illuminated speed signs are operating.
Twenty-five per cent (four parents) observed that other drivers reduced their speed when children were in the vicinity.
Four per cent (one parent) observed that other drivers did not reduced their speed within the school zone.
- Parents were asked if they reduced their speed in the school zone when they see the signs.
Eighty-one per cent (13 parents) stated that they slowed down whether or not they see children
Nineteen per cent (three parents) stated they slow down only during school hours and on school days.

- If parents did slow down they were asked what speed they slowed down to. Fifty-six per cent (nine parents) stated they slowed to around 60km/hr
Thirty-eight per cent (six parents) stated they slow to slower than 60km/hr
Four per cent (one parent) stated they slowed down but not as low as 60km/hr.
No parents stated they did not slow down.

Additional comments from parents are detailed below:

- Regardless of signs, drivers still doing more than 80km/hr
- A crossing is needed
- Limit should go lower
- Footpath is needed.

Pre-Implementation Traffic Counts

The results of these initial speed counts are demonstrated in Table A1 and Table A2

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	32.2	56.4
8-9am	59.6	48
9-10am	25.6	44.8
1-2pm	14.4	53.2
2-3pm	24.8	50.2
3-4pm	56.2	39.2
4-5pm	27.4	53.8
5-6pm	23.6	54.8

Table A1 Counter 1, Ararimu Road

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	176.8	87.2
8-9am	194	82.8
9-10am	105.6	82.8
1-2pm	73.4	86.6
2-3pm	105.2	84.2
3-4pm	161	82.6
4-5pm	157.8	87.4
5-6pm	150.4	88.2

Table A2 Counter 2 Ararimu Road

Pre- Implementation Site and Video Observations

Site Observations - Morning Peak

The site observations commenced at 7am. The individual observations are as follows:

- At 7:27am the school bus turned right into Steel Road, right into the community hall car park, picked up several children for another school then turned right out of Steel Road.
- In the first part of the observation period there were low traffic flows, with almost no bunching and large gaps.

- Between 7:32-7:37am seven students were dropped off and one walked to the hall car park. Another bus picked up some children on the northern corner of Ararimu Road and Steel Road and partly obstructs the intersection while picking up the children.
- At 7:40am a bus from the south turned left into Steel Road then right into the car park. A child is picked up then the bus turned left into Steel Road and right onto Ararimu Road.
- Three students were observed walking down Steel Road and one vehicle drove down Steel Road and turned left into the hall car park.
- The busiest period for drop-offs was between 8:25-9am. In this period the western car park had 11 vehicles turning left into the car park and 15 vehicles turning right out. There were no right turns in or left-turns out during the entire morning observation.
- There was some activity observed on the road outside the western car park on camera one that will be discussed in section 2.1.4.
- The on-street 90° angle parking outside of the school had 24 vehicles left-turn into the angle park in the period between 8:25-9am. Six vehicles reversed into these car parks. To exit these car parks, seven vehicles drove out forwards and 18 reversed out.
- The angle parks outside the community hall had a shorter peak period which was between 8:54-9:05am. In this period, two vehicles turned left into the angle parks and two right-turned into the angle parks. When exiting, two were observed to do a left-turn-reverse out manoeuvres. Vehicles were reversing into and out of the angle parks from both sides of the road. Many vehicles were reversing onto the road with limited visibility. Also, given the parking's close proximity to the intersection there is definite potential for conflict with the left turning vehicles into Steel Road. This was also observed in the video observation.
- The community hall car park had limited activity before 8:40am and was busiest between 8:42-8:53am. In this period, five vehicles turned left and one turned right into the car park. Five vehicles exited the car park by turning left.

Video Observations – Morning Peak

The morning peak video observations commenced at approximately 7am and finished at approximately 9:10am. Camera one was located on the northern side of Steel Road, just back from the western car park, facing the school. Camera two was located at the intersections of Steel Road and Waiuku Road, looking up Steel Road. Between 2:26-2:33pm the camera was blown over and no useful footage was taken. Camera three was positioned on the eastern side of Waiuku Road. The camera was facing the intersection of Steel Road and Waiuku Road. Figure A1 (above) demonstrates the position of the cameras.

Camera One

The observations from the video recording of the morning peak generally match those from the morning site visit. There were several additional incidents observed on the video, as follows:

- At 8:40am a vehicle reversed (left turn) onto Steel Road (from the angle parks outside the school, a through vehicle was delayed by this manoeuvre.
- At 8:48am, a vehicle turned right out of the eastern car park. A through vehicle travelling at speed down Steel Road (towards the school) had to brake hard to avoid the manoeuvring car (which is still picking up speed).
- At 8:49am a vehicle turned left into Steel Road and reversed into angle parking outside the school. This delayed a through vehicle.
- Pedestrians could be seen crossing the road outside the community hall occasionally throughout the morning. On one occasion (8:56am) the pedestrians were crossing the road with a small animal and had to return to the middle of the road to retrieve the animal that had remained on the road.

- At 8:52am, a child was seen running across the road alone, a vehicle stopped on the school side of Steel Road (by the angle parks) to allow the child to cross.
- At 8:53am, a vehicle turned left into the western car park, reversed right back onto the road (on the wrong side of the road) then parked just west of the western car park entrance on the road side facing the wrong way and partially in the traffic lane. This vehicle remained parked there until 9am. In that time three oncoming vehicles had to cross the centre line in order to overtake this vehicle.
- Two vehicles parked on this shoulder near the corner between 9:01-9:05am, causing two vehicles to cross the centre line to pass.
- At 9:08am a vehicle was observed reversing (right turn) out of the western car park entrance.

Camera Two

- A vehicle drove down Steel Road and stopped at intersection where the bus was waiting (partially in the intersection). Two children exited the car and ran to the bus.
- At 8:38am a vehicle turned right into Steel Road and turned left into the 90° angle parking area and stopped perpendicular to the angle parks. This vehicle drove out of the parking area to position itself for a reverse angle park but did not check for turning traffic and narrowly avoided hitting a right turning car coming into Steel Road.
- As mentioned in the site observations, there are several issues with drivers reversing into and out of the angle parks. It appeared that some drivers did not check for other traffic carefully enough and as a result, several 'close calls' were observed. These were from either two drivers nearly reversing or driving into one another, or a driver not seeing another vehicle turning into Steel Road.
- At 9:03am a vehicle turned left to park on the Steel Road and parked partially in the lane, causing a vehicle to cross the centre line to pass it.
- It was observed that many right turners onto Steel Road cut the corner and travelled over the line markings.

Camera Three

- At 9:10am two vehicles travelling south on Waiuku Road were overtaken just past the intersection with Steel Road by another vehicle.

Morning Peak Summary

The safety inspection and review of the video observations identified that the morning peak had fairly limited issues due to the more even arrival pattern distribution. As no vehicles parked directly onto Ararimu Road, there were few issues here, although the proximity of parking spaces on Steel Road to Ararimu Road meant there were conflict situations between turning and manoeuvring vehicles. Many drivers parked in the Community Hall across from the school and crossed the road with children, particularly during the busiest drop off times.

Site Observations - Afternoon Peak

The afternoon site visit commenced at 2pm. The specific observations during the afternoon period are as follows:

- At 2pm there were four cars in 90° angle parking outside the school and one vehicle angle parked outside the hall. Through traffic was very light.
- The western car park was busiest between 2:55-3:30pm. During this period eight cars turned left into the car park and one turned right in. Two cars turned left out of the car park and ten turned right, towards Ararimu Road. These turns were made without issue or effect on other road traffic.

- During the afternoon period, six cars were observed to turn left and park on the shoulder, adjacent to the western car park, immediately outside the school.
- The angle parking outside the school (on Steel Road) was busiest between 2:50-3:30pm. During this time, ten people turned left to park, five turned left to reverse park and one reversed in (right turn). Vehicles were busiest leaving these parks between 3:05-3:30pm. Five vehicles were observed turning right out of the parks, eight reversed out (right turn) and one left turned out.
- The community hall car park was busiest between 2:50-3:20pm. Twelve vehicles turned right to enter the car park and one turned left. Twelve vehicles exited the community hall car park by making a left turn. There were no right turns out of the community hall car park in the afternoon peak.
- Between 2:50-3:20pm seven cars turned right to park in the angle parking outside the community hall. One of these vehicles reversed into the park. One car turned left to angle park. Four vehicles exited the parks by reversing out (left turn) and one drove into the community car park to exit. One vehicle reversed out of the car park (right turn). This activity was again observed to be potentially troublesome, as many parents did not appear to have good visibility or were not checking for other vehicles.
- Some parents did park on the street, but the shoulders are very narrow on Steel Road and the cars protruded onto the road. Several incidents were observed on the video analysis in relation to this. It was observed that many parents use the hall car parking, which could be a problem if the hall was being used for something else. It was common for parents to park in the hall car park and then walk across the road to pick up children. On return, many children were walking or running ahead of their parents and were observed to cross Steel Road independently. It was also observed that the footpath area and 90° parks were also used as a loading zone
- The bell sounded at 3:02pm.
- At 3:06pm a vehicle did a U turn at the intersection outside the community hall. This same vehicle departed at 3:19pm via another U turn.
- At 3:22pm the school bus turned right at the intersection and parked on the road directly outside the school entrance. At 3:28pm the bus exited by U turning through the hall car park and turned left at the intersection. The lack of a specific bus area may cause congestion.
- By 3:30pm the afternoon peak was finished.

Video Observations – Afternoon Peak

The video observations match those made on the site visit. There were several additional observations made from the video analysis and these are detailed below.

Camera One

- At 2:56pm a vehicle drove down Steel Road (eastbound) and turned right to park on the road side (facing the wrong way) beside the western car park. The shoulder is narrow and the vehicle protruded into the lane.
- At 2:57pm, a vehicle driving up Steel road had to cross the centre line to pass this vehicle, turned left into the exit of the western car park and reversed (right turn) onto the road to park behind the car parked on the wrong side of the road beside the western car park.
- At 3pm a truck was observed to travel up Steel Road and overtook these parked vehicles by crossing the centre line.
- At 3:01pm a car turned left into western car park, looped around, turned right into Steel Road and parked on the shoulder opposite the car park. This narrowed the road space further (as the two above mentioned cars were still parked). Vehicles travelling both ways now had to cross the centre line to pass these parked vehicles.

- At 3:13pm a concrete mixing truck was delayed by a right turning vehicle from the west car park and by the cars parked on both sides of the road in the lane. An oncoming vehicle was also delayed by this, as it had to wait for the truck to pass. At this time the western car park appeared full so two vehicles left turned into the exit and then reversed (right turn) back onto the road.
- At 3:35pm the driver of the vehicle parked opposite the western car park on the shoulder returned with children. One child opened the door on the road side and entered the vehicle. As the driver was shutting the child's door a vehicle drives around the bend and had to cross the centre line to avoid the driver and the car door.

Camera Two

The afternoon peak again demonstrated some issues with vehicles accessing the angle parks and the intersection with Waiuku Road. Otherwise, the observations were similar to the site visit.

Camera Three

There were no observations of note from camera three in the afternoon peak.

Afternoon Peak Summary

The afternoon peak had a much more pronounced activity period, common with schools as parents and caregivers all arrive to pick up children at the same time. Most of the issues were between vehicles entering Steel Road and vehicle manoeuvring into or out of on street car parks, or parents crossing the road to the community hall car park with children as there is no pedestrian crossing facility on Steel Road.

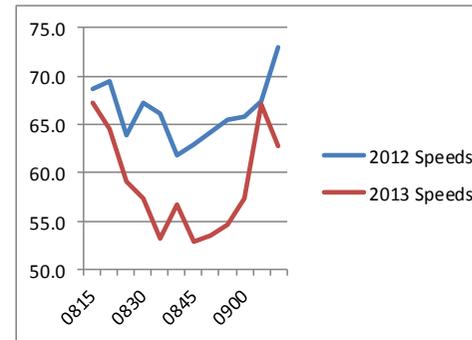
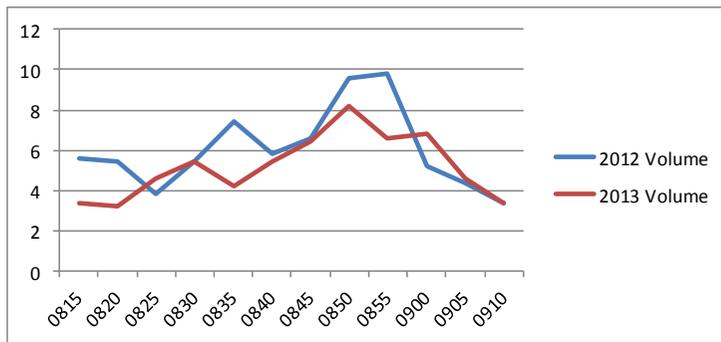
Speed Survey Results

Ararimu Rd South of Steel Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	N	5.6	68.7
0820	N	5.4	69.4
0825	N	3.8	63.8
0830	N	5.4	67.3
0835	N	7.4	66.1
0840	N	5.8	61.9
0845	N	6.6	62.9
0850	N	9.6	64.2
0855	N	9.8	65.5
0900	N	5.2	65.8
0905	N	4.4	67.4
0910	N	3.4	72.9

Ararimu Rd South of Steel 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	N	3.4	67.2
0820	N	3.2	64.5
0825	N	4.6	59.0
0830	N	5.4	57.3
0835	N	4.2	53.2
0840	N	5.4	56.6
0845	N	6.4	52.8
0850	N	8.2	53.4
0855	N	6.6	54.6
0900	N	6.8	57.3
0905	N	4.6	67.0
0910	N	3.4	62.7



Ararimu Rd South of Steel Road 2012

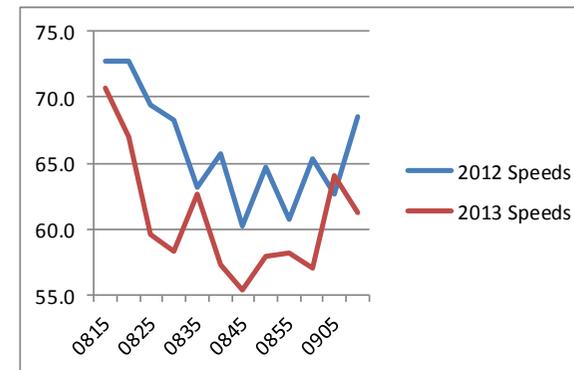
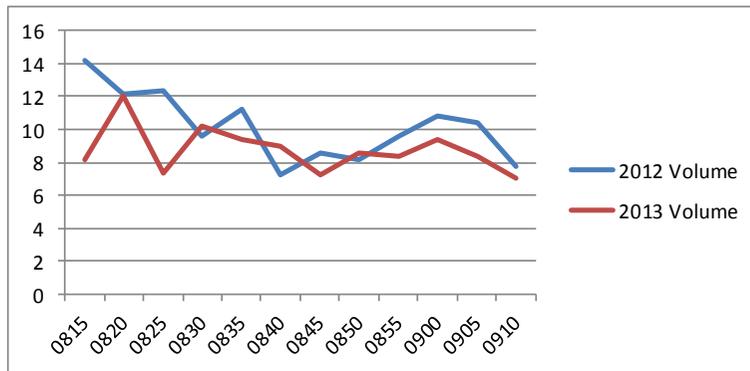
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	S	14.2	72.8
0820	S	12.2	72.8
0825	S	12.4	69.4
0830	S	9.6	68.3
0835	S	11.2	63.1
0840	S	7.2	65.7
0845	S	8.6	60.2
0850	S	8.2	64.7
0855	S	9.6	60.7
0900	S	10.8	65.3
0905	S	10.4	62.6
0910	S	7.8	68.5

Ararimu Rd South of Steel Rd 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
0815	S	8.2	70.8
0820	S	12	67.0
0825	S	7.4	59.5
0830	S	10.2	58.3
0835	S	9.4	62.6
0840	S	9	57.4
0845	S	7.2	55.3
0850	S	8.6	57.9
0855	S	8.4	58.1
0900	S	9.4	57.1
0905	S	8.4	64.1
0910	S	7	61.3



Ararimu Rd South of Steel 2012

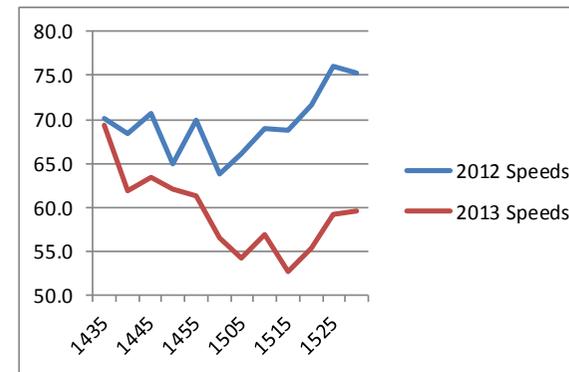
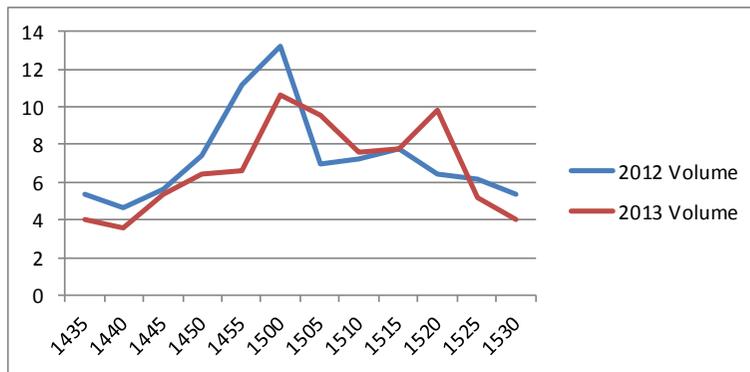
5 Day average

Time	Direction	Average volume	Average mean speed
1435	N	5.4	70.0
1440	N	4.6	68.4
1445	N	5.6	70.8
1450	N	7.4	64.9
1455	N	11.2	69.9
1500	N	13.2	63.8
1505	N	7	66.0
1510	N	7.2	69.0
1515	N	7.8	68.7
1520	N	6.4	71.6
1525	N	6.2	76.1
1530	N	5.4	75.2

Ararimu Rd South of Steel 2013

5 Day average

Time	Direction	Average volume	Average mean speed
1435	N	4	69.3
1440	N	3.6	61.9
1445	N	5.4	63.4
1450	N	6.4	62.1
1455	N	6.6	61.3
1500	N	10.6	56.4
1505	N	9.6	54.3
1510	N	7.6	56.9
1515	N	7.8	52.7
1520	N	9.8	55.3
1525	N	5.2	59.2
1530	N	4	59.6



