The Warrant for 40 km/h School Zones – (Electronically-Signed Part-Time Speed Limits at Schools)

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Abstract
This technical note provides a brief description of how the warrant for the installation of 40 km/h school zones was derived from the results of surveys to evaluate trial sites for the zones in Christchurch.

1 Introduction

In July 2002, following trials for two years at five sites in Christchurch, the Land Transport Safety Authority (LTSA) made provision for more general installation of 40 km/h school zones. [1, 2.] These zones had permanently-displayed fluoro warning signs and part-time 40 km/h speed limits imposed by electronically-operated, illuminated signs. Christchurch City Council and LTSA conducted questionnaire surveys and on-road surveys to evaluate the effects of the school zones at the trial sites. The results of these surveys were reported in late 2001. [3, 4.]

This note describes how the results of these surveys lead to the warrant for school zones included in *Traffic Note 37*.

2 Warrant for school speed zones

A road controlling authority may only consider a 40 km/h school zone at a pre-school, primary, intermediate or secondary school in the period immediately before the commencement and immediately after the conclusion of school each day and, where practicable, at other times of the day when:

(a) there is a high level of on-road, school related activity (at least 50 children crossing the road or entering or leaving vehicles at the roadside); and

(b) (i) the mean speed of free running vehicles is greater than 45km/h; or

(ii) the 85th percentile speed of free-running vehicles is greater than 50km/h; or

(iii) there have been speed related crashes of any type along the roadway outside the school in the previous five years; or

(iv) the on-road, school-related activity is occurring on main traffic routes with high traffic volumes.

Evaluations in Christchurch found locations most likely to benefit from a school zone are those meeting the above criteria and:

- are on arterial routes or multi-lane roads or high speed environments; and
- have on-road, school-related activity at an obscured school frontage (ie where the presence of the school is not immediately obvious to approaching traffic).

3 The requirement for "active" signs for school zones

An essential element in the success of the school zones, apparent in the results of both the on-road speed surveys and the interview surveys, is the "active" nature of the speed limit signs. That is, they are only displayed when children are on the roadside and the lower speed limit is needed. Table 1 shows how mean and 85th percentile speeds at the trial sites generally increased over time if the speed limit signs were activated with no children present. The same effect did not occur if children were present when the signs were activated, as Table 2 shows. (In these tables "Before" refers to the period before the trial sites were installed, "Interim" is the period within a month of the trial sites being installed, and "After" is nine months after the trial sites were installed.)

	Mean Speeds (km/h)			85%ile Speeds (km/h)		
	Before	Interim	After	Before	Interim	After
Trial Sites						
Belfast School	58.5	44.9	46.9	63.9	51.3	53.6
Bishopdale School	52.8	42.1	46.1	57.2	46.5	52.8
Branston Intermediate	55.5	43.2	45.2	60.5	47.5	52.3
Halswell School	54.9	42.3	44.8	60.5	46.6	50.9
Harewood School	61.5	50.9	47.9	67.5	60.5	57.4
Control Sites						
Breens Rd Intermediate	54.3	-	51.6	60.4	-	59.0
Redwood School	52.0	49.2	50.2	57.1	56.0	56.7
Westburn School	51.3	-	-	56.2	-	-

Table 1 Effects on Vehicle Speeds of Permanent Warning Signs plus Electronic Speed Limit Signs (no children present)

	Mean Speeds (km/h)			85%ile Speeds (km/h)		
	Before	Interim	After	Before	Interim	After
Trial Sites						
Belfast School	50.6	40.0	42.2	57.1	44.6	47.5
Bishopdale School	44.7	38.6	39.2	50.0	43.3	43.7
Branston Intermediate	52.3	41.5	42.1	57.8	48.5	48.0
Halswell School	45.4	39.7	40.4	51.8	44.1	44.6
Harewood School	48.3	41.3	41.2	56.7	47.5	47.6
Control Sites						
Breens Rd Intermediate	46.7	47.5	47.0	52.8	53.3	53.5
Redwood School	41.2	40.1	42.2	47.1	47.8	47.2
Westburn School	41.7	40.1	39.9	46.3	44.8	46.8

Table 2 Effects on Vehicle Speeds of Permanent Warning Signs plus Electronic Speed Limit Signs plus Patrol, Warden or Children

The results of the questionnaire surveys were that 81% of respondents said they would obey the speed limits if "active" signs imposed them, with only 37% saying they would obey a speed limit imposed by permanent signs. There was strong support for the "active" signs compared to permanent signs.

