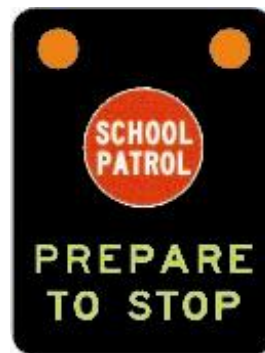
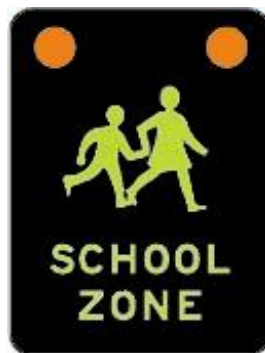


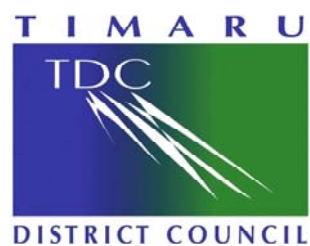
# Active Signs Trial



school bus

## Report

October 2005





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## CONTACTS

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## 1 BACKGROUND

Flashing (yellow) signals to supplement warning signs are used in many applications throughout the world. Their main use is to provide additional warning at times when a sporadic activity or temporary condition exists on or near the road.

In New Zealand flashing warning signals are limited to use in advance of traffic signals and to supplement temporary 40km/hr speed restriction signs at schools. They have also been observed on variable message signs on the rear of road works vehicles, in 'truck crossing' and ice warning situations.

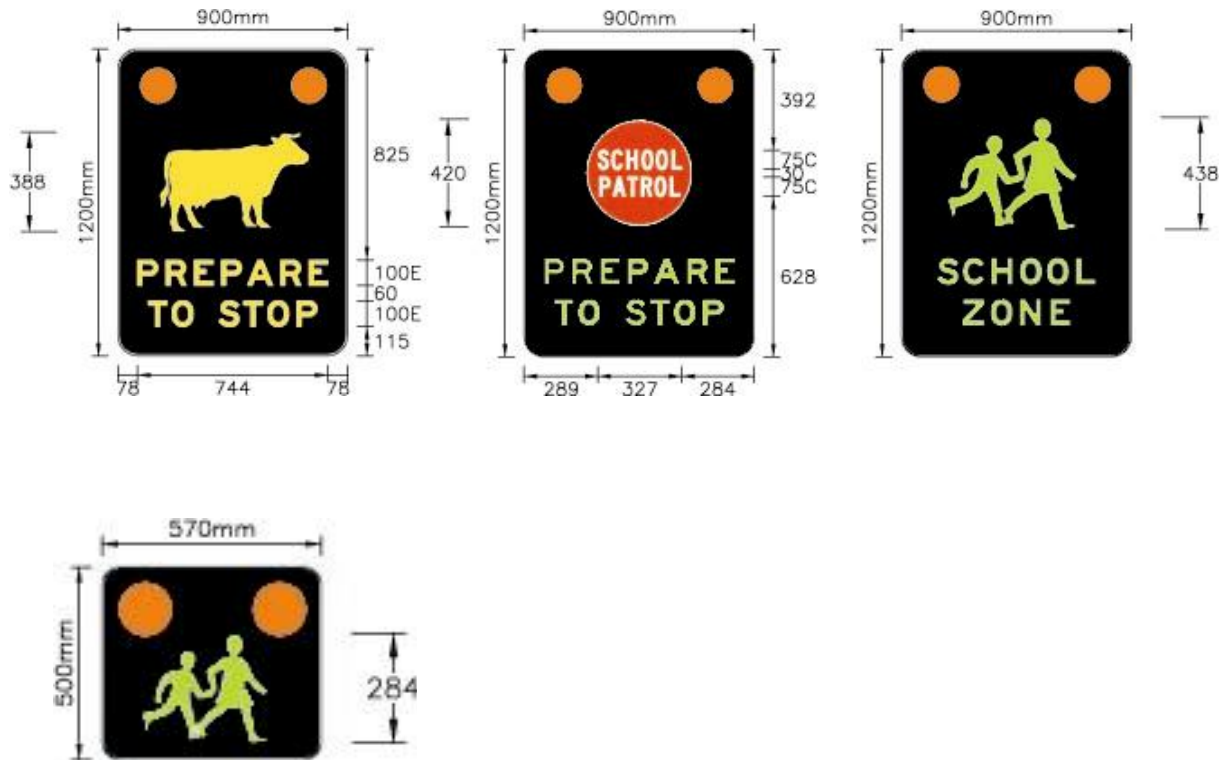
Reference is also made to the document 'Flashing Warning Signals – Proposed Trial' (Timaru District Council ref Doc #228092) dated June 2004. This document covered the proposed trial for both the Timaru and Invercargill sites.