Ararimu Rd South of Steel Road 2012

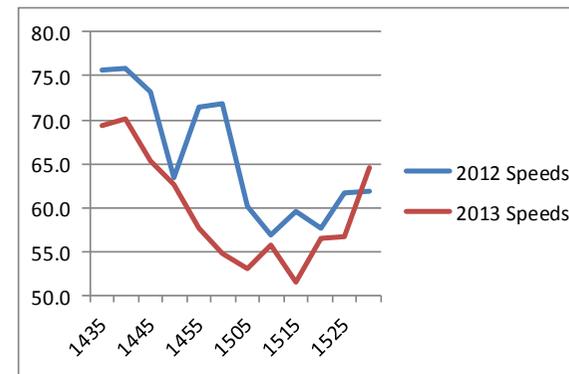
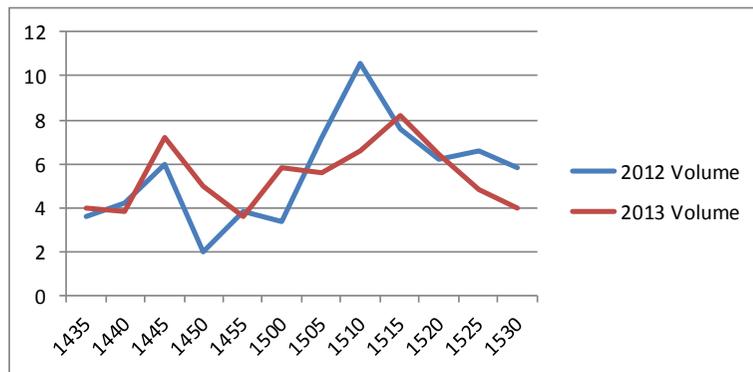
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	S	3.6	75.7
1440	S	4.2	75.9
1445	S	6	73.1
1450	S	2	63.5
1455	S	3.8	71.4
1500	S	3.4	71.8
1505	S	7.2	60.1
1510	S	10.6	56.9
1515	S	7.6	59.5
1520	S	6.2	57.6
1525	S	6.6	61.6
1530	S	5.8	61.8

Ararimu Rd South of Steel Road 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
1435	S	4	69.3
1440	S	3.8	70.1
1445	S	7.2	65.3
1450	S	5	62.6
1455	S	3.6	57.6
1500	S	5.8	54.9
1505	S	5.6	53.0
1510	S	6.6	55.6
1515	S	8.2	51.5
1520	S	6.4	56.4
1525	S	4.8	56.6
1530	S	4	64.6

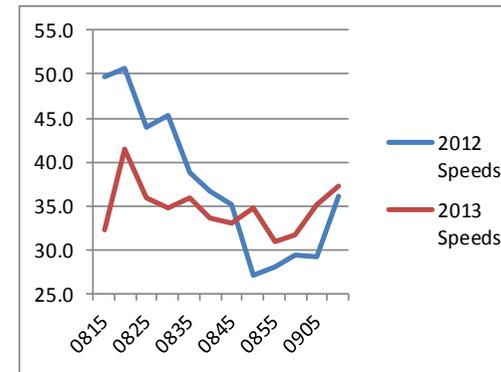
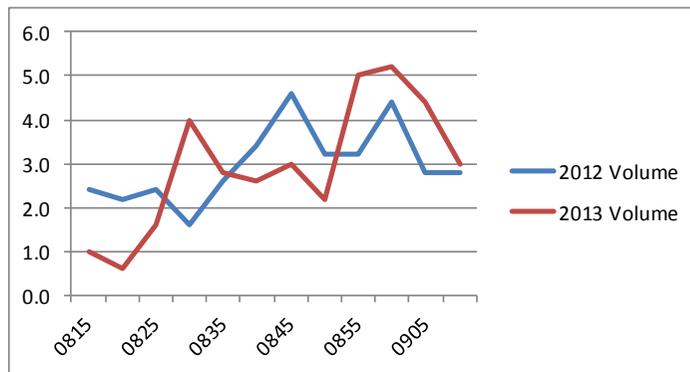


Steel Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	E	2.4	49.6
0820	E	2.2	50.6
0825	E	2.4	44.0
0830	E	1.6	45.4
0835	E	2.6	38.8
0840	E	3.4	36.6
0845	E	4.6	35.1
0850	E	3.2	27.0
0855	E	3.2	28.0
0900	E	4.4	29.4
0905	E	2.8	29.3
0910	E	2.8	36.1

Steel Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	E	1.0	32.2
0820	E	0.6	41.4
0825	E	1.6	35.9
0830	E	4.0	34.7
0835	E	2.8	36.0
0840	E	2.6	33.6
0845	E	3.0	33.0
0850	E	2.2	34.8
0855	E	5.0	31.0
0900	E	5.2	31.8
0905	E	4.4	35.1
0910	E	3.0	37.2

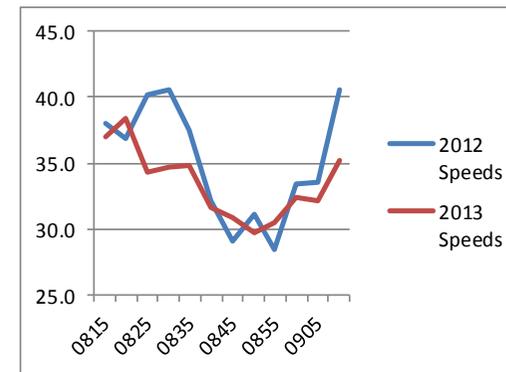
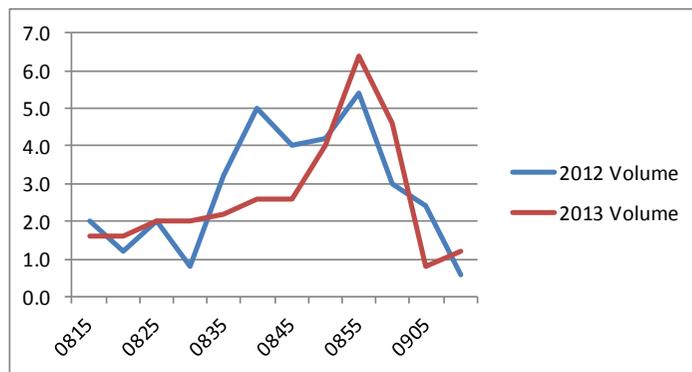


Steel Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	W	2.0	38.1
0820	W	1.2	36.9
0825	W	2.0	40.2
0830	W	0.8	40.6
0835	W	3.2	37.5
0840	W	5.0	32.2
0845	W	4.0	29.0
0850	W	4.2	31.1
0855	W	5.4	28.5
0900	W	3.0	33.5
0905	W	2.4	33.5
0910	W	0.6	40.6

Steel Road 2013
5 Day average

Time	Direction	Average volume	Average mean speed
0815	W	1.6	37.0
0820	W	1.6	38.4
0825	W	2.0	34.3
0830	W	2.0	34.8
0835	W	2.2	34.8
0840	W	2.6	31.6
0845	W	2.6	30.9
0850	W	4.0	29.8
0855	W	6.4	30.4
0900	W	4.6	32.4
0905	W	0.8	32.1
0910	W	1.2	35.2

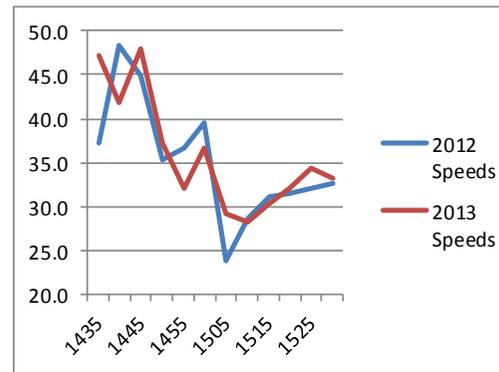
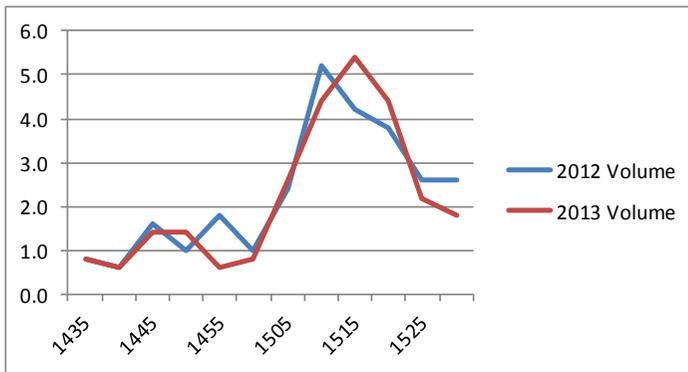


Steel Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	E	0.8	37.2
1440	E	0.6	48.4
1445	E	1.6	44.9
1450	E	1.0	35.4
1455	E	1.8	36.7
1500	E	1.0	39.5
1505	E	2.4	23.9
1510	E	5.2	28.6
1515	E	4.2	31.1
1520	E	3.8	31.5
1525	E	2.6	32.0
1530	E	2.6	32.6

Steel Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	E	0.8	47.2
1440	E	0.6	41.8
1445	E	1.4	48.0
1450	E	1.4	37.2
1455	E	0.6	32.0
1500	E	0.8	36.6
1505	E	2.6	29.3
1510	E	4.4	28.2
1515	E	5.4	30.4
1520	E	4.4	32.1
1525	E	2.2	34.3
1530	E	1.8	33.3

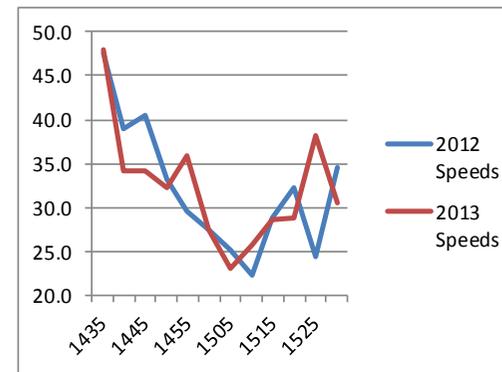
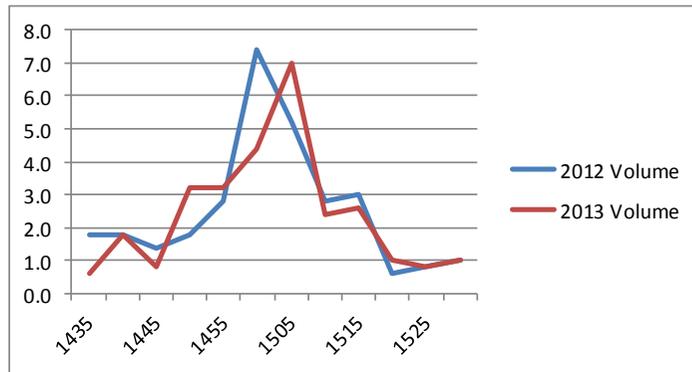


Steel Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	W	1.8	47.5
1440	W	1.8	38.9
1445	W	1.4	40.6
1450	W	1.8	33.2
1455	W	2.8	29.6
1500	W	7.4	27.5
1505	W	5.2	25.2
1510	W	2.8	22.3
1515	W	3.0	28.8
1520	W	0.6	32.2
1525	W	0.8	24.5
1530	W	1.0	34.6

Steel Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	W	0.6	47.9
1440	W	1.8	34.2
1445	W	0.8	34.2
1450	W	3.2	32.2
1455	W	3.2	35.8
1500	W	4.4	27.6
1505	W	7.0	23.0
1510	W	2.4	25.8
1515	W	2.6	28.6
1520	W	1.0	28.7
1525	W	0.8	38.3
1530	W	1.0	30.6



Appendix B
Dairy Flat School

DAIRY FLAT SCHOOL

Initial 40km/hr/Electronic Warning Signage Assessment

MWH was commissioned by Auckland Transport to assess the eligibility of Dairy Flat School for a 40km/h variable speed limit or electronic school warning sign zone. A safety assessment was also carried out to identify any operational and safety issues.

The initial assessment was undertaken in order to understand the general operation of the street environment surrounding the school and also how this environment operated during the peak school times. The initial assessment consisted of:

- Seven day speed and volume traffic counts
- Survey of pedestrian activity
- Crash history of the surrounding area

The results from the traffic counts undertaken on the between 11-18 June 2012 are provided below.

Time	Morning Peak	Afternoon Peak
Mean Speed (km/h)	73	77
85 th percentile speed (km/h)	82	86

Table B1 Initial Assessment - Mean and 85th Percentile Speeds Dairy Flat School

A pedestrian survey counted no pedestrians in the morning peak and one parent and child crossing the road in the afternoon peak. An analysis of CAS data for the past five years (2007-2011) showed one reported crash here. The vehicle involved was travelling too fast and swerved to avoid a vehicle. There were no crashes involving pedestrians or cyclists.

Dairy Flat School did not meet the warrant for application of either the 40 km/h variable speed signs or the electronic school warning signs. Although the criteria for mean-speed and 85th percentile speed were met, the school children activity on the highway was not high enough to meet the warrant.

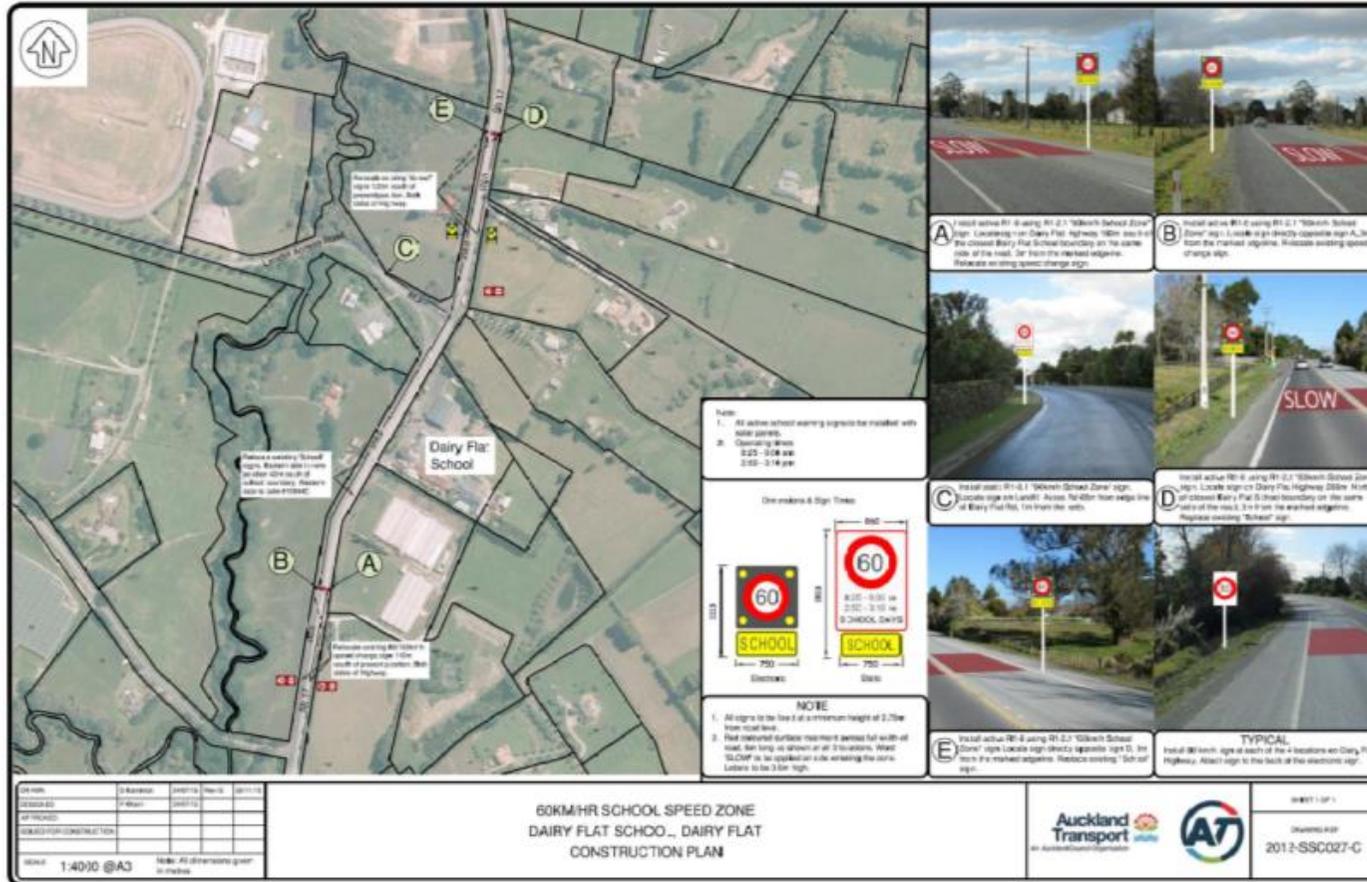
Site Description – Video Camera and Counter Locations

Figure B1 demonstrates the location of the speed counters and the the video.



Figure B1 Dairy Flat School - Location of Video and Counter

Signage Construction Plan



Pre-Implementation Consultation

Ninety parents responded to the survey. The response rate was for this school approximately 41 per cent (based on a school roll of 220 pupils). This is only an approximate response rate, as some families will have more than one child at the school.

The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school.
 - Fourteen per cent (13 parents) stated their average speed was below 60km/h.
 - Eighty-two per cent (74 parents) stated their average speed was between 60-80km/h.
 - Four per cent (3 parents) stated their average speed was above 80km/h.Tube counts taken as part of this project indicate that the average speeds past the school between 8-9am and 2-4pm was 81km/h.
- Parents were asked what they believed was a safe speed for traffic passing the school.
 - Thirty-seven per cent (33 parents) believed below 50km/h was a safe speed.
 - Sixty per cent (53 parents) believed between 50-60km/h was a safe speed
 - Three per cent (3 parents) believed that more than 60km/h was a safe speed.
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
 - Twenty-six per cent (23 parents) said that other drivers did reduce their speed within the school zone regardless of whether children were present.
 - Twenty-nine per cent (26 parents) stated that other drivers did reduce their speed but only when there were children in the vicinity
 - Thirty-four per cent (31 parents) stated that other drivers did reduce their speed within the school zone, but only during school hours on school days.
 - Eleven per cent (10 parents) stated that other drivers did not reduce their speed within the school zone.
- Parents were asked if they had observed any crashes or near misses on the road outside of the school.
 - Sixty-one per cent (54 parents) reported that they had observed crashes or near misses outside the school.
 - Thirty-nine per cent (34 parents) reported that they had not observed any crashes or near-misses outside the school.Of those that have observed incidents, all of these were recorded as 'near misses'. The details of these events are listed as follows:
 - Parked cars obscure the view of vehicles leaving the school (several comments). This is made worse by the bend in the road and driver inattention when exiting the school.
 - High traffic speeds when enter/exit school gates (several comments).
 - Cars making U-turns.
 - Cars overtaking in waiting-to-turn lane.

Additional comments made by parents about road safety at Dairy Flat School are detailed below:

- *Speed*

The speeds of all vehicles (including trucks) past the school were of mentioned by several parents. It was suggested that speeds should be lowered to 30km/h or 50km/h at school start and finish times, or at all times. Warning signs should be used to alert drivers.

Others suggested that speed limits should be enforced with speed cameras or with variable message speed signs.
- *High Traffic Volumes*

Large volumes of traffic travelling past the school were identified as an issue.
- *School Buses*

More school buses were suggested, with one parent commenting that their children now use the school bus as they believe it is safer than having to drive in and out of school gates.
- *Parking*

Parking was an issue, with some parents believing that parking should be moved away from the school gates as children should not have to exit a car onto a busy road. It was suggested that the bus stops be moved further away from school gates. Others believed that there should be more parking within the school grounds. Parking enforcement was also mentioned, as some parents are observed to park on the broken yellow lines. One parent commented on parents speeding within the school car park. Another parent commented that the congestion caused during drop-off and pick-up was a cause of frustration.
- *Pedestrian Facilities*

Pedestrian crossing and footpaths outside the school were also suggested by several parents.
- *General*

Sun-strike affects visibility

Post-Implementation Consultation

Thirty parents responded to the post-implementation survey.