Therefore school zones should only be installed at schools where there is a significant amount of child activity on the roadside, and the times the speed limit signs are activated should align as closely as possible to the times this activity occurs. The minimum number of 50 children is subjectively based on observations when surveying at the trial sites. It also coincides with the number of children that justify operation of a school patrol at the minimum traffic flow of 100 vehicles per half-hour.

Note that there is provision to activate the school zone signs at other times of the day when there are congregations of children on or near the roadway (for a school trip, for example.) However, Fixed School Zone signs may not be used at school zones with this facility since they can not accurately reflect the operating times of the Variable School Zone signs.

4 Minimum vehicle speed thresholds

The underlying speed limit at the trial sites varied from 50 km/h to 70 km/h. The main benefit of the school zones observed at these sites was that they achieved mean vehicle speeds of about 40-42 km/h and 85th percentile speeds of about 44-48 km/h at all sites. However, at two of the control sites used for the evaluation these mean and 85%ile speeds were consistently observed without imposing any special speed limit. Installing 40 km/h school zones at these sites would achieve no additional benefits.

Therefore 40 km/h school zones should only be installed where worthwhile reductions in speeds past a school should result. In the warrant, the mean speed threshold of 45 km/h and 85th percentile threshold of 50 km/h have been set at levels where the speed reductions expected from a school zone should be worthwhile.

5 Crash history

If there have been speed-related crashes on the section of road outside a school and the installation of a 40 km/h school zone would prevent further crashes of the same type, then it is worth considering the installation of a school zone. The crashes need not involve children or pedestrians but, implicitly, they should have occurred at times when the school zone would have been operating.

6 Road classifications

Observations and speed surveys at the trial sites and at other schools on less busy roads has lead to the conclusion that school zones should be most beneficial on arterial routes or multi-lane roads or in high speed environments. In general a much higher proportion of the traffic on other roads will be traffic associated with the school. This traffic will be stopping at the school and, in doing so, will slow any other passing traffic. In most circumstances, installing a school zone is unlikely to further reduce speeds past these schools.

7 Underlying speed limits

The trial sites had underlying speed limits of 50 km/h to 70 km/h. The site in the 70 km/h area (Harewood School) is essentially rural in nature. School zones may be installed in rural areas (with underlying speed limits of 80 km/h or more) with the proviso that the Variable School Zone and the School Zone Ends signs must be duplicated on the right hand side of the road. In most situations the signs should also be bigger than those in urban areas. Experience with the trial sites suggests that speed reductions to means of 40-42 km/h should be achievable in rural areas and that school zones may be most beneficial in rural areas. LTSA will be very keen to monitor the effects of any rural school zones that are installed.

8 References

1. Land Transport Safety Authority – *"Traffic Note 37: 40 km/h School Zones – Guidelines"*, July 2002.
2. *New Zealand Gazette*, 4 July 2002, page 2029.
3. Paul Cottam – "*Christchurch's 40 km/h Part Time School Speed Zone Trial: Community Perceptions and Attitudes*", Proceedings of the Road Safety Research, Policing and Education Conference, Melbourne, 18-20 November 2001.
4. Wayne Osmers – "*The Effect on Vehicle Speeds of Electronically-Signed Part Time Speed Limits Outside Schools*", Proceedings of the Road Safety Research, Policing and Education Conference, Melbourne, 18-20 November 2001.