The trial was approved by the Land Transport Safety Authority and published in the *New Zealand Gazette* on 17 June 2004. The trial is approved to continue to the 24<sup>th</sup> December 2005.

## 2 REASONS FOR THE TRIALS

- 1 Cow crossings currently have a range of signage and warning systems both official and unofficial. Many farmers use unofficial rotating yellow 'roadworks type' beacons. Also the fold up/down warning signs are not popular to use and may be left open.
- 2 School patrols have no standard pre-warning signage yet they operate on kea crossings or zebra crossings. Some school patrol crossing sites have fold-out 'children crossing' signs. Crash statistics show over 50% of crashes at or near crossings are rear-end type suggesting a need for improved pre-warning signage.
- 3 The 40km/hr school zone temporary speed restriction signage system is relatively costly and is not applicable for every school frontage. (reference LTNZ Traffic Note 37).
- 4 Lack of recognition of a school bus stopped and/or lack of compliance with the 20km/hr law has been identified as a significant safety issue.
- 5 The concepts are in use in various forms in other countries.
- 6 There is appropriate reliable and cost-effective technology available.

### 3 TRIAL SIGNAGE



School Bus

### 4 METHODOLOGY

Trial signs were erected in eleven different situations in Timaru and Invercargill for twelve months. Various aspects of the trial were measured including road user surveys, speed/traffic counts and general observations.

Assistance with the trial was provided by Land Transport New Zealand.

## 5 TRIAL RESULTS – POLE SIGNS (COW CROSSING, SCHOOL PATROL, SCHOOL ZONE) TIMARU



## **Pole Signs Installation**

All pole sign sites were installed using cable-less control and powered by solar panel. The batteries have 15 days life (based on normal usage).

All signs have a small light on the back of the sign to confirm that the signals are on or off. The signs also have a time-out facility that switches the signs off after an hour.

## **Cow Crossing – Coonoor Road**

Coonoor Road carries a traffic volume of 1425 vehicles per day and the crossing is in a 50km/hr speed limit zone with curves on both approaches. The active signs are located approximately 65m back from the crossing. Prior to the installation the farmer used a rotating beacon on a swing out pole and there were no pre-warning signs installed.

The signs are remotely activated by a switch located on the outside of the cow-shed building beside the road. A hand-held remote control was not required at this site.

The signs have been running successfully since their installation and the Council has received positive responses from the farmer and from road users. All signs have proven to be particularly visible in fog conditions.

The cost of the installation was \$7054 exclusive of GST.



*Cow Crossing Coonoor Road*

## School Patrol

The school patrol signs have been located 70m back from the zebra pedestrian crossing on Wai-iti Road. Wai-iti Road carries 11800 vehicles per day and is in a 50km/hr zone. Prior to the installation the site had flucal fold-open 'children crossing' signs.

The signs are turned on and off by means of a hand-held remote control.



*School Patrol – Wai-iti Road*

The site is on a straight stretch of typical urban arterial road with trees in the grass berms. The road lies east-west and can be subjected to low sun for westbound traffic in winter in the afternoon. Cowls were installed to improve the conspicuity of the signals.

Comment received from the school is that the signs are very effective compared to the fold-out 'school crossing' type and in fog conditions.

The signs cost \$8688 a pair. Installation cost approximately \$600.

## School Zone



*School Zone – Pages Road*

Two sites in Timaru were chosen to trial the school zone signs:

### Site 1

Pages Road at Mountain View High School. This site is on an urban (50km/hr) arterial road carrying 3000 vehicles per day. There is a bend on the westbound approach to the school frontage and there is no pedestrian crossing at the school.

### Site 2

Fairview Road (500 vehicles per day) at Barton Rural School (previously Fairview School). This site is a rural primary school in an 80km/hr zone. There is a bend on the westbound approach to the school frontage.