The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school.

Fifty-seven per cent (17 parents) stated their average speed was between 60-80km/h.
Forty-three per cent (13 parents) stated their average speed was below 60km/hr
- Parents were asked if they had observed other drivers reducing their speed within the school zone.

Fifty-three per cent (16 parents) had observed other drivers reducing their speed only when the illuminated speed limit signs are operational.
Thirty-three per cent (10 parents) stated that they had observed other drivers reducing their speed whether or not children were present.
Seven per cent (2 parents) had observed other drivers reduce their speed only when children were present.
Seven per cent (2 parents) had not observed other drivers reducing their speed within the school zone.
- Parents were asked if they reduced their speed while driving in the school zone.

Ninety-seven per cent (29 parents) stated that they did slow down, regardless of whether they see children or not.

Three per cent (one parent) stated they slowed down only during school hours on school days.

- For parents that did reduce their speed, they were asked what speed they slowed down to. Sixty per cent (18 parents) stated they slowed down to below 60km/hr. Forty per cent (12 parents) stated they slowed down to around 60km/hr.

Additional comments made by parents about road safety at Dairy Flat School are detailed below:

- *Speed*
 - Signs were slowing the traffic (mentioned several times)
 - Speed limit on signs should be reduced further (mentioned several times). Suggested should be 30km/hr.
 - Highway speed limit should be 60km/hr at all times.
 - Some parents still speeding on road and in car park
- *Signs*
 - Crucial for school safety
 - Sign has only been operational for one morning this term
 - Need speed advisory sign at school car park exit
 - Signs should be illuminated for an hour at start and end of school
 - Signs have promoted discussion and awareness
- *Driver Behaviour*
 - Drivers tailgating those who slow down
- *Parking*
 - Poor access into the school if parking on side of road
 - Parking in bus stop by parents should be monitored
 - Poor visibility when exiting school.

Pre- Implementation Traffic and Speed Counts

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	531.6	84.6
8-9am	563.8	81
9-10am	345.4	82.6
1-2pm	349.6	84.6
2-3pm	431.8	81
3-4pm	513	81
4-5pm	562.8	85.6
5-6pm	606	86.6

Table B2 Dairy Flat School Survey - 5 Day ADT and 85th Percentile Speeds

Pre-Implementation Site and Video Observations

Site Observations - Morning Peak

The morning drop-offs and teacher parking began just before 7am. The specific observations were as follows:

- At 7:13am the first drop-off was observed.
- At 7:19am a southbound platoon of eight vehicles was observed being delayed by a right-turning truck into Landfill Access Road. There were steady flows of vehicles travelling in small bunches and within the speed limit.
- At 7:30am a south-bound through vehicle was observed to overtake a truck turning from the Landfill Access Road
- The flush median is used by many northbound vehicles to overtake the trucks slowing to turn left into Landfill Access Road.
- It was also observed that many northbound vehicles tended to stay close to the right-turning (into the school) lane. Several through vehicles used the flush median to swing wider before the bend north of the school.
- Southbound vehicles were also observed cutting the corner north of Landfill Access Road intersection.
- The busiest times of the morning peak were between 8:25-9am. In this period 60 vehicles made a left turn into the school and 44 vehicles made a right turn in. In the same period, 49 vehicles turned left out of the school and 40 vehicles turned right out of the school car park.
- In general, the deceleration and turning areas are kept clear of through traffic. There were some left turning vehicles that did not use the left shoulder. These vehicles were passed by following vehicles using the flush median. There were only two occasions when there was some entering delay, but this was on-site, not on the road.
- Few parents parked on the road during the morning peak. The site observations noted a vehicle parking just north of the northern entrance on the shoulder. This blocked the deceleration area.
- The morning bell sounded at 8:55am.

Video Observations – Morning Peak

The camera was initially located on the western side of Dairy Flat Highway. However this positioned had to be moved to the eastern side of the road just south of the car park exit. The camera had to be turned off and moved a second time during the morning peak, at approximately 8:38am for two minutes when a vehicle parked and obstructed the camera. During the afternoon peak, camera one was located on the western side of Dairy Flat Highway. Figure B1 (above) demonstrates the camera position.

Camera One

The video observations were similar to those of the site visit, with specific issues noted below:

- The video observations showed a vehicle parked in the western shoulder between 7:50-8:08am and another vehicle stopping briefly in the western shoulder at 8:08am (children from another school appeared to be transferring cars).
- Between 8:30-9am four cars were observed to park on the eastern side of the road. Two of these were north of the northern school entrance, arrived at 8:51am and 8:57am and were both still present when the video ended at 9:30am. One vehicle was parked in front of the school on the road between 8:47-9am. Another vehicle was parked south of the school exit between 8:37-8:56am.

- By 9:15am turning traffic had reduced to pre-school starting levels.

Site Observations – Afternoon Peak

Due to a school event, it was not possible to undertake the afternoon peak site observations.

Video Observations – Afternoon Peak

The afternoon peak video observations commenced at 2:30pm and finished at 4:30pm, with **specific observations noted below:**

- The busiest time of the afternoon period was between 2:40-3:10pm. In this period 17 vehicles turned left into the car park and 39 vehicles turned right. Twenty-six vehicles turned left out of the school in this period, although 13 of these exited between 3-3:05pm. Twenty-four vehicles turned left out of the school in the busiest period. Again, 3-3:05pm was extremely busy, with 11 vehicles turning right out of the school in this five minute period.
- By 3:15pm the traffic had reduced back to pre-school finishing time levels.
- At 2:43pm a parent parked on the narrow shoulder of the northbound lane. Two other vehicles waited in the right turn lane. A large northbound truck was observed to brake heavily to avoid driving into the back of the car parked in the shoulder. As was observed in the morning, traffic for the landfill moderated traffic speeds past the school.
- There were more parents parking on the road during the afternoon peak period. At 3pm there were 13 vehicles parked on the road, with five north of the school entrance, five outside of the school and three south of the school exit.
- Between 2:30-3:30pm there were six vehicles parked directly outside the school on the road (between the entrance and exit). Five of these did U turns to leave the parked position.
- Four vehicles were parked south of the school exit between 2:30-3:30pm. None of these did U turns to leave. One vehicle was observed to be parked close to the exit and it is possible that this vehicle was affecting the sight lines of right turning vehicles exiting the car park.
- At 3:01pm a car waiting to turn right out of the school exit was observed to creep forward into the traffic lane but was forced to brake, stop in the lane and then reverse to avoid a northbound vehicle. This vehicle then turned right and waited in the western shoulder for through traffic to pass.
- Between 3-3:30pm there was a steady flow of vehicles turning right and left out of the school. At times this interfered with through traffic, causing it to reduce speed and at times brake hard.
- At 3:03pm a vehicle was observed turning right out of the school entrance. It also appeared that some of the right turners exiting the school were impatient to do so. This, combined with potentially limited sight lines caused by a vehicle parked close to the school exit resulted in several cars creeping onto the road space and attempting to leave, only to brake when they saw through traffic.

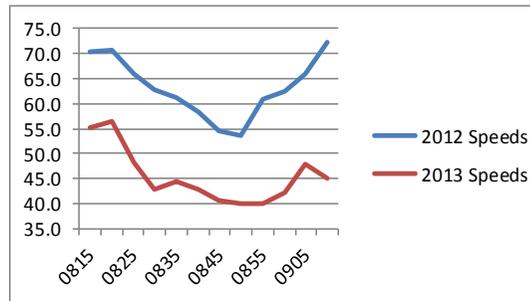
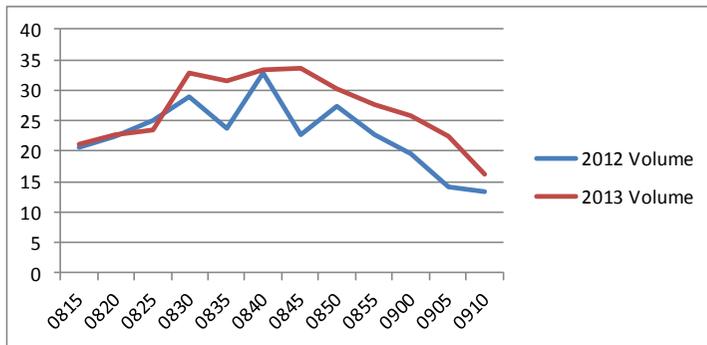
Speed Survey Results

Dairy Flat Highway 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	N	20.6	70.2
0820	N	22.4	70.6
0825	N	25	66.0
0830	N	29	62.8
0835	N	23.8	61.2
0840	N	32.8	58.2
0845	N	22.8	54.6
0850	N	27.4	53.7
0855	N	22.8	60.9
0900	N	19.6	62.5
0905	N	14.2	65.8
0910	N	13.4	72.4

Dairy Flat Highway 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	N	21.2	55.2
0820	N	22.8	56.5
0825	N	23.4	48.3
0830	N	32.8	42.8
0835	N	31.4	44.3
0840	N	33.4	42.7
0845	N	33.6	40.5
0850	N	30.2	40.0
0855	N	27.6	40.1
0900	N	25.8	42.1
0905	N	22.4	47.9
0910	N	16.2	45.0

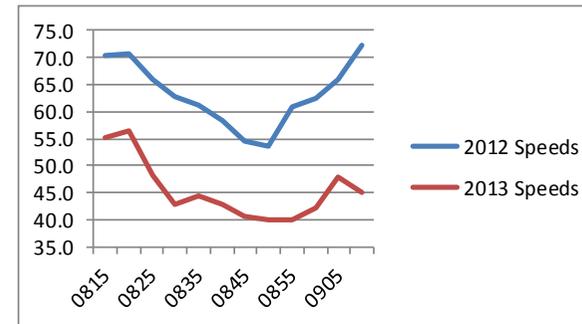
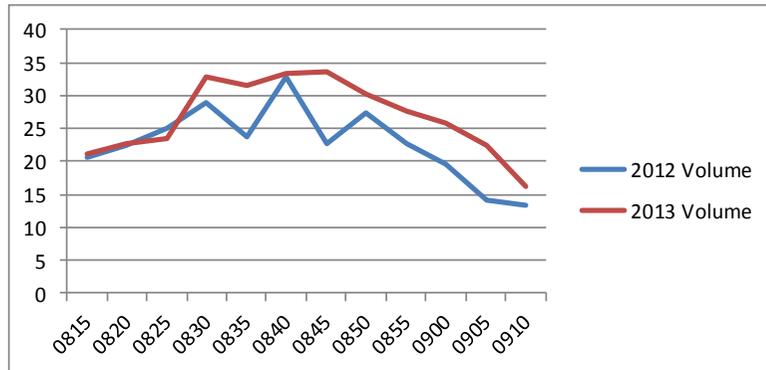


Dairy Flat Highway 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	N	20.6	70.2
0820	N	22.4	70.6
0825	N	25	66.0
0830	N	29	62.8
0835	N	23.8	61.2
0840	N	32.8	58.2
0845	N	22.8	54.6
0850	N	27.4	53.7
0855	N	22.8	60.9
0900	N	19.6	62.5
0905	N	14.2	65.8
0910	N	13.4	72.4

Dairy Flat Highway 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	N	21.2	55.2
0820	N	22.8	56.5
0825	N	23.4	48.3
0830	N	32.8	42.8
0835	N	31.4	44.3
0840	N	33.4	42.7
0845	N	33.6	40.5
0850	N	30.2	40.0
0855	N	27.6	40.1
0900	N	25.8	42.1
0905	N	22.4	47.9
0910	N	16.2	45.0



Dairy Flat Highway 2012

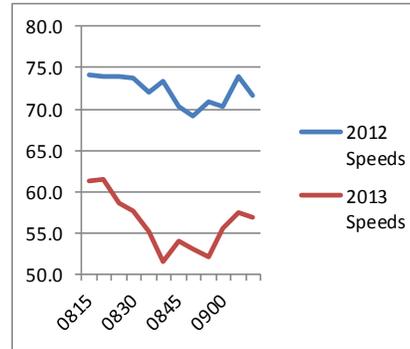
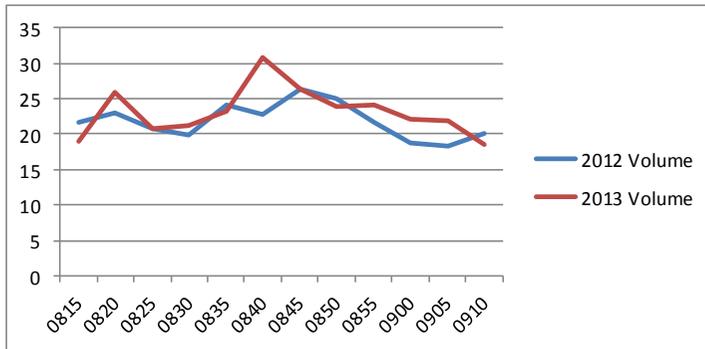
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	S	21.6	74.1
0820	S	23	74.0
0825	S	20.8	73.8
0830	S	19.8	73.8
0835	S	24.2	72.1
0840	S	22.8	73.3
0845	S	26.4	70.2
0850	S	25	69.1
0855	S	21.6	70.9
0900	S	18.8	70.2
0905	S	18.2	73.9
0910	S	20.2	71.6

Dairy Flat Highway 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
0815	S	19	61.2
0820	S	25.8	61.5
0825	S	20.8	58.6
0830	S	21.2	57.6
0835	S	23.2	55.1
0840	S	30.8	51.6
0845	S	26.4	54.1
0850	S	23.8	53.0
0855	S	24.2	52.1
0900	S	22	55.5
0905	S	21.8	57.4
0910	S	18.6	56.8

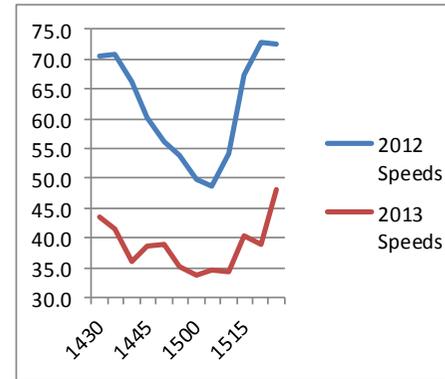
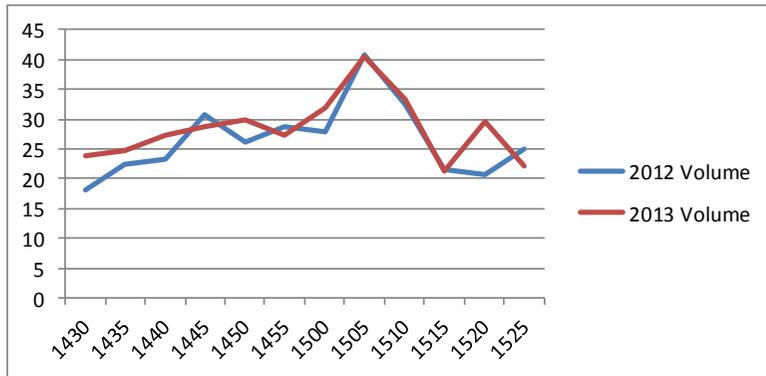


Dairy Flat Highway 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1430	N	18	70.5
1435	N	22.4	70.8
1440	N	23.2	66.2
1445	N	30.6	60.1
1450	N	26.2	56.3
1455	N	28.8	53.9
1500	N	27.8	49.8
1505	N	40.8	48.6
1510	N	32.4	54.0
1515	N	21.6	67.4
1520	N	20.6	72.7
1525	N	25	72.6

Dairy Flat Highway 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1430	N	23.8	43.4
1435	N	24.6	41.4
1440	N	27.2	36.0
1445	N	28.8	38.5
1450	N	29.8	39.0
1455	N	27.4	35.0
1500	N	32	33.7
1505	N	40.6	34.7
1510	N	33.2	34.4
1515	N	21.2	40.3
1520	N	29.6	38.9
1525	N	22.2	48.0



Appendix C
Glenbrook School

GLENBROOK SCHOOL

Initial 40km/hr/Electronic Warning Signage Assessment

Opus International Consultants Limited (Opus) was commissioned by Auckland Transport to assess the eligibility of Glenbrook School for a 40km/h variable speed limit or electronic school warning sign zone. The initial assessment undertaken by Opus involved:

- seven day speed and volume traffic counts
- a survey of pedestrian activity (children only)
- crash history of the surrounding area
- extent of the school related activity or 'hazard zone'
- other observations relevant to the type or placement of signs.

The traffic counts undertaken on the 18th June 2012 resulted in a 5 day ADT of 14,585, with a mean speed of 78.9km/h and an 85th percentile speed of 86km/h. The mean and 85th percentile for speed at key school times is demonstrated in Table C1

A pedestrian survey on the 23rd May 2012 counted five children between 8:15–9:15am and nine children between 2:30-3:15pm. An analysis of CAS data for the past five years (2007-2011) showed seven reported crashes within a 500m radius of the school. Of these crashes, three involved speed. There were no crashes involving pedestrians or cyclists.

Time	8-9am	2-3pm
Mean Speed (km/h)	76.6	78.3
85 th percentile speed (km/h)	83	84.6

Table C1 Initial Assessment - Mean and 85th Percentile Speeds Glenbrook School

Opus concluded that the school did not meet the warrant for application of 40 km/h variable speed signs. Although the criteria for mean-speed and 85th percentile speed were met, the school children activity was not high enough to meet the warrant. It was found that the school did warrant electronic school warning signs given the large amounts of turning traffic outside the school and the nature and speeds of Glenbrook Waiuku Road as per NZTA Traffic Notes 56.

Site Description – Video Camera and Counter Locations

Figure C1 demonstrates the locations of the speed counters and video cameras.



Figure C1 Glenbrook School Location of Cameras and Counters

Pre-Implementation Consultation

Thirty-three parents responded to the survey. The response rate for this school was 16 per cent (based on a school roll of 203 pupils). This is only an approximate response rate, as some families will have more than one child at the school.

The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school.
 - Nine per cent (three parents) stated their average speed was below 60km/hr.
 - Ninety-one per cent (32 parents) stated their average speed was between 60-70km/hr.
 - No parents stated their average speed was above 70km/hr.
- The tube counts taken as part of this project found that the 85th percentile speeds past the school were 69.8km/hr between 8-9am. Between 2-3pm the 8^{5th} percentile speed past the school was 72.8km/hr and 74km/hr between 3-4pm.
- Parents were asked what they believed was a safe speed for traffic passing the school.
 - Eight per cent (three parents) believed below 40km/hr was a safe speed.
 - Nineteen per cent (seven parents) believed between 40-50km/hr was a safe speed
 - Forty-four per cent (16 parents) believed between 50-60km/hr was a safe speed
 - Twenty-nine per cent (ten parents) believed more than 60km/hr was a safe speed
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
 - Twenty-seven per cent (nine parents) said that other drivers did reduce their speed within the school zone, regardless of whether there were children there.
 - Nine per cent (three parents) stated that other drivers did reduce their speed but only when there were children in the vicinity
 - Fifty-two per cent (17 parents) stated that other drivers did reduce their speed within the school zone, but only during school hours on school days.
 - Twelve per cent (six parents) stated that other drivers did not reduce their speed within the school zone.
- Parents were asked if they had observed any crashes or near misses on the road outside of the school.
 - Forty-two per cent (15 parents) reported that they had observed crashes or near misses outside the school.
 - Fifty-eight per cent (21 parents) reported that they had not observed any crashes or near-misses outside the school.

Of those that have observed incidents, all of these were recorded as 'near misses'. The details of these events are listed as follows:

- Cars pulling out
- Near misses in the car park
- Speeding cars nearly rear-ending those turning into car park.

Additional comments made by parents about road safety at Glenbrook School are detailed below:

- *Parking*
 - Parking issues far more of a problem than the speed limit (mentioned more than once).
 - Cars parked too close to the school entrance, reduces visibility (mentioned more than once).
 - Exiting and entering car park, road traffic does not slow
 - Parents parking in NP area of car park and on the gravel
 - Car park too small
 - Parents waiting on the road to pick up children
- Parent behaviour is the main issue (mentioned more than once)
- If speeds made too low drivers will ignore it
- Flashing school signs needed (mentioned more than once)
- Very pleased to see police patrolling – drivers aware of it
- Coffee van outside school causes issues

Post-Implementation Consultation

Post-Implementation consultation was undertaken. Thirty-two parents responded. The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school. Eighty-seven per cent (28 parents) stated their average speed past the school was between 40-60km/hr. Thirteen per cent (four parents) stated their average speed past the school was below 40km/hr.
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
 - Sixty-three per cent (20 parents) stated that had observed drivers lowering their speed only when there are children in the vicinity.
 - Eighteen per cent (six parents) stated that they had observed other drivers reducing their speed regardless of whether there are children there.
 - Twelve per cent (four parents) stated that they do not observe other drivers reducing their speed within the school zone
 - Six per cent (two parents) stated other drivers slow down only when the speed limit signs are operational.
- Parents were asked whether they reduced their speeds in the school zones when they see the signs.
 - Sixty-three per cent (20 parents) slow down during school hours on school days.
 - Twenty-eight per cent (nine parents) state they slow down whether children were there or not.
 - Nine per cent (three parents) state they slow down when they see children in the vicinity.
- Parents were asked what speed they slowed to when driving in the school zone
 - Eighty-one per cent (26 parents) stated they slow down to around 40km/hr
 - Nine per cent (three parents) stated they go slower than 40km/hr
 - Nine per cent (three parents) stated they slow down, but not as low as 40km/hr.

Additional comments from parents about road safety at Glenbrook School are detailed below:

- Speed limit is too low, not obeyed (multiple comments)
- Electronic signs, like those at Puni are better (multiple comments)
- It is not clear when the speed limit applies – eleven comments about this
- Need bigger car parking area (several comments)
- Too many speed limit changes on this road.
- Signs are helpful reminder. Easier to move in and out of car park
- Coffee van affects visibility of car park users.

Pre- Implementation Traffic and Speed Counts

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	616.6	71.6
8-9am	578.6	69.8
9-10am	375	73.8
1-2pm	331.4	76.6
2-3pm	446.4	72.8
3-4pm	492	74
4-5pm	610.8	73.4
5-6pm	667.2	74.2

Table C2 Glenbrook School Survey - 5 Day ADT and 85th Percentile Speeds

Pre- Implementation Site and Video Observations

Site Observations Morning Peak

Site observations were undertaken between 7 and 9am. Specific observations were made as follows:

- At 7am heavy northbound traffic was observed on Waiuku Road. The 'Coffee Guy' was trading from the south car park entrance and the police, who were doing speed enforcement work were parked just to the south of the south car park.
- At 7:16am the 'Coffee Guy' had four vehicles queued, all of these stopped as part of a northbound trip. Two others were observed to have stopped on a southbound trip and used the right turning bay. Platoons of up to ten vehicles were observed in this first 30 minutes of observations.
- The school drop-offs commenced at approximately 8:10am and continued until 9am.
- Between 8:10-8:35am, 11 vehicles turned left and ten vehicles turned right into the south car park. In this same period, seven vehicles made a right turn to exit the car park and four turned left, to head north.
- The busiest period was between 8:35-8:53am when 24 vehicles were observed turning left and 12 turning right into the south car park. Fifteen vehicles exited the car park in this period by making a right turn. Only three vehicles made a left turn out of the south car park in this period.
- At 8:32am there were some minor queues observed at the south car park and nearly a reversing collision.

- Between 8:40-8:50am there was some delay to through vehicles on Waiuku Road. All vehicles slowed when delayed rather than crossing the centre-line to overtake.
- At 8:52am, more congestion was observed at the entrance to the south car park as vehicle wishing to enter this area had to wait for exiting vehicles to manoeuvre out of the carparks.
- The north car park was less busy. It was observed that vehicles wishing to make a right turn from Waiuku Road into either the north car park or the teachers' car park used the right turning bay into the bus turning bay and then drove along the shoulder to access these car parks. In this report this movement is described as a "right-turn-in loop".
- Between 7:35-7:40am three vehicles were observed turning left into the north car park (directly) and three vehicles were observed doing a right-turn-in loop.
- There was little activity here again until 8:10-8:30am when six vehicles did a right-turn-in loop. One vehicle made a left turn into the north car park in this period.
- The period between 8:30-9am had six vehicles doing a left turn and no right-turn-in loops were observed.
- Few vehicles parked on the road during the morning peak.
- Between 8:44-8:48am three vehicles were observed to make a left turn (stop) to park on the shoulder.
- The bus bay was used by several parents as a drop-off bay. This was busiest between 8:45-9am when five vehicles were observed making a right turn into this area to drop off children. Two vehicles turned left into the bus bay to drop off children in this time period.
- Several vehicles were also observed to use the bus bay and the south car park to complete U turns.
- By 8:25am the through-traffic was observed to be moderate and was evening out north and southbound. Gaps were increasing. The pattern for dropping children off appeared to be more "drop and go".
- At 8:55am the bell sounded. There were 15 cars in the southern car park at this time.
- At 8:57am a vehicle was observed to turn right into the school and drive along a wide path and into the quad area.
- By 9am the morning peak was over.

Video Observations – Morning Peak

There were two cameras filming the school. Camera one was positioned north of the school, just on the southbound side of the road, on the bend, looking towards the school. Camera two was positioned south of the south car park, on the southbound side of the road looking towards the school. Figure C1 (above) demonstrates the location of the cameras.

Camera One

The video observations match those of the site visit. There were no specific instances observed.

Camera Two

The observations made of the video recording match those of the site visit. Interestingly, the 'Coffee Guy' was trading in the car park as observed previously. At 7:43am a child was observed to cross the road from the school, just south of the 'school' sign and walked south along the shoulder.

Site Observations Afternoon Peak

The afternoon site observations commenced at 2pm, with specific observations noted as follows:

- The school related traffic for pick-ups using the south car park appeared to be more evenly spread with steady traffic between 2:40-3:10pm. In this time period there were 28 vehicles right-turning in and 15 left-turning in.
- There was a more concentrated flow of vehicles leaving the south car park. Between 2:58-3:10pm, 16 vehicles made a right-turn out and seven made a left-turn out. The north car park had little activity during the afternoon peak.
- In addition to using the north and south car parks, parents also used the metalled shoulder outside the sealed shoulder to park. Parking was clear of the through-lane.
- Regular flows of traffic or small bunches of three to four vehicles with gaps of 10-20 seconds with no traffic were observed. In general, throughout the afternoon observation period vehicles travelled reasonably slowly past the school; only one or two times was through traffic delayed.
- By 3:10pm the afternoon peak was largely finished, with 25 to 30 children still remaining on site. All but two or three of these children were picked up by a school bus at 3:27pm.
- Some of the issues identified relate to the minor delays at the south car park entry. Limited manoeuvre room may be adding to the delays.
- It was observed that there were no crossing facilities to access, or footpath alongside the roadside parking.
- The northern area has limited use, but is wide and provides manoeuvring area off the roadway for any vehicles using it.
- The key time for this school was between 2:40 and 3:05pm.

Video Observations – Afternoon Peak

Camera One

The video observations match those of the site visit.

Camera Two

The video observations generally match those of the site visit, with the following instances noted;

- Between 2:52-2:58pm left turning vehicles into the northern area were slow to enter the school grounds due to congestion in the car park and instead waited in the shoulder.
- Some right turning vehicles were waiting in the right turning bay for congestion to clear within the car park.
- Through traffic slowed as it passed through this area.
- Throughout the afternoon observation period, parents were observed to reverse out of the northern car park and use the shoulder to drive back towards the bus bay where they can turn onto the road.

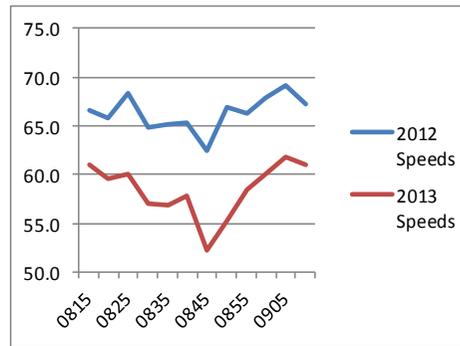
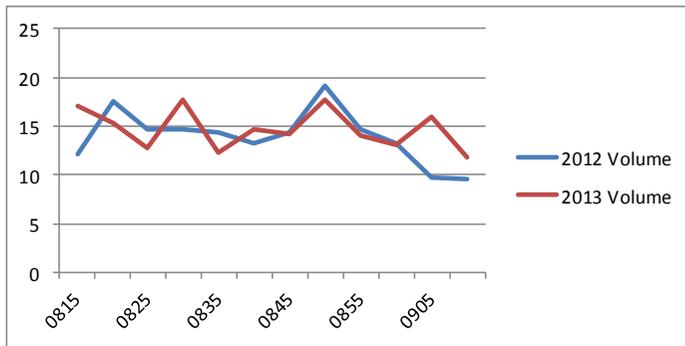
Speed Survey Results

Glenbrook 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	S	12.2	66.6
0820	S	17.6	65.7
0825	S	14.6	68.3
0830	S	14.6	64.9
0835	S	14.4	65.1
0840	S	13.2	65.2
0845	S	14.4	62.4
0850	S	19.2	66.9
0855	S	14.6	66.3
0900	S	13.2	67.9
0905	S	9.8	69.2
0910	S	9.6	67.2

Glenbrook 2013
5 Day Average

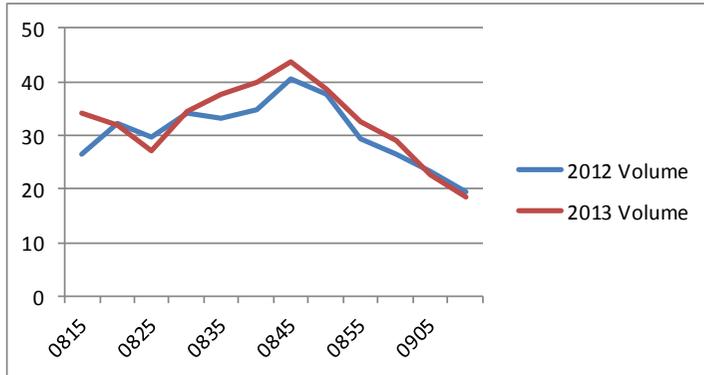
Time	Direction	Average volume	Average mean speed
0815	S	17.0	61.1
0820	S	15.3	59.6
0825	S	12.8	60.1
0830	S	17.8	57.0
0835	S	12.3	56.9
0840	S	14.8	57.8
0845	S	14.3	52.3
0850	S	17.8	55.3
0855	S	14.0	58.4
0900	S	13.0	60.1
0905	S	16.0	61.8
0910	S	11.8	61.1



Glenbrook-Waiuku Road 2012

5 Day Average

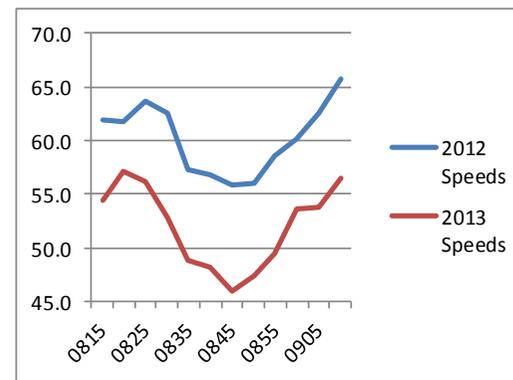
Time	Direction	Average volume	Average mean speed
0815	N	26.4	62.0
0820	N	32.2	61.7
0825	N	29.6	63.7
0830	N	34.2	62.5
0835	N	33.2	57.3
0840	N	34.8	56.8
0845	N	40.6	55.8
0850	N	37.8	56.0
0855	N	29.2	58.5
0900	N	26.4	60.2
0905	N	23.4	62.5
0910	N	19.6	65.8



Glenbrook- Waiuku Road 2013

5 Day average

Time	Direction	Average volume	Average mean speed
0815	N	34.3	54.4
0820	N	31.8	57.1
0825	N	27.0	56.2
0830	N	34.5	52.8
0835	N	37.5	48.9
0840	N	39.8	48.2
0845	N	43.8	45.9
0850	N	38.5	47.5
0855	N	32.5	49.5
0900	N	29.0	53.6
0905	N	22.5	53.8
0910	N	18.5	56.5



Glenbrook-Waiuku Road 2012

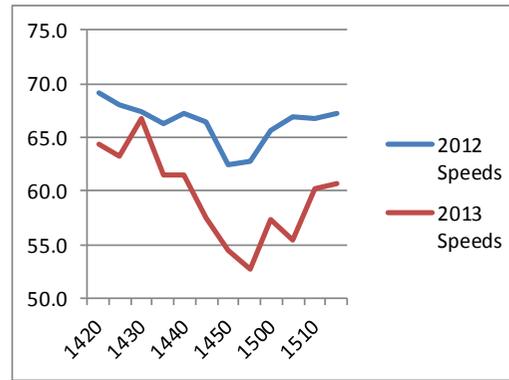
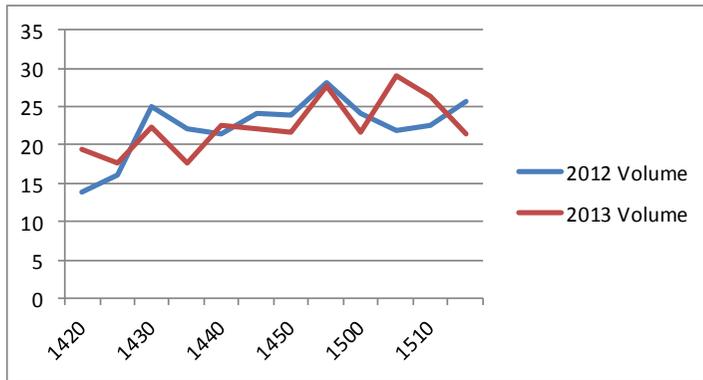
5 Day Average

Time	Direction	Average Volume	Average Mean Speed
1420	S	13.8	69.2
1425	S	16	68.1
1430	S	25	67.3
1435	S	22.2	66.2
1440	S	21.4	67.2
1445	S	24.2	66.5
1450	S	23.8	62.5
1455	S	28.2	62.7
1500	S	24.2	65.6
1505	S	21.8	67.0
1510	S	22.6	66.8
1515	S	25.6	67.2

Glenbrook-Waiuku Road 2013

5 Day Average

Time	Direction	Average Volume	Average Mean Speed
1420	S	19.3	64.3
1425	S	17.7	63.3
1430	S	22.3	66.7
1435	S	17.7	61.5
1440	S	22.7	61.5
1445	S	22.0	57.6
1450	S	21.7	54.5
1455	S	27.7	52.7
1500	S	21.7	57.4
1505	S	29.0	55.5
1510	S	26.3	60.3
1515	S	21.3	60.7

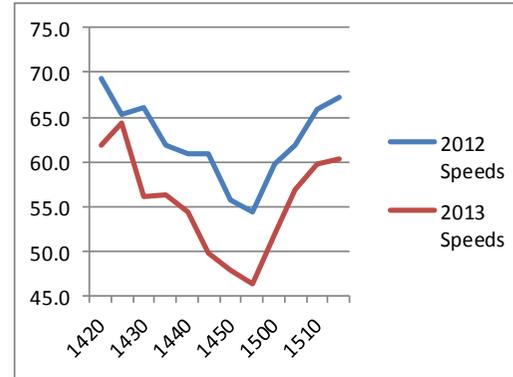
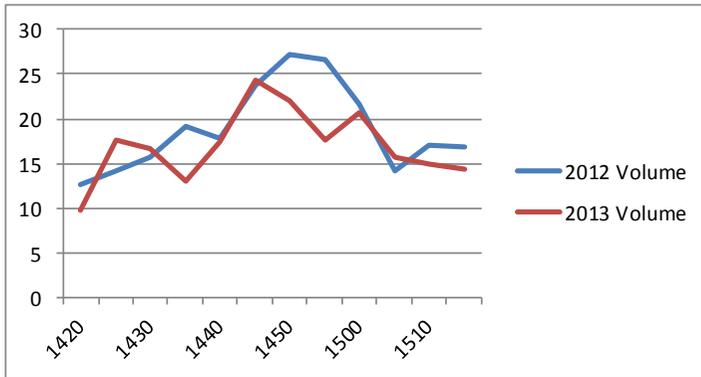


Glenbrook-Waiuku Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1420	N	12.6	69.3
1425	N	14.2	65.3
1430	N	15.6	66.1
1435	N	19.2	61.9
1440	N	17.8	60.9
1445	N	23.8	60.9
1450	N	27.2	55.7
1455	N	26.6	54.4
1500	N	21.6	59.7
1505	N	14.2	61.9
1510	N	17	66.0
1515	N	16.8	67.2

Glenbrook-Waiuku Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1420	N	9.7	61.9
1425	N	17.7	64.3
1430	N	16.7	56.1
1435	N	13.0	56.2
1440	N	17.3	54.4
1445	N	24.3	49.9
1450	N	22.0	47.9
1455	N	17.7	46.3
1500	N	20.7	51.9
1505	N	15.7	56.8
1510	N	15.0	59.8
1515	N	14.3	60.3



Appendix D
Halsey Drive School

HALSEY DRIVE SCHOOL

Initial 40km/hr/Electronic Warning Signage Assessment

Urban Solutions were commissioned by Auckland Transport to assess the eligibility of Halsey Drive School for a 40km/h variable speed limit or active school warning sign zone. A safety assessment was also carried out to identify any operational and safety issues. The assessment also considered the appropriate type of signs to be used and where these signs should be located.

The initial assessment undertaken by Urban Solutions involved:

- seven day speed and volume traffic counts
- a survey of pedestrian activity (children only)
- crash history of the surrounding area
- extent of the school related activity or 'hazard zone'
- other observations relevant to the type or placement of signs.

The results of the traffic counts undertaken on the 30 April to 6 May 2012 are detailed in Table D1.

Time	Morning Peak	Afternoon Peak
Mean Speed (km/h)	36	36
85 th percentile speed (km/h)	46	49

Table D1 Initial Assessment - Halsey Drive School Mean and 85th Percentile Speeds

A pedestrian survey outside the school counted 66 pedestrians between 8-9am and 63 children pedestrians in the afternoon peak.

An analysis of CAS data for the past five years (2007-2011) showed one reported pedestrian, cyclist or speed related crash.

Halsey Drive School did not meet the warrant for application of 40km/h variable speed limit or electronic school warning sign zone. Although there were a significant number of pedestrians recorded during school peak periods, vehicle speeds remained low.

Site Description – Video Camera and Counter Locations

Figure D1 demonstrates the locations of the speed counters and video cameras.