### General

The signs are pre-programmed to flash in the morning and afternoon on each school day. Site 1 operates between 8:25am and 8:55am and between 3:25pm and 3:50pm. Site 2 operates between 8:30am and 9:00am and between 3:00pm and 3:20pm.

There is a manual over-ride remote control to turn the signals on or off if necessary.

Initially there were a few problems with the electronics, however these have been resolved. It is important that the times be programmed locally by a suitably experienced technician. Also, allow for daylight saving in the programming.

Regular checks on operation have been carried out including performance of the electronics. The signs cost \$8688 a pair. Installation cost approximately \$600 per site.

## Speed Survey Results

School Patrol Signs		AM		PM		Other	
Period		Mean	85%ile	Mean	85%ile	Mean	85%ile
Wai-iti Road (posted 50)							
Before Signs		47	51	44	50	49	53
After Signs		47	51	47	53	50	55
Change		0	0	3	3	1	2

School Zone Signs		AM		PM		Other	
Period		Mean	85%ile	Mean	85%ile	Mean	85%ile
Fairview Road (posted 80)							
Before Signs		77	83	76	95	82	86
After Signs		80	91	78	87	80	93
Change		3	8	2	-8	-2	7
Pages Road (posted 50)							
Before Signs		44	51	45	53	51	56
After Signs		44	51	43	51	52	57
Change		0	0	-2	-2	1	1

Cow Crossing Sign (posted 50)		All	
Period		Mean	85%ile
Coonoor Road			
Before Signs		51	61
After Signs		48	57
		-3	-4

'Other' times cover outside the am and pm time

The Fairview Road site had a low sample size. The Wai-iti Road site had relatively low speeds overall during the am and pm periods. The Coonoor Road crossing shows a drop in speeds possibly reflecting the presence of the signs only (without signs flashing) as the speeds were not taken when cars were stopped.

In general the before and after surveys show a mix of results with no overall pattern of speed changes. The speed survey recorders ideally should have been separated for direction and placed well back from the crossing or site. Further before/after counts could be taken on other sites if necessary.

## Control Sites

<b>Control Sites (all 50km/hr posted)</b>						
<b>Period</b>	<b>AM</b>		<b>PM</b>		<b>Other</b>	
	Mean	85%ile	Mean	85%ile	Mean	85%ile
1. Wai-iti Road (zebra crossing at Highfield Mall)						
Before Signs	49	54	45	52	48	54
After Signs	49	53	45	51	47	54
Change	0	-1	0	-1	-1	0
2. Grants Road (near school crossing)						
Before Signs	38	45	37	46	42	51
After Signs	44	50	42	48	47	55
Change	6	5	5	2	5	4
3. Selwyn Street (near school crossing)						
Before Signs	45	52	42	51	48	55
After Signs	49	53	48	53	49	54
Change	4	1	6	2	1	-1
4. Selwyn Street (200m from school crossing)						
Before Signs	47	54	49	56	50	57
After Signs	48	54	46	53	50	56
Change	1	0	-3	-3	0	-1
5. North Street (near school crossing)						
Before Signs	44	51	42	50	49	55
After Signs	48	54	48	55	50	56
Change	4	3	6	5	1	1

## Control Sites

As for the pole signs the results show a mix of changes to speed. A trend is not obvious from the data.

## **6 TRIAL RESULTS – POLE SIGNS (SCHOOL PATROL, SCHOOL ZONE) INVERCARGILL**

Trials of school patrol and school zones active signs were carried out in Invercargill at the following sites:

### **School Patrol Signs**

Herbert Street - Waihopai Primary School  
Queens Drive – James Hargest Junior High School  
Layard Street - James Hargest Junior High School  
Dunns Road – Otatara Primary School

### **School Zone Signs**

Mill Road – Myross Bush Primary School

### **Road User Feedback Video**

The focus of these trials was to gauge road user feedback and this has been captured on a 7minute video. A copy of the video can be obtained from the contact on page one of this document (Mr Eddie Cook) or alternatively the video will be available off available off <http://www.icc.govt.nz/> from late January 2006.

### **Costs of Active Signs**

The cost to supply and install the active signs were \$5,725.00 (ex gst) per site (2 approaches, 1 sign per approach).

## 7 RESULTS – SCHOOL BUS: TIMARU



*School Bus Stopped*

Two school buses were fitted with the signs front and rear as shown. The ‘school’ signs were displayed alongside in some cases. The police commented that the flashing signs needed to be higher on the bus to be more effective.