Figure D1 Halsey Drive Location of Camera and Counter

Signage Construction Plan



Pre-Implementation Consultation

The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school. Most parents were answering the question in relation to driving past at school times.
Seventy-three per cent (184 parents) stated they drove past the school at less than 40km/h.
Twenty-seven per cent (69 parents) stated they drove past the school at between 40-50km/h.
One per cent (2 parents) stated they drove past the school at faster than 50km/h.
The tube counts taken as part of this project found that the 85th percentile speeds past the school were 42.6km/h between 8-9am. Between 2-3pm the 8^{5th} percentile speed past the school was 45.2km/h and 47.6km/h between 3-4pm.
- Parents were asked what they believed was a safe speed for traffic passing the school.
Eighty-four per cent (219 parents) believed that a safe speed to drive past the school at was less than 40km/h
Fifteen per cent (40 parents) believed that travelling at between 40-50km/h past the school was safe.
One per cent (2 parents) believed that travelling past the school at more than 50km/h was safe.
- Parents were asked if they had observed other drivers reducing their speeds within the school zone.
Fifteen per cent (40 parents) stated that they had observed other drivers reducing their speeds regardless of whether there were children present.
Forty-two per cent (109 parents) stated that they had observed other drivers reducing their speeds within the school zone when there were children in the vicinity
Thirty-two per cent (83 parents) observed other drivers reducing their speeds only during school hours on school days.
Eleven per cent (27 parents) have not observed other drivers reducing their speeds outside the school at any time.
- Parents were asked if they had observed any crashes or near misses on the road outside of the school.
Twenty-four per cent (63 parents) have observed crashes or near misses outside the school.
Seventy-six per cent (197 parents) have not observed any crashes or near misses outside the school.

Of those that have observed incidents, all of these were recorded as 'near misses'. The details of these events are listed as follows:

- Parents pulling out without looking/indicating. This was commented on several times.
- U turns and three-point turns in front of oncoming cars. This was commented on several times.
- Cars not stopping at pedestrian crossing, or driving through pedestrian crossing without looking.
- Parents parking illegally in driveways
- Children opening doors without looking, stepping onto the road without looking.
- Pedestrians crossing the road not at the crossing.
- Drivers overtaking other vehicles in front of the school.

Additional comments made about road safety at Halsey Drive School are detailed below:

➤ *Poor Parking Behaviour*

Parents' poor parking behaviour was mentioned by several respondents. Parking on the broken yellow lines, double parking, stopping in the middle of the road and waiting for parking spaces in the middle of the lane were listed as issues. Some form of enforcement by the police, parking wardens or teachers was recommended. Banning U turns was also suggested.

➤ *Parking Availability*

Several parents suggested limiting parking around the school in order to encourage parents to walk further.

P2 Zone – It was suggested that the "P2" zone should be removed. Another parent suggested increasing the "P2" zone to a "P10" zone so parents would not have to rush and cars would not be queuing to use them. Another suggestion was that "P2" zone should only be used by parents who are waiting in the car. Another suggestion was that parents of younger children should be given priority parking closer to the school.

One parent suggested that the pick-up/drop off could be put just inside the school gates and another suggested that a car park could be built in the reserve opposite the school.

➤ *Active Travel*

Walking school buses and encouraging cycling to school – especially for older children.

➤ *Speed*

Variable speed limits with lit warning signs and speed bumps were suggested for around school times (30km/h speed was suggested). One parent commented that buses speed through the pedestrian crossing especially when the school patrol is not out.

Several parents commented that speed was not a problem. Rather the problem was poor driving behaviours from parents.

➤ *Education*

A suggestion was made for a school campaign to educate children about road safety.

Pedestrian crossing improvements and usage.

A raised pedestrian crossing was suggested in order to make it more visible to motorists.

Add an additional school crossing further up Halsey Drive.

Several parents commented that the pedestrian crossing was not being used by some parents and children.

➤ *General*

Pre-school children at kindergarten increase traffic and risks

There are many unrestrained children (including pre-school age) in cars.

Post-Implementation Consultation

Post-Implementation consultation was undertaken. Approximately 170 parents responded. The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school.
Seventy-three per cent (125 parents) stated their average speed past the school was less than 40km/hr.
Twenty-six per cent (45 parents) stated their average speed was between 40-50km/hr.
One parent (0.5 per cent) stated their average speed past the school was more than 50km/hr.
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
Fifty-one per cent (85 parents) stated that had observed drivers lowering their speed only when there are children in the vicinity.
Twenty-nine per cent (49 parents) stated that they had observed other drivers lowering their speed whether there were children in the vicinity.
Twelve per cent (20 parents) stated that they had observed other drivers lowering their speed only when the speed limit signs were operational
Eight per cent stated they had not observed other drivers reducing their speed within the school zone.
- Parents were asked whether they reduced their speeds in the school zones when they see the signs.
Seventy-two per cent (122 parents) stated they slow down whether or not they see children
Twenty-two per cent (37 parents) only slow down during school hours on school days
Six per cent (11 parents) stated that they only slow down if children are in the vicinity.
- Parents were asked what speed they slowed to when driving in the school zone
Sixty per cent (102 parents) stated they go slower than 40km/hr.
Thirty-nine per cent (66 parents) state they slow down to around 40km/hr.
One per cent (two parents) stated they slow down a bit, but not as low as 40km/hr.

Additional comments from parents about road safety at Halsey Drive School are detailed below:

- Parents stay too long in the two minute drop-off parking spaces (multiple mentions)
- 'No U turn' signs are needed and must be enforced (multiple mentions)
- Parents park too close to the crossing
- Double parking (multiple mentions)
- Need more/less 2 min drop off parking spaces
- More patrolling needed
- Buses travel too fast
- Need another pedestrian crossing on the Avenue
- Slow down signs needed
- People not crossing at pedestrian crossing

Pre- Implementation Traffic and Speed Counts

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (Km/h)
7-8am	64.2	54.8
8-9am	286.8	42.6
9-10am	69.4	49.2
1-2pm	41.2	53.4
2-3pm	102.2	45.2
3-4pm	174	47.6
4-5pm	88.4	55.2
5-6pm	112.6	58

Table D2 Halsey Drive School Survey - 5 Day ADT and 85th Percentile Speeds

Pre- Implementation Site and Video Observations

Site Observations - Morning Peak

- In the morning period, traffic movements around the school were low with occasional drop-offs (first at 7:18am) and teachers arriving (first at 7:19am). Up to 7:30am there were no hold-ups or delays and traffic was light. Parents were observed to be making U turns into and from P2 on the southern side of road (Manukau Domain side). Small delays were observed for parents exiting the P2 zone and teachers entering the car park. In general, drop-offs took approximately five minutes, with one to two cars in front of the school, none on the opposite side. Traffic speeds were consistent with no school influence.
- At 7:54am the first drop-off opposite the school occurred and the child used the pedestrian crossing. By 8am there was a small build-up of drop-offs, although this was inconsistent. Until 8:20am any congestion was limited to teachers and parents and not affecting through traffic. At 8:20am some delay to through traffic was observed and was the result of parents manoeuvring into and out of parking spaces.
- At 8:30am the school patrol set up and stopped the through traffic. The P2 area tended to go from full to empty within one minute, although parents would slow in the lane to find a spot within the P2 area. Some drop-off cars would extend into the lane or reverse into it. Some parents entering the P2 would stop to let others out, so they could take their place. On two occasions parents were observed to drop children off on the road and once a parent was observed to reverse along the street to find a park.

- Between 8:30am and 8:50am a lot of manoeuvring was taking place, with U turns and reversing into the road. These were all done at low speeds and although extremely disruptive, were not necessarily unsafe. Drop offs were observed to be backing up onto the road and were blocking through vehicles. It appeared that parents were keen on using only the most convenient parking spaces and in many cases, parents were not moving to the front of the P2 area as space became available. In general, drop-offs in the P2 area continued to be very quick and no patrolling of this area was undertaken. There was one incidence of a through vehicle overtaking a double-parked parent by crossing the centre line.
- By 8:50am traffic tailed off and the school patrol finished. At 8:52am one parent was observed to exit the P2 area without looking and nearly collided with a through vehicle. For about three minutes from 8:53am the road was blocked by parents dropping off and on three occasions, delay to through traffic occurred. At 9am the situation returned to pre-school levels, although at 9:01am one vehicle stopped on the road at the crossing for one minute to drop-off a child. One through vehicle had to swerve around this vehicle.

Video Observations – Morning Peak

One camera was used for this site visit and it was located to the east of the school, in Manukau Domain. Figure C1 (above) demonstrates the position of the camera and the counter. The camera was facing the pedestrian crossing outside the school. The video observations match those of the site visit, with a concentrated period of congestion and U turns.

Site Observations Afternoon Peak

The afternoon site observations commenced at 2pm. It was observed that areas west of the school were being used for parking (three cars on each side).

- At 2:15pm, two parents parked in the P2 spaces and by 2:25pm there were six cars outside the school, and two people who had walked to the school. Parking spaces further away from the school were being taken first and lots of U turning was occurring. There was little through traffic.
- At 2:40pm parents were parking closer to the school but still only using the P2 area adjacent to the school, not on the opposite side. Several U turns were done in the face of traffic and required vehicles to slow or stop.
- At 2:45pm an Auckland Transport parking officer was on duty.
- At 2:45pm the first parent parked opposite the school and the build-up of parkers was fast. Some early pick-ups were starting to leave. Several drivers were observed U turning and 'circling' for close spaces. There were several reversing manoeuvres into the remaining spaces. The absence of NSAAT's around bus stops affected buses and through traffic.
- At 2:52pm the school patrol goes out and speeds are severely affected. It is likely that the school patrol assisted with speed reduction. No double parking was observed so far and parents were still arriving at the school.
- A vehicle turns into the teachers' car park at 2:55pm. A few more early leavers were observed exiting the car parks at 2:58pm.
- At 3pm there was more manoeuvring into very limited spaces, U turns and reversing. At this time it was affecting through traffic. Children and vehicles starting to leave and the parking warden was operating.
- At 3:03pm a number of pedestrian pick-ups were observed. At 3:04pm it was extremely busy, traffic was moving very slowly and through traffic were searching for parks. Children using the school crossing were coming across in groups of 20-30. There were still many U turns and the situation appeared chaotic.

- At 3:06pm an eastbound vehicle waiting to pull in delayed other vehicles. Through vehicles overtook crossing the centre line. The P2 parkers were observed to turn over quickly as people exit.
- At 3:10pm the school crossing was taken down and no one was parked opposite the school.
- At 3:12pm there were still a few children visible on each side of the road and several were using the crossing. The parking officer finished and did not have much to do.
- By 3:15pm the through speeds have increased due to a lack of side friction. Very few children are left and several vehicles are starting to exit the staff parking area.
- By 3:19pm there were no longer any cars in the P2 area and just the occasional pick-up happening. By 3:20pm the site has essentially returned to pre-school finishing conditions.

Video Observations – Afternoon Peak

A similar pattern was observed in the afternoon. Traffic volumes were low until 3pm. At this time volumes increased as parents parked and attempted to park in the P2 zones. By 3:20pm traffic volumes were returning to pre-school finish time. The volume of school related traffic and the congestion it caused resulted in very low speeds along Halsey Drive during the school pick-up and drop-off times. Outside of these times traffic speeds were within the speed limit.

Unlike the site observations, when an AT parking warden was present, the video observations showed parents not obeying the P2 restrictions. In the P2 area adjacent to the school, two vehicles were observed parking for four minutes and one vehicle for seven minutes. In the P2 area outside the school between 3-3:10pm, there was one vehicle which was parked for four minutes, one for five minutes and another for ten minutes into the P2 time. After 3:10pm the P2 area has a quicker turn over.

It was also observed that two parents parked in the no-stopping zone beside the pedestrian crossings. At 2:57pm one vehicle attempted to park just to the west of the school crossing on the yellow lines and was moved on by a teacher almost immediately. Another parent parked almost at the crossing and waited for a few seconds to pick up six children who had to use the crossing to access the vehicle.

Speed Survey Results

Halsey Drive 2012

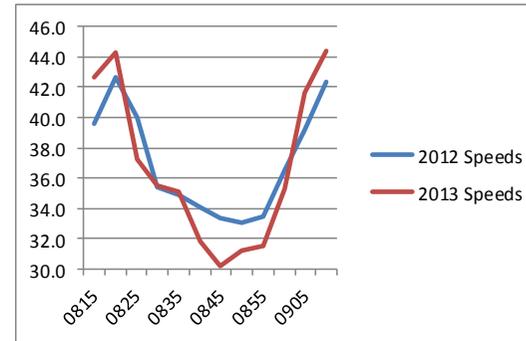
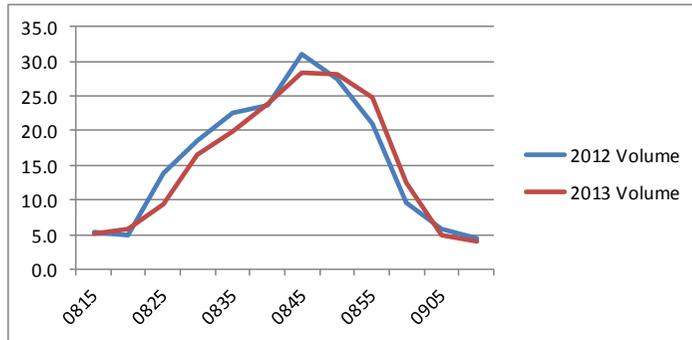
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	E	5.4	39.6
0820	E	4.8	42.7
0825	E	13.8	40.0
0830	E	18.6	35.4
0835	E	22.6	34.9
0840	E	23.6	34.0
0845	E	31.0	33.4
0850	E	27.4	33.1
0855	E	21.0	33.4
0900	E	9.6	36.6
0905	E	5.8	39.2
0910	E	4.4	42.4

Halsey Drive 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
0815	E	5.2	42.7
0820	E	5.8	44.3
0825	E	9.4	37.2
0830	E	16.6	35.5
0835	E	19.8	35.1
0840	E	23.8	31.8
0845	E	28.4	30.2
0850	E	28.2	31.3
0855	E	24.8	31.6
0900	E	12.6	35.3
0905	E	5.0	41.7
0910	E	4.0	44.4

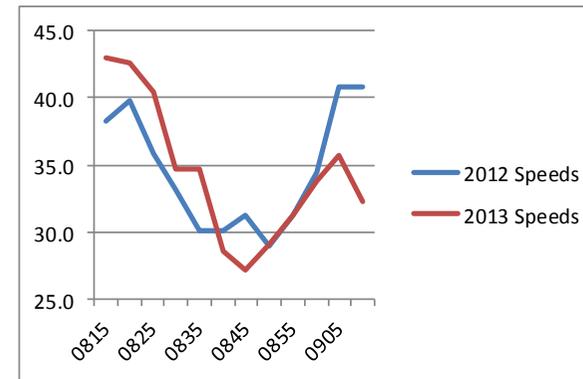
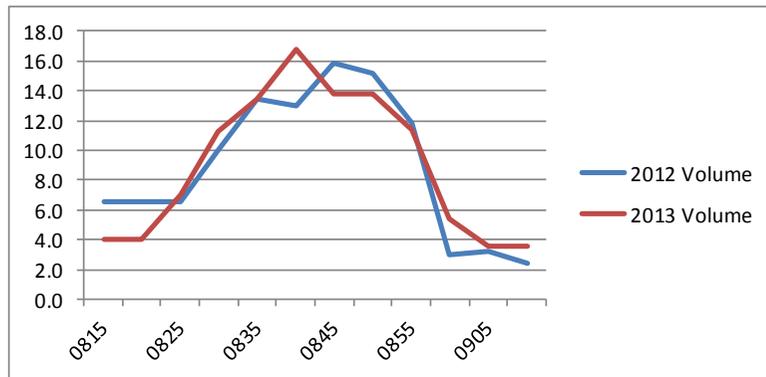


Halsey Drive 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	W	6.6	38.3
0820	W	6.6	39.8
0825	W	6.6	35.8
0830	W	10.0	33.1
0835	W	13.4	30.1
0840	W	13.0	30.1
0845	W	15.8	31.2
0850	W	15.2	29.0
0855	W	11.8	31.2
0900	W	3.0	34.5
0905	W	3.2	40.8
0910	W	2.4	40.8

Halsey Drive 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	W	4.0	43.0
0820	W	4.0	42.6
0825	W	7.0	40.5
0830	W	11.2	34.7
0835	W	13.4	34.8
0840	W	16.8	28.6
0845	W	13.8	27.2
0850	W	13.8	29.0
0855	W	11.4	31.2
0900	W	5.4	33.8
0905	W	3.6	35.7
0910	W	3.6	32.3

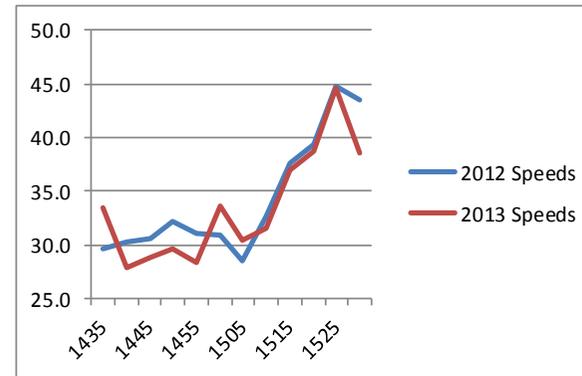
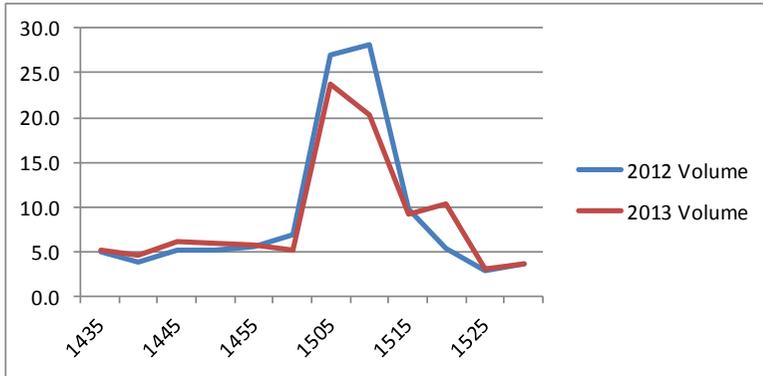


Halsey Drive 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	E	5.0	29.6
1440	E	3.8	30.3
1445	E	5.2	30.6
1450	E	5.2	32.1
1455	E	5.6	31.1
1500	E	6.8	31.0
1505	E	27.0	28.6
1510	E	28.2	32.6
1515	E	9.8	37.5
1520	E	5.4	39.4
1525	E	2.8	44.8
1530	E	3.6	43.5

Halsey Drive 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	E	5.2	33.5
1440	E	4.6	27.8
1445	E	6.2	28.8
1450	E	6.0	29.6
1455	E	5.8	28.4
1500	E	5.2	33.5
1505	E	23.8	30.4
1510	E	20.2	31.5
1515	E	9.2	37.0
1520	E	10.4	38.6
1525	E	3.0	44.7
1530	E	3.6	38.6

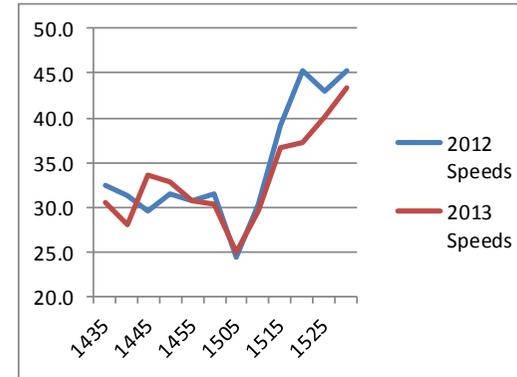
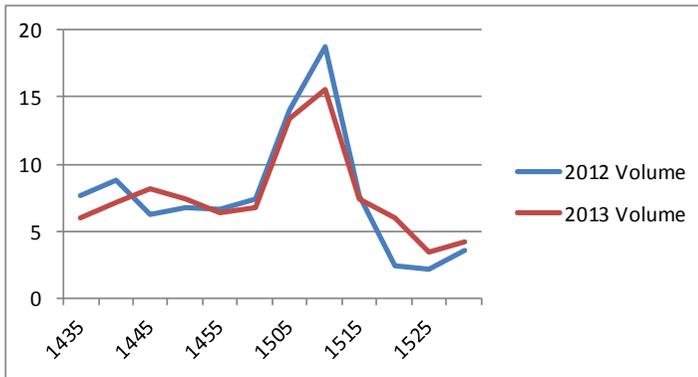


Halsey Drive 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	W	7.6	32.4
1440	W	8.8	31.3
1445	W	6.2	29.5
1450	W	6.8	31.4
1455	W	6.6	30.7
1500	W	7.4	31.4
1505	W	14	24.4
1510	W	18.8	30.3
1515	W	7.6	39.2
1520	W	2.4	45.3
1525	W	2.2	43.0
1530	W	3.6	45.2

Halsey Drive 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1435	W	6.0	30.5
1440	W	7.2	28.1
1445	W	8.2	33.6
1450	W	7.4	32.9
1455	W	6.4	30.6
1500	W	6.8	30.4
1505	W	13.4	24.9
1510	W	15.6	29.6
1515	W	7.4	36.7
1520	W	6.0	37.2
1525	W	3.4	40.1
1530	W	4.2	43.4



Appendix E
Puni School

PUNI SCHOOL

Initial 40km/hr/Electronic Warning Signage Assessment

Opus International Consultants Limited (Opus) was commissioned by Auckland Transport to assess the eligibility of Puni School for a 40km/h variable speed limit or electronic school warning sign zone. A safety assessment was also carried out to identify any operational and safety issues.

The initial assessment undertaken involved:

- survey of pedestrian activity (children only)
- the crash history of the surrounding area
- the extent of the school related activity or 'hazard zone' and other observations relevant to the type or placement of signs.

A speed and volume traffic count was not undertaken as part of this initial assessment as it was determined unnecessary given the minimal pedestrian activity on Waiuku Road. A pedestrian survey counted only one child being picked up on the side of Waiuku Road. It was noted on a subsequent visit that no children were picked up on the side of Waiuku road. An analysis of CAS data for the past five years (2007-2011) shows that there have been no reported crashes within a 500 metre radius around the vicinity of the school.

Opus concluded that with minimal pedestrian and vehicle activity on Waiuku Road, Puni School did not meet the warrants for either a 40km/h variable speed limit or an electronic school warning zone. Opus recommended that threshold signs be considered to alert motorists that they are in a school area. It was also suggested that kerb build outs and flush medians could be installed to accommodate the turning vehicles and allow through traffic to pass without having to use the shoulder.

Auckland Transport has advised Puni School that it has been accepted by the NZTA to participate in the Rural School Speed Management Trial.

Site Description – Video Camera and Counter Locations

Figure E1 demonstrates the locations of the speed counters and video cameras.



Figure E1 Puni School - Location of Cameras and Counters

Signage Construction Plan



Pre-Implementation Consultation

The survey results are detailed as follows:

- Parents were asked what their average speeds were when driving past the school.
Nine per cent (11 parents) stated they drove past the school at speeds below 60km/h.
Ninety-one per cent (31 parents) stated they drove past the school at speeds between 60-80km/h.
No parents said they drove past the school faster than 80km/h
The tube counts taken as part of this project found that the 85th percentile speeds past the school were 77.8km/h between 8-9am. Between 2-3pm the 8^{5th} percentile speed past the school was 79.2km/h and 80.8km/h between 3-4pm
- Parents were asked what they believed was a safe speed for traffic passing the school.
Thirty-one per cent (13 parents) believe that travelling at less than 50km/h is a safe speed for traffic to be passing the school
Sixty-four per cent (27 parents) believed that between 50-60km/h was a safe speed for traffic passing the school
Five per cent (2 parents) believed that it was safe to travel past the school at above 60km/h.
- Parents were asked if they had observed other drivers reducing their speeds within the school zone.
Ten per cent (4 parents) believe that other drivers reduce their speed whether or not there are children in the vicinity.
Twenty-one per cent (9 parents) believe that other drivers do reduce their speeds but only when there are children in the vicinity.
Twenty-six per cent (11 parents) believe that other drivers reduce their speeds during school hours on school days
Forty-three per cent (18 parents) believe that other drivers do not reduce their speeds at all.
- Parents were asked if they had observed any crashes or near misses on the road outside of the school.
Fifty-four per cent (22 parents) have observed crashes or near misses on the road outside the school
Forty-six per cent (19 parents) have not observed any crashes or near misses on the road outside the school.
The details of these incidents are listed as follows:
 - A crash was observed at the intersection of Waiuku and Aka Aka Roads – possibly due to high speeds.
 - Cars exiting the car park onto a busy main road (near misses)
 - Vehicles queue on the road to enter the car park. Through traffic travel at high speeds up the hill and have resulted in near misses (several comments from parents)
 - Vehicles exiting car park pull onto road – resulting in near misses (several comments from parents). This may be due to poor visibility.
 - Gap perception is an issue, with cars turning across traffic without sufficient space.
 - Vehicles indicating to turn left as if turning into the school, but turn into Aka Aka Road instead – some near misses.
 - Between the school and Puni Workshop there have been some near misses observed.

Additional comments made about road safety at Puni School are detailed below:

- *Parking*

Cars parked outside the school can limit the visibility for cars exiting the car park.
Greater restrictions on parking around the bus bay on Aka Aka Road are needed. Also restrict parking on Waiuku Road in order to improve visibility.
A larger car park is needed.
There needs to be improved exit/entry to the car park.
- *Speed*

One parent suggests that a national speed limit around schools is needed.
Vehicles are travelling too fast and overtaking on the brow of the hill on Waiuku Road.
Not many vehicles are reducing their speeds from 100km/h to 80km/h.
- *Warnings/safety*

Install flashing warning and 'Slow Down' signs around the school – several comments
Need police enforcement of the restrictions as they are often ignored
Install 'no overtaking' lines on Puni Road
Need a designated right turn lane into the school from Waiuku Road.
Install a traffic island to allow pedestrians to cross on Waiuku Road.

Post Implementation Consultation

The post-implementation consultation results are detailed as follows:

- Parents were asked what their average speed was when driving past the school
Fifty six per cent (18 parents) stated they drove past the school at below 60km/hr.
Forty-four per cent (14 parents) stated they drove past the school at between 60-80km/hr.
No parents stated they drove past the school faster than 80km/hr
- Parents were asked if they observed other drivers reducing their speed within the school zone.
Forty-three per cent (13 parents) observed that other drivers slowed down only when the illuminated signs were operating.
Thirty per cent (nine parents) stated that other drivers slowed down regardless of whether there were children present.
Twelve and a half per cent (four parents) stated that other drivers slowed down when there were children in the vicinity
Twelve and a half per cent (four parents) stated that other drivers did not slow down at all when in the school zone.
- Parents were asked if they reduced their speed in the school zone.
Eighty-four per cent (27 parents) stated they reduce their speed in the school zone whether or not they see children
Sixteen per cent (five parents) stated they slow down only during school hours on school days.

- If parents did reduce their speed they were asked what speed they slowed down to
Sixty-six per cent (21 parents) stated they slowed down to around 60km/hr
Thirty-four per cent (11 parents) stated they slowed down to below 60km/hr

Additional comments made about road safety at Puni School are detailed below:

- *Access*
Need right turning bay for vehicles to turn into the school. Also need yellow lines to stop people parking on the roadside.
Need coordination of car park. Vehicles can get stuck in the middle of the road waiting for car park congestion to decrease.
- *Speed*
Speed limit should be 50km/hr near Puni School
Still issues with drivers speeding (multiple mentions)
Should be 60km/hr 24 hours per day
Keep speed between 60-80km/hr
- *Parking*
Drivers need to enter the bus bay off Aka Aka Road much slower
Drivers need to drive into car park more quickly as they are blocking traffic on Puni Road
- *General*
Much improved
Need to change position of the 60km/hr sign
Near miss with car coming out of Puni School. Perhaps the driver thought that cars coming along the road had reduced their speed more.
Need footpaths

Pre- Implementation Traffic and Speed Counts

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	615.6	79.6
8-9am	689.6	77.8
9-10am	471.4	81.4
1-2pm	458.6	81.2
2-3pm	553	79.2
3-4pm	565.8	80.8
4-5pm	689.8	81.8
5-6pm	641.4	82.6

Table E2 Puni School Survey – Waiuku Road 5 Day ADT and 85th Percentile Speeds

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	88	93
8-9am	101.6	88.4
9-10am	81.8	87
1-2pm	79	85.2
2-3pm	91.2	86.4
3-4pm	91.8	90
4-5pm	101.2	87.4
5-6pm	82.2	89.6

Table E3 Puni School Survey – Aka Aka Road 5 Day ADT and 85th Percentile Speeds

Pre- Implementation Site and Video Observations

Site Observations Morning Peak

The morning peak observations commenced at 7am. There is a definite commuter pattern with platoons of three to ten vehicles. Vehicles approaching from the west were travelling at high speeds, occasionally having to slow for vehicles turning right from Aka Aka Road – especially turning trucks. Specific observations included:

- At 7:44am two children were observed walking around the front of the school. The busiest time for school drop offs was between 7:55-8:25am.
- The north car park was the busiest of the two car parks, with 43 vehicles making a left-turn in between 7:55-8:25am. In the same time period 11 vehicles made a right turn in.
- The busiest period for outward movements from the north car park was between 7:55-8:35am when 44 vehicles were observed making a right-turn out.
- Only eight vehicles made a left-turn out between 8:09-8:27am.
- At the south car park the most common entry movement pattern was a left turn at the intersection of Waiuku Road and Aka Aka Road followed by a left turn into the school.
- Between 8:05-8:30am 15 vehicles entered the south car park in this way.
- Between 8:24-8:30am there was a bunch of nine vehicles making a right turn at the intersection followed by a left turn into the car park
- The most common exiting movements were a right turn into Aka Aka Road and a right turn into Waiuku Road. Between 8:15-8:22am 14 vehicles were observed completing this movement. Between 8:30-8:35am five vehicles also completed this movement. Between 7:55-8:25am one vehicle made a left turn out of the south car park.
- At 8:18am two left turning vehicles slowing to enter the north car park had two following vehicles swerve around them as they slowed to turn.
- At 8:29am a left turning vehicle (into the southern car park) was delayed from entering the car park by another left turning vehicle that had stopped in the driveway.
- The bell sounded at 8:33am.
- At 8:34am northbound vehicles on Waiuku Road were delayed by right turning vehicles from Aka Aka Road.
- Through vehicles in Waiuku Road often had to slow and use the shoulder to pass.
- There were no concerns with delays on Aka Aka Road with only two to three incidences of queuing at the intersection – usually related to vehicles waiting behind trucks.
- By 8:40am through traffic had reduced so there were multiple gaps.

Video Observations – Morning Peak

There were two cameras recording at Puni School. Camera one was positioned on Waiuku Road on the east bound side of the road facing towards the north car park. Camera two was positioned on Aka Aka Road, on the north bound side of the road facing towards the south car park driveways. **Error! Reference source not found.** demonstrates the locations of the cameras and counters. The morning peak video observations commenced at 7am and finished at 9:15am.

Camera One

Camera one was positioned on the northern side of Waiuku Road and was directed towards the north car park entrance. Although the site observations match the video observations, there were some additional incidents captured by the video that are worth mentioning:

- At 7:42am an eastbound car was observed to be overtaking at speed, crossing the centre-line.
- At 7:47am a vehicle parked on the road beside the north car park did a U turn into eastbound traffic. Through traffic had to brake as a result of this manoeuvre.
- At 8:02am a secondary school student crossed the road towards the school in front of the camera.
- At 8:10am one through vehicle was observed to swerve into the shoulder to go around a right turning vehicle (into the north car park).
- At 8:16am a right turning vehicle exiting the north car park was observed to turn in front of westbound traffic, causing delay.
- A right turning vehicle exiting the north car park at 8:18am caused an east bound vehicle that was travelling at speed to brake hard.
- At 8:21am a right turning vehicle (into north car park) caused delay to four to five following vehicles that were following close behind. These through vehicles had to brake and use the shoulder to pass.
- An eastbound vehicle parked on the shoulder at 8:22am and the driver crossed the road during a break in traffic.
- At 8:33am a westbound vehicle overtook a tractor by crossing the centre-line. The oncoming traffic swerved into the shoulder to avoid the overtaking vehicle.

Camera Two

This camera was situated on the western side of Aka Aka Road, facing towards the south car park. Several specific observations were noted, including:

- At 7:41am a vehicle reversed out of a driveway on the western side of Aka Aka Road into the southbound lane causing two northbound vehicles to brake. This vehicle then turned left into the south car park, turned right out of the car park onto Aka Aka Road and then reversed back into the driveway it originally came out of.
- At 8:07am the school bus turned right into the south car park. As it dropped off children it blocked the entrance temporarily, leaving a vehicle wishing to make a left turn into the car park waiting in the lane for approximately 20 seconds.
- It was observed that there were a significant number of heavy vehicles using Aka Aka Road.

Site Observations - Afternoon Peak

The afternoon site visit commenced at 2:10pm. Specific observations are as follows;

- The north car park was once again the most used car park and was busiest between 2:20-2:50pm. Twenty seven vehicles were observed making a left-turn in during this period. In the same period 14 vehicles were observed making a right-turn in. The busiest period for exiting the north car park was between 2:34-2:50pm. Twenty-nine vehicles were observed making a right-turn out during this period. Only five vehicles made a left turn out of the north car park during this period.
- The south car park was busiest between 2:25-2:37pm. The most common movements were a left turn at the intersection and a left turn into the car park. Eight vehicles were observed completing this movement. Four vehicles completed a right turn at the intersection and then a left turn into the school in this period. Six vehicles exited the south car park making a right turn out and a right turn at the intersection between 2:34-2:37pm. Between 2:42-2:44pm four vehicles turned left out of the south car park.
- At 2:23pm a left turning vehicle (into the north car park) resulted in through traffic moving over the centre-line to overtake. This was again observed at 2:30pm.
- At 2:32pm a vehicle parked on the north side of Waiuku Road and the driver crossed the road to the school. The driver returned with a child at 2:37pm.
- At 2:39pm through traffic was observed to be delayed by approximately 30 seconds by a right turning vehicle (into the north car park).
- At 2:44pm a vehicle that had just turned right out of the north car park was overtaken in a dangerous manoeuvre by through vehicle travelling very fast.
- At 3:04pm right turning traffic (out of the north car park) had to wait approximately 15 seconds for a gap in the traffic.

In general, the afternoon period traffic was busy for short periods of time. The speeds of through vehicles on Waiuku Road and gap perception are an issue. The wide shoulders ensure that turning traffic has less of an impact on through traffic.

Video Observations – Afternoon Peak

Camera One

- At 2:24pm a left turning vehicle (into north car park) was overtaken by a following vehicle that swerved and crossed the centre-line.
- At 2:38pm a right turning vehicle did not obey the right turn rule and was delayed in the driveway of the north car park. A left turning vehicle waited in the shoulder and through traffic was delayed as it slowed to overtake the left turning car. The overtaking vehicles were very close to the centre-line and oncoming traffic had to use the shoulder to avoid passing too close to the overtaking vehicles.
- At 2:41pm a right turning vehicle attempted to exit the north car park stops but stopped when it sees the westbound vehicle. This caused the westbound vehicle to brake, swerve and cross the centre line in order to manoeuvre around the right turning vehicle which had now stopped in the lane.
- At 3:51pm a school bus stops on the westbound shoulder to offload two students. Through traffic slows and overtakes carefully, oncoming traffic does not.

Camera Two

No additional observations were made.

Speed Survey Results

Waiuku Road, Puni 2012

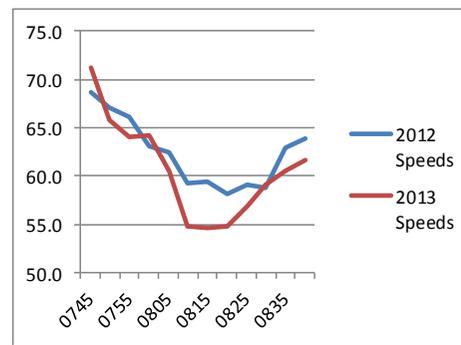
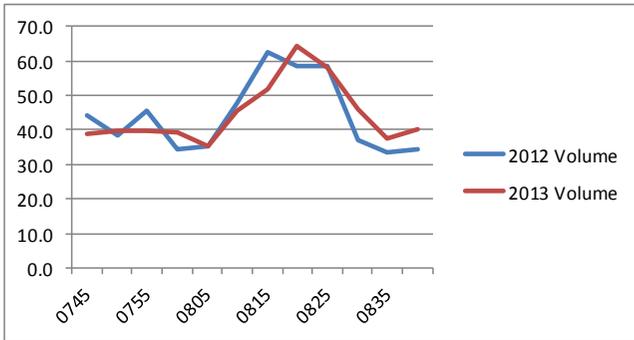
5 Day Average

Time	Direction	Average volume	Average mean speed
0745	E	44.4	68.7
0750	E	38.4	67.1
0755	E	45.4	66.2
0800	E	34.2	63.0
0805	E	35.2	62.5
0810	E	47.8	59.2
0815	E	62.4	59.4
0820	E	58.4	58.2
0825	E	58.6	59.0
0830	E	37.0	58.8
0835	E	33.4	63.0
0840	E	34.4	63.8

Waiuku Road, Puni 2013

5 Day Average

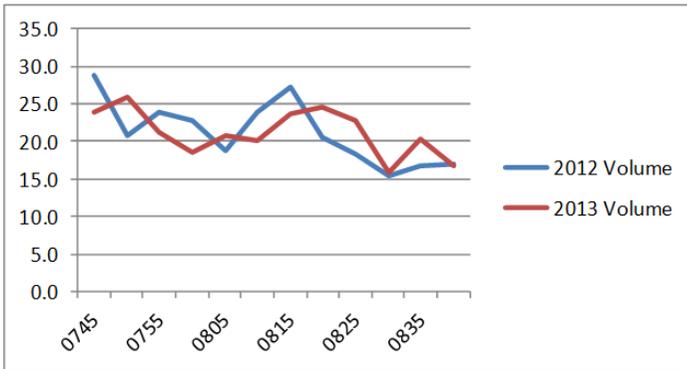
Time	Direction	Average volume	Average mean speed
0745	E	39.0	71.3
0750	E	39.8	65.9
0755	E	39.8	64.0
0800	E	39.2	64.1
0805	E	35.2	60.6
0810	E	45.4	54.8
0815	E	52.0	54.7
0820	E	64.4	54.8
0825	E	58.2	56.8
0830	E	46.2	59.1
0835	E	37.4	60.5
0840	E	40.0	61.7



Waiuku Road, Puni 2012

5 Day Average

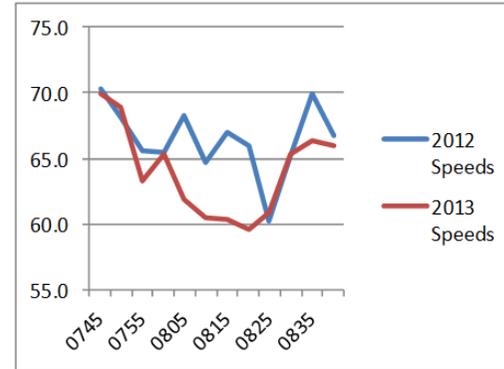
Time	Direction	Average volume	Average mean speed
0745	W	28.8	70.3
0750	W	20.8	68.1
0755	W	23.8	65.5
0800	W	22.8	65.5
0805	W	18.8	68.3
0810	W	23.8	64.7
0815	W	27.2	67.1
0820	W	20.6	65.9
0825	W	18.2	60.2
0830	W	15.4	65.2
0835	W	16.8	69.9
0840	W	17.0	66.7



Waiuku Road, Puni 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
0745	W	23.8	69.9
0750	W	26.0	68.9
0755	W	21.2	63.3
0800	W	18.6	65.4
0805	W	20.8	61.9
0810	W	20.2	60.4
0815	W	23.6	60.4
0820	W	24.6	59.5
0825	W	22.8	60.9
0830	W	15.8	65.3
0835	W	20.4	66.3
0840	W	16.8	66.0



Waiuku Road, Puni 2012

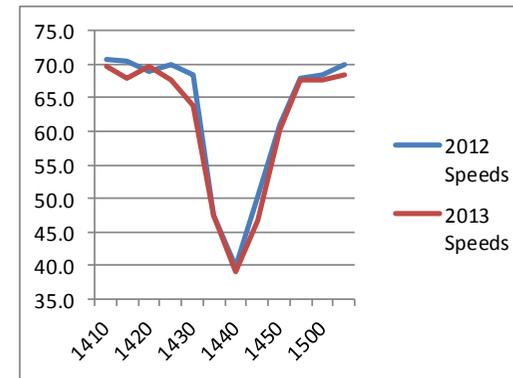
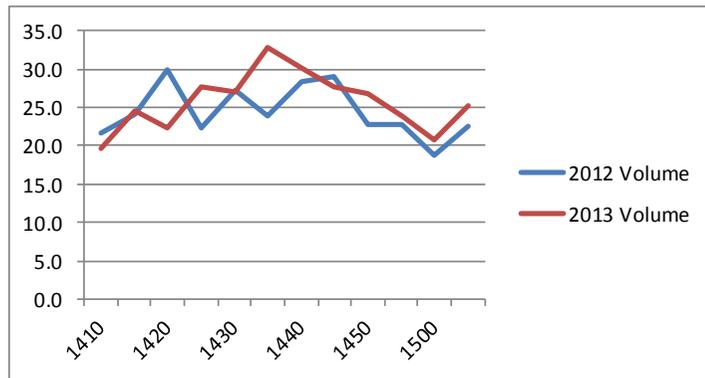
5 Day Average

Time	Direction	Average volume	Average mean speed
1410	E	15.6	70.7
1415	E	21.2	70.5
1420	E	18.8	68.9
1425	E	18.8	69.9
1430	E	21.6	68.5
1435	E	34.6	47.5
1440	E	43.6	40.0
1445	E	37.6	50.3
1450	E	28.0	61.0
1455	E	24.4	67.8
1500	E	21.0	68.4
1505	E	20.8	70.0

Waiuku Road, Puni 2013

5 Day Average

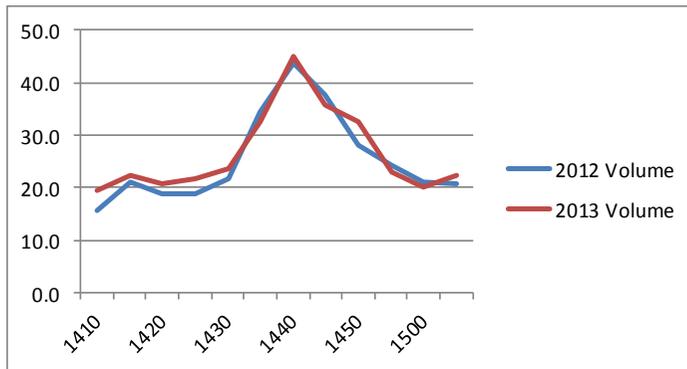
Time	Direction	Average volume	Average mean speed
1410	E	19.4	69.7
1415	E	22.4	68.0
1420	E	20.8	69.7
1425	E	21.8	67.8
1430	E	23.6	63.9
1435	E	32.6	47.4
1440	E	45.0	39.0
1445	E	35.8	46.8
1450	E	32.4	60.3
1455	E	23.0	67.8
1500	E	20.2	67.6
1505	E	22.2	68.5



Waiuku Road, Puni 2012

5 Day Average

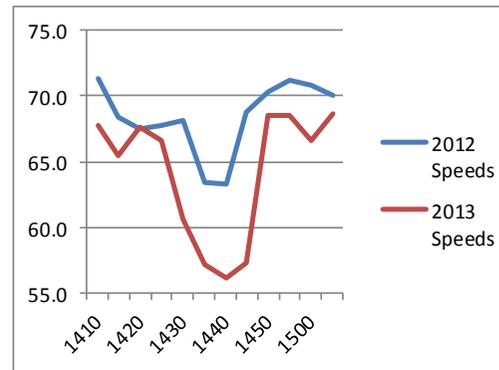
Time	Direction	Average volume	Average mean speed
1410	W	21.6	71.4
1415	W	24.2	68.4
1420	W	30.0	67.5
1425	W	22.4	67.8
1430	W	27.2	68.1
1435	W	24.0	63.5
1440	W	28.4	63.2
1445	W	29.0	68.7
1450	W	22.8	70.3
1455	W	22.8	71.2
1500	W	18.8	70.8
1505	W	22.6	70.0



Waiuku Road, Puni 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
1410	W	19.6	67.8
1415	W	24.6	65.5
1420	W	22.4	67.6
1425	W	27.8	66.6
1430	W	27.0	60.6
1435	W	32.8	57.1
1440	W	30.2	56.1
1445	W	27.6	57.3
1450	W	26.8	68.5
1455	W	24.0	68.5
1500	W	20.8	66.6
1505	W	25.2	68.6

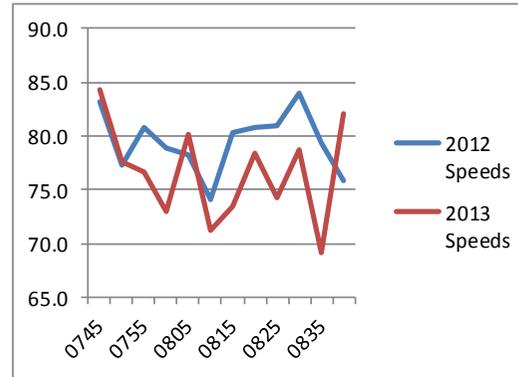
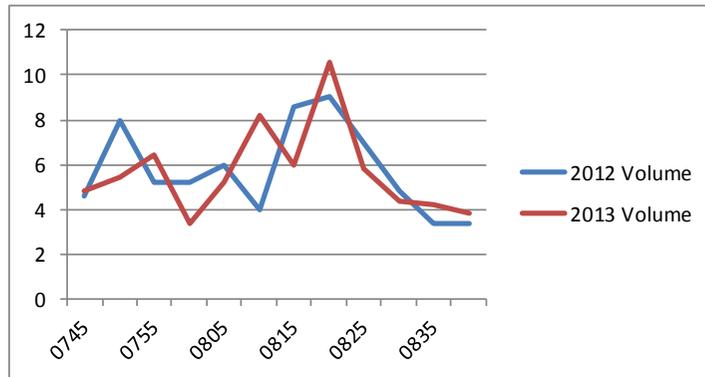


Aka Aka Road 2012
5 Day average

Time	Direction	Average volume	Average mean speed
0745	N	4.6	83.2
0750	N	8	77.4
0755	N	5.2	80.7
0800	N	5.2	78.8
0805	N	6	78.2
0810	N	4	74.1
0815	N	8.6	80.4
0820	N	9	80.8
0825	N	7	80.9
0830	N	4.8	84.0
0835	N	3.4	79.4
0840	N	3.4	75.8

Aka Aka Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0745	N	4.8	84.3
0750	N	5.4	77.6
0755	N	6.4	76.7
0800	N	3.4	72.9
0805	N	5.2	80.2
0810	N	8.2	71.2
0815	N	6	73.4
0820	N	10.6	78.3
0825	N	5.8	74.3
0830	N	4.4	78.8
0835	N	4.2	69.1
0840	N	3.8	82.0

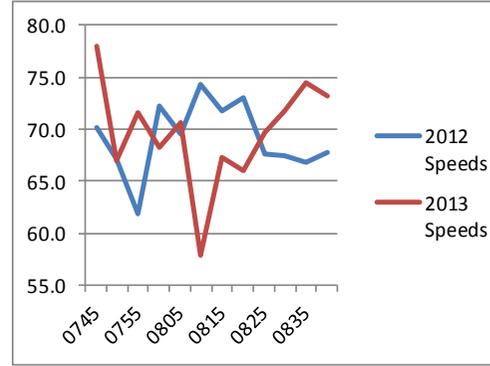
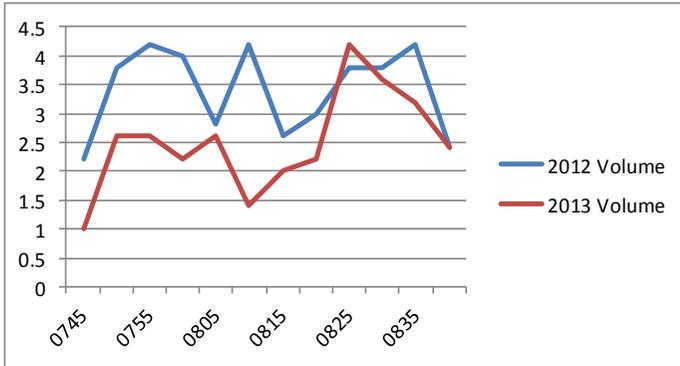


Aka Aka Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0745	S	2.2	70.1
0750	S	3.8	67.2
0755	S	4.2	61.8
0800	S	4	72.2
0805	S	2.8	69.5
0810	S	4.2	74.3
0815	S	2.6	71.7
0820	S	3	73.1
0825	S	3.8	67.6
0830	S	3.8	67.4
0835	S	4.2	66.8
0840	S	2.4	67.7

Aka Aka Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0745	S	1	77.9
0750	S	2.6	66.9
0755	S	2.6	71.6
0800	S	2.2	68.2
0805	S	2.6	70.6
0810	S	1.4	57.8
0815	S	2	67.3
0820	S	2.2	66.0
0825	S	4.2	69.7
0830	S	3.6	71.7
0835	S	3.2	74.4
0840	S	2.4	73.2

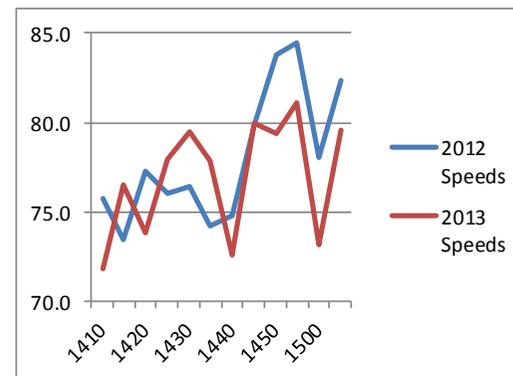
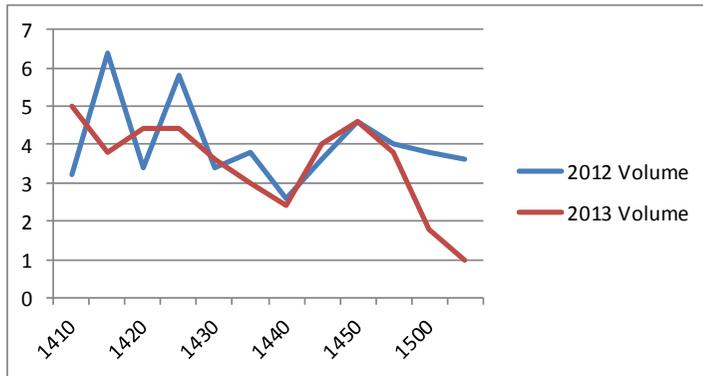


Aka Aka Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1410	N	3.2	75.8
1415	N	6.4	73.4
1420	N	3.4	77.3
1425	N	5.8	76.0
1430	N	3.4	76.4
1435	N	3.8	74.2
1440	N	2.6	74.8
1445	N	3.6	79.9
1450	N	4.6	83.8
1455	N	4	84.4
1500	N	3.8	78.1
1505	N	3.6	82.4

Aka Aka Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1410	N	5	71.8
1415	N	3.8	76.5
1420	N	4.4	73.8
1425	N	4.4	78.0
1430	N	3.6	79.5
1435	N	3	77.8
1440	N	2.4	72.6
1445	N	4	79.9
1450	N	4.6	79.4
1455	N	3.8	81.1
1500	N	1.8	73.1
1505	N	1	79.6

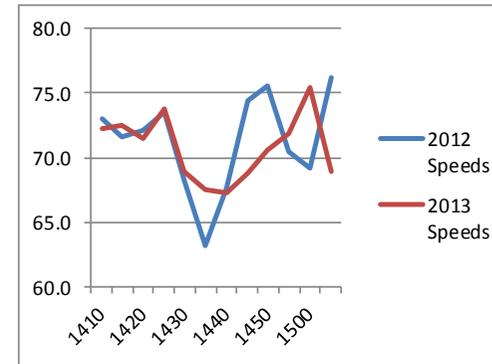
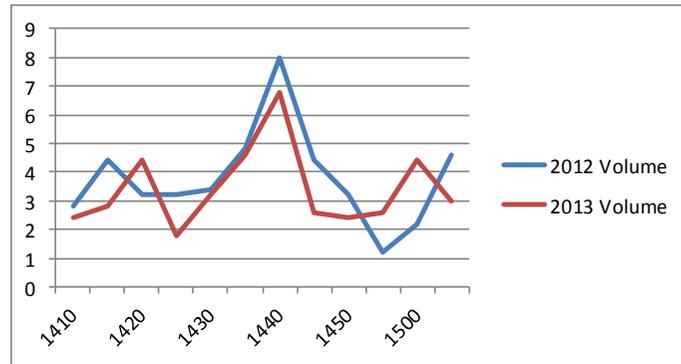


Aka Aka Road 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
1410	S	2.8	73.0
1415	S	4.4	71.6
1420	S	3.2	72.1
1425	S	3.2	73.5
1430	S	3.4	68.4
1435	S	4.8	63.2
1440	S	8	67.7
1445	S	4.4	74.4
1450	S	3.2	75.6
1455	S	1.2	70.5
1500	S	2.2	69.1
1505	S	4.6	76.2

Aka Aka Road 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
1410	S	2.4	72.3
1415	S	2.8	72.6
1420	S	4.4	71.5
1425	S	1.8	73.8
1430	S	3.2	68.9
1435	S	4.6	67.5
1440	S	6.8	67.3
1445	S	2.6	68.8
1450	S	2.4	70.6
1455	S	2.6	71.8
1500	S	4.4	75.5
1505	S	3	69.0



Appendix F
Ramarama School

RAMARAMA SCHOOL

Initial 40km/hr/Electronic Warning Signage Assessment

Opus International Consultants Limited (Opus) was commissioned by Auckland Transport to assess the eligibility of Ramarama Primary School for a 40kmph variable speed zone. An assessment was undertaken to determine whether the implementation of electronic school warning signs or a 40km/h variable speed zone is appropriate for the street environment surrounding this school. This assessment also considered the appropriate type of signs to be used and where these signs should be located.

The initial assessment was undertaken in order to understand the general operation of the street environment surrounding the school and also how this environment operated during the peak school times. The initial assessment consisted of:

- Seven day speed and volume traffic counts
- Survey of pedestrian activity (children only)
- Crash history of the surrounding area
- Extent of the school related activity or 'hazard zone'
- Other observations relevant to the type or placement of signs.

The initial speed readings for Ramarama School are detailed in Table F1.

Time	7-8am	8-9am	2-3pm	3-4pm
Mean Speed (km/h)	67.7	66	66	65.9
85 th percentile speed (km/h)	76.7	74.2	76.3	75.6

Table F1 Initial Assessment Ramarama School – Mean and 85th Percentile Speeds

A pedestrian survey counted a total of 48 child pedestrian movements. There were 14 children recorded in the morning period and 34 in the afternoon period. An analysis of CAS data for the past five years (2007-2011) found one reported crash within a 500m radius of the school. This crash involved a car losing control on the slight right hand bend at night.

Ramarama School did not meet the criteria for a 40km/h variable speed limit. It did meet the criteria for electronic warning signs and it was recommended that these be considered.

Site Description – Video Camera and Counter Locations

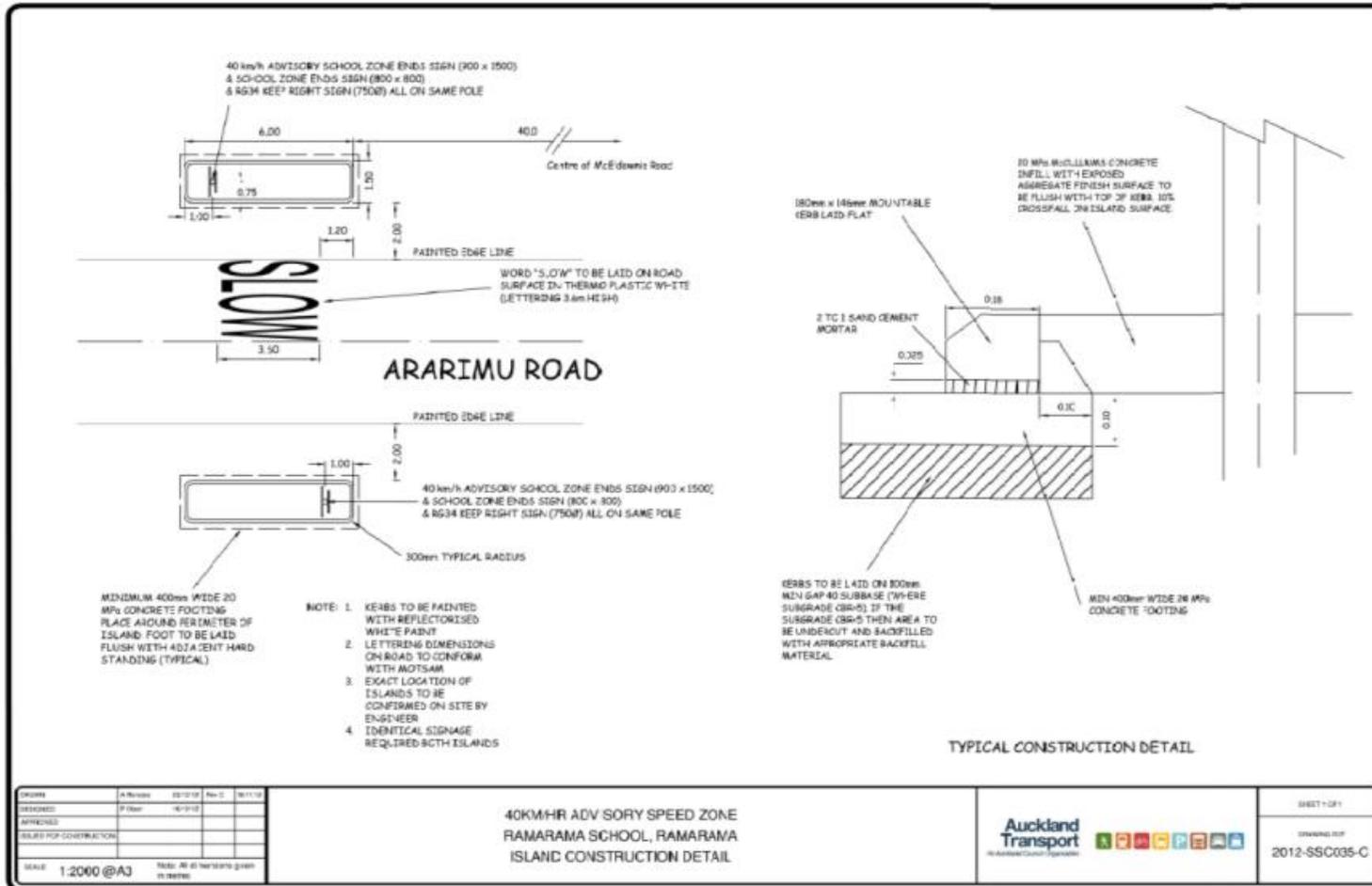
Figure F1 demonstrates the locations of the speed counters and video cameras.



Figure F1 Ramarama School - Locations of Cameras and Counters

Signage Construction Plans





Pre-Implementation Consultation

Thirty-seven parents responded to the survey. The school has a role of 220 pupils. The response rate was for this school was approximately 17 per cent. This is only an approximate response rate, as some families will have more than one child at the school.

Parents' responses to the survey are detailed as follows:

- Parents were asked what their average speeds were when driving past the school.
Sixty-two per cent responded that their average speeds past the school were below 60km/hr.
Thirty-eight per cent stated that their average speeds past the school were between 60-70km/hr.
No parents stated they travel past the school at speeds above 70km/hr.
The tube counts taken as part of this project found that the 85th percentile speeds past the school were 77.8km/hr between 8-9am. Between 2-3pm the 8^{5th} percentile speed past the school was 79.2km/hr and 80.8km/hr between 3-4pm
- Parents were asked what they believed was a safe speed for traffic passing the school.
Thirty per cent (11 parents) believed that speeds less than 40km/hr were safe for traffic passing the school
Sixty-two per cent (23 parents) believed that speeds between 40-50km/hr were safe for traffic passing the school
Five per cent (2 parents) of parents believed that speeds between 50-60km/hr were safe for traffic passing the school
Three per cent (1 parent) believed that speeds above 60km/hr were safe for traffic passing the school.
- Parents were asked if they had observed other drivers reducing their speeds within the school zone.
No parents have observed other drivers reducing their speed within the school zone, regardless of whether children are present.
Thirty-one per cent (11 parents) have observed other drivers reducing their speed within the school zone, but only when children are in the vicinity
Thirty-one per cent (11 parents) have observed other drivers reducing their speed within the school zone, but only during school hours on school days.
Thirty-eight per cent (13 parents) have observed that other drivers do not reduce their speed at all.
- Parents were asked if they had observed any crashes or near misses on the road outside of the school.
Thirty-nine per cent (14 parents) have observed crashes or near misses on the road outside the school
Sixty-one per cent (22 parents) have not observed any crashes or near misses on the road outside the school

Of those that have observed incidents, all of these were recorded as 'near misses'. The details of these events are listed as follows:

- One parent is aware of three crashes since 2003, has seen multiple near misses
- Through traffic travelling at speed – near misses with cars exiting the car park.
- Cars parked illegally on yellow lines
- Cars slowing down or queuing to enter car park, through traffic near misses.
- Cars leaving car park pull out into fast moving traffic
- Cars ignoring the 'no right hand turn sign'
- Children running out to parked cars
- Illegal U turns

Additional comments made about road safety at Ramarama School are detailed below:

- *Speed*
One parent observed that speeds are too high around the school.
Need varied speed limits around school times, or a compulsory 40km/hr speed limit like that in Australia.
Reduced speeds are need around the car park entrance and exit.
- *Signage*
Need better signage - in the form of lit warning signs for school start and end times.
- *Inadequate Pedestrian Facilities*
Vehicles drive close to the road edge where there is no defined footpath. Difficult to see the path at the Dale Road – needs maintenance.
Crossing Hillview Road is dangerous for children as bend means they cannot see cars.
One parent recommends a marked pedestrian crossing needed.
- *Difficult Turning Conditions*
One parent believes a dedicated right turn lane is needed for the car park. Limited visibility and high speeds of through traffic make turning in and out of the car park difficult
- *Enforcement*
One parent commented that a police presence was needed in order to enforce the speed restrictions

Post-Implementation Consultation

Post-Implementation consultation was undertaken. Nineteen parents responded to the survey. The survey results are detailed below:

- Parents were asked what their average speeds were when driving past the school.
Sixty-one per cent (11 parents) stated the average speed they drove past the school was between 40km/hr.
Thirty-nine per cent (seven parents) stated the average speed they drove past the school was between 40-60km/hr.
- Parents were asked if they had observed other drivers reducing their speed within the school zone.
Fifty per cent (9) stated they had observed other drivers reducing their speed whether or not there are children present.
Thirty-nine per cent (7 parents) stated they observed other drivers reducing their speed only when there are children in the vicinity

Seven per cent (two parents) stated that they had not observed other drivers slowing down within the school zone.

Four per cent (one parent) stated they had observed other drivers reducing their speed only when the speed limit signs are operational.

- Parents were asked if they reduced their speed within the school zone when they see the signs.
Fifty per cent (nine parents) stated they slow down whether or not children are present
Forty-seven per cent (eight parents) stated they slow down only during school hours and on school days
Three per cent (one parent) stated they slow down only when children are in the vicinity
- Parents were asked what speed they slowed to when driving in the school zone.
Eighty-three per cent (15 parents) stated they slow down to around 40km/hr.
Seventeen per cent (three parents) stated they go slower than 40km.

Additional comments from parents about road safety at Ramarama School are detailed below:

- Only a few cars slow down enough
- Children crossing at Hillview Road is of greater concern
- Signs with lights would be good during school hours
- When turning right for the motorway, not enough space for trucks to pass on the left
- Lines on road to show where zone starts
- Signage is not clear enough.

Pre Implementation Traffic and Speed Counts

The automatic speed counts were on site from Thursday the 13th of September 2012 until Wednesday the 19th September 2012. The 5 day Average Daily Traffic volume (ADT) was 1359 westbound and 1362 eastbound. Weekend flows were 997 westbound and 1050 eastbound for Saturday and 896 westbound and 870 eastbound for Sunday.

The average 85th percentile for speeds on weekdays was 79.6km/h. The speeds past the school during school drop off and pick-ups were generally lower than this. Between 8-9am the average 85th percentile speed over the five day period was 75km/h. Between 2-3pm and 3-4pm the average 85th percentile speed over the five day period was 75.4km/h and 76.4km/h respectively. The five day Average Daily Traffic Volumes in both directions at peak times are detailed in Table F1.

Time	5 Day Average Daily Traffic Volume	85 th Percentile Speeds (km/h)
7-8am	243.6	79.6
8-9am	281.6	75
9-10am	157.8	76.8
1-2pm	139.2	77.4
2-3pm	163.4	75.4
3-4pm	230.2	76.4
4-5pm	224.6	80
5-6pm	245.4	81.2

Table F1 Ramarama School Survey - 5 Day ADT and 85th Percentile Speeds

Pre- Implementation Site and Video Observations

Site Observations – Morning Peak

The morning site observations commenced at 7am. The school is quite hidden from the road by planting. Generally, the speeds of through-traffic during the morning peak were less than in the afternoon peak and the flows are spread out and not bunched. Specific observations included:

- At 7:20am the flows were observed to be building steadily in both directions.
- At 7:30am a truck stopped to check its load.
- At 8:25am the speeds were observed to be generally lower than previously.
- Two children crossed the road towards the school from McEldowie Road at 8:45am. There was some delay at entry with manoeuvring vehicles.
- The bell sounded at 8:52am.
- At 9:05am there were seven vehicles in the lower car park and the upper car park was still full.

Video Observations – Morning Peak

Camera one was positioned on the northern corner of McEldowie Road and Ararimu Road, facing the lower car park. Camera two was positioned on the northern side of Ararimu Road, to the east of the school, observing the on-road car parks and the entrance area to the upper and lower car parks. Figure F1 (above) demonstrates the location of the cameras and counter.

Camera One

The video observations matched those of the site visit. There were several additional observations of note:

- At 8:37am a left turning car exiting the lower car park crossed paths with a right turning car exiting the upper car park. Although both cars were driving slowly and carefully and there was no real safety concern, an inattentive or more aggressive driver may create issues here. This manoeuvre was observed again at 8:51am.
- At 8:41am a vehicle was observed turning right into the lower car park exit in order to gain access to an empty car park space.
- At 8:44am a vehicle was observed doing a U turn out of the lower car park exit.

Camera Two

There were no observations of note during the morning peak period.

Site Observations – Afternoon Peak

The afternoon observations commenced at 2pm.

- At 2:15pm the through-speeds past the school were high. There were a few cars stopping on the shoulder but these were not school related.
- At approximately 2:25pm several vehicles started to arrive at the school. This did not disrupt the through traffic which was still light at this stage.
- At 2:35pm a vehicle was observed to do a U turn on Ararimu Road in order to park on the road side of the island. There were long gaps (approximately 20-30seconds) between the through traffic at this time.
- At 2:43pm a vehicle was observed to make a U turn into an on-road parking space.
- At 2:45pm a car did a U turn into the road (from the road side car park).
- At 2:47pm a westbound vehicle parked on the shoulder west of the upper car park exit.

- By 2:48pm the through traffic speeds were noticeably slower.
- At 2:51pm the front car park was full and at 2:52pm the school bell sounded.
- At 2:53pm a bus arrives, does a right turn and blocked the front area and drops off some children. There was some back-up of traffic up to the road by vehicles delayed on site at 2:58pm.
- By 3:06pm the through-traffic speeds were increasing again. Two vehicles were observed doing U turns at the intersection during this peak time.
- Two children crossed the road to walk up McEldowie Road at 3:13pm.
- By 3:30pm the lower car park was empty, there was nothing on the road. It had returned to pre-school finish time status.

Video Observations – Afternoon Peak

Camera One

During the afternoon peak period there were more parents parking on the street than was observed during the morning peak. Through traffic was observed to be travelling slowly though here at approximately 3pm. There were several U turns done, similar to those described in the site observations.

- At 2:57pm a vehicle turned right into the exit in order to park in an empty space.
- At 3:06pm a vehicle parked in the road side car parks (eastern end of the school) attempted a U turn without checking for traffic. A through vehicle had to brake and swerve across the centre line to avoid the vehicle.
- At 3:15pm a vehicle turned right into the exit of the lower car park, turned left and parked on the road side of the island. This vehicle then turned onto the road and made a right turn into the entrance and drove up the upper driveway.

Camera Two

- At 2:55pm a vehicle was observed parking on the northern side of Ararimu Road on the shoulder. The driver crossed the road then at 2:58pm returned with a child and left.

Speed Survey Results

Ararimu Road, Ramarama 2012

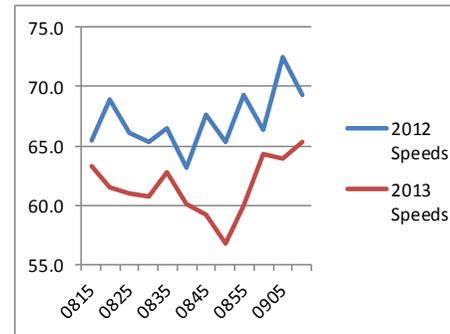
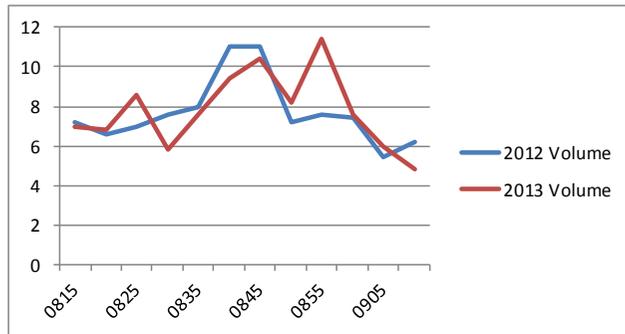
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	E	7.2	65.4
0820	E	6.6	69.0
0825	E	7	66.1
0830	E	7.6	65.3
0835	E	8	66.5
0840	E	11	63.1
0845	E	11	67.6
0850	E	7.2	65.4
0855	E	7.6	69.2
0900	E	7.4	66.4
0905	E	5.4	72.4
0910	E	6.2	69.2

Ararimu Road, Ramarama 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
0815	E	7	63.3
0820	E	6.8	61.5
0825	E	8.6	61.0
0830	E	5.8	60.8
0835	E	7.6	62.8
0840	E	9.4	60.1
0845	E	10.4	59.2
0850	E	8.2	56.8
0855	E	11.4	60.0
0900	E	7.6	64.3
0905	E	6	64.0
0910	E	4.8	65.4

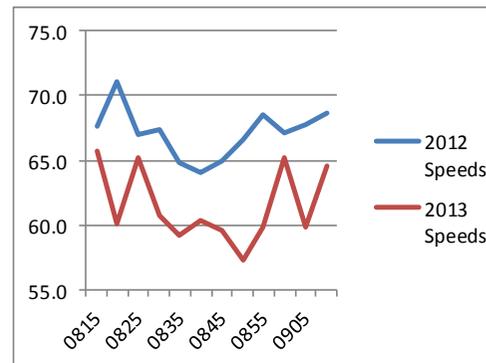
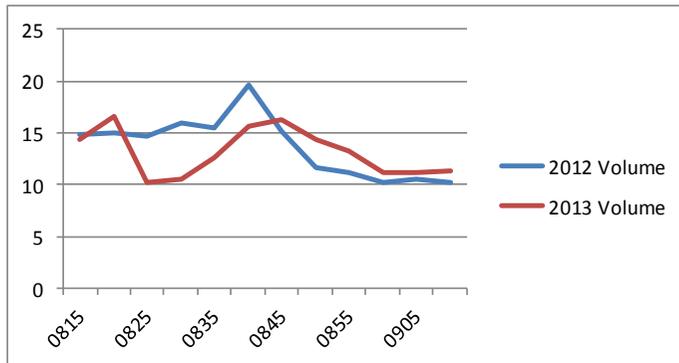


Ararimu Road, Ramarama 2012
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	W	14.8	67.7
0820	W	15	71.1
0825	W	14.6	67.0
0830	W	16	67.4
0835	W	15.4	64.8
0840	W	19.6	64.1
0845	W	15.2	65.0
0850	W	11.6	66.6
0855	W	11.2	68.5
0900	W	10.2	67.1
0905	W	10.6	67.7
0910	W	10.2	68.6

Ararimu Road, Ramarama 2013
5 Day Average

Time	Direction	Average volume	Average mean speed
0815	W	14.4	65.8
0820	W	16.6	60.1
0825	W	10.2	65.2
0830	W	10.6	60.7
0835	W	12.6	59.2
0840	W	15.6	60.4
0845	W	16.2	59.6
0850	W	14.4	57.3
0855	W	13.2	59.8
0900	W	11.2	65.2
0905	W	11.2	59.9
0910	W	11.4	64.6



Ararimu Road, Ramarama 2012

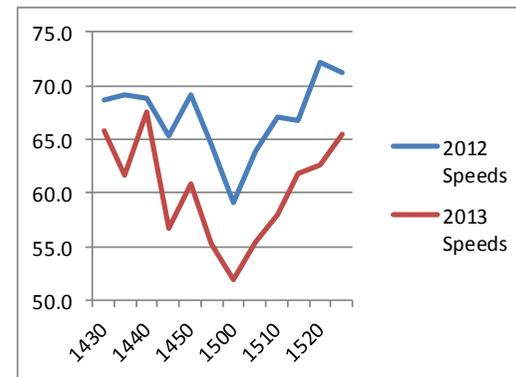
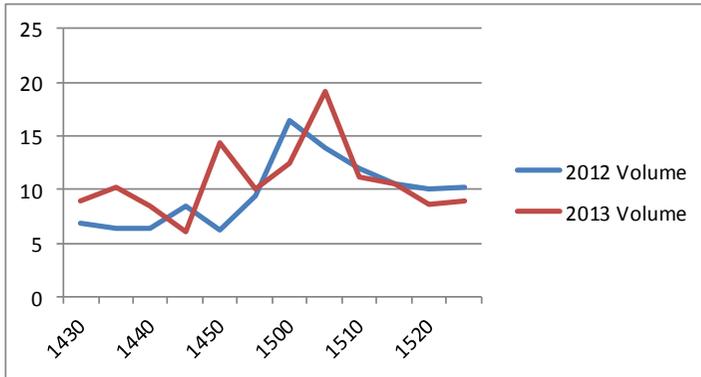
5 Day Average

Time	Direction	Average volume	Average mean speed
1430	E	6.8	68.6
1435	E	6.4	69.1
1440	E	6.4	68.9
1445	E	8.4	65.2
1450	E	6.2	69.1
1455	E	9.4	64.5
1500	E	16.4	59.1
1505	E	13.8	63.9
1510	E	12	67.1
1515	E	10.6	66.8
1520	E	10	72.2
1525	E	10.2	71.2

Ararimu Road, Ramarama 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
1430	E	9	65.8
1435	E	10.2	61.7
1440	E	8.4	67.5
1445	E	6	56.8
1450	E	14.4	60.9
1455	E	10	55.2
1500	E	12.4	51.9
1505	E	19.2	55.4
1510	E	11.2	58.0
1515	E	10.6	61.8
1520	E	8.6	62.5
1525	E	9	65.4



Ararimu Road, Ramarama 2012

5 Day Average

Time	Direction	Average volume	Average mean speed
1430	W	6	66.2
1435	W	9.4	67.0
1440	W	7.6	65.1
1445	W	8.8	62.7
1450	W	12.2	63.3
1455	W	9.4	63.8
1500	W	11.8	56.7
1505	W	8.2	61.6
1510	W	8.2	66.2
1515	W	9.2	68.0
1520	W	6.2	67.3
1525	W	3.4	67.9

Ararimu Road, Ramarama 2013

5 Day Average

Time	Direction	Average volume	Average mean speed
1430	W	4.8	64.1
1435	W	6.6	65.5
1440	W	7.8	65.4
1445	W	9.6	59.6
1450	W	12	59.1
1455	W	14	54.1
1500	W	13.2	52.1
1505	W	11.8	51.8
1510	W	12.8	58.2
1515	W	7.8	64.4
1520	W	10.8	61.8
1525	W	6.4	64.3