The driver activates the signals when there is a need to slow traffic as the bus stops. Drivers noticed an improvement in traffic behaviour responding to the flashing signs. One driver advised that, on occasions, when the bus is leaving a stop, cars slow and let the bus in and this has improved over the period of the trial.

### Speed Survey Results

Metrocount classifier tubes were set out across the road and the bus was positioned on the side of the road over the counter.

Posted Limit	100		70		50	
	Mean	85%ile	Mean	85%ile	Mean	85%ile
<b>'School' Signs</b>	81	100	67	75	46	52
<b>New signs</b>	65	90	61	72	40	49
<b>Speed Reduction</b>	-16	-10	-6	-3	-6	-3

The speeds generally are surprisingly high with very little compliance with the 20km/hr limit as required by law. It is possible that, at the two 100km/hr zone sites, slowing to 20km/hr in such a traffic stream could be a dangerous exercise in itself as following vehicles may attempt to overtake.

Consultation was carried out with the police who advised that enforcement was difficult given the logistics of stopping vehicles in the vicinity of an operating school bus.

## 8 CONCLUSIONS

### General

The black backing boards provide good contrast to the diamond grade facing detail and, whilst there could be a number of suitable design layout options it is considered there is no need to review the design. The signals are visible from a long distance off and perform well in fog conditions. Cowls should be displayed where low sun is a problem.

### Speed Surveys

#### School Bus

The surveys show a significant drop in vehicle speeds passing the school bus. It should be noted that the traffic mix is a combination of local traffic (who are likely to have encountered the signals more than once and familiarised themselves with the message/system), and others traveling through the district who may have encountered it for the first time.

#### Pole Signs

In general the before and after surveys show a mix of results with no overall pattern of speed changes. The speed survey recorders ideally should have been separated for direction and placed well back from the crossing or site. Further before/after counts could be taken on other sites if necessary.

#### Control Sites

As for the pole signs the results show a mix of changes to speed. A trend is not obvious from the data.

#### Crash Records

##### Location, year and crash ID no:

The crashes listed below were selected from a list as being those crashes likely to be eliminated with the deployment of active signs.

Wai-iti Road – 2000 (2021570), 2001 (2171924), 2002 (2273111, 2274006)

Pages Road – 2000 (2022193, 2073355), 2002 (2270558, 2270988)

Herbert Street – 2001 (2122634), 2002 (2223041), 2003 (2322935)

There are no recorded crashes for the sites in 2005. However it is considered that there is insufficient sample in terms of period covered and number of sites to form any firm conclusions regarding reduction in crashes at this stage.

#### Cow Crossing

Cow crossings are located on roads of various levels of usage, from local one-lane unsealed roads with less than 20 vehicles per day to busy rural roads over 500 vehicles per day. In some cases it is not possible to install an underpass although an underpass should be a minimum requirement for new crossings on busy roads.

The Timaru District Council has a bylaw requiring require a person to be standing at the crossing while cows are crossing although this is not always possible in practice, particularly with one-farmer operations. This may have implications in terms of farm occupational safety practices.

A road controlling authority could have a policy that stipulates levels of treatment for given types of road. The active cow crossing signs would appear to be appropriate as a mid-range treatment between busy roads (preferably having stock underpasses) and minor roads (static or fold out signs).

### **School Patrol**

The school patrol sign is clearly an improvement on the fold-out 'children crossing' sign both in terms of gaining motorists attention and usability (remote switching). It would appear suitable as a mid-range alternative between the foldout 'children crossing' sign and the 40km/hr school zone system.

### **School Zone**

The school zone signs provide an 'active' alternative to the static sign. It is essential that the signs are pre-programmed for each school day so that there is no reliance on manual switching.

The school patrol or school zone signs should not be located in such a position as to compete with traffic signal displays or be used in conjunction with 40km/hr school zone systems.

### **School Bus**

The speed surveys highlighted a significant lack of compliance with the 20km/hr speed limit when passing a stationary school bus. This improved markedly with the deployment of the active signs although, in the 100km/hr zones, it was noted that 20km/hr could be an unsafe speed to slow down to as vehicles may overtake those slowing. It may be that 40km/hr is a speed that would be more achievable in line with the principles behind the 40km/hr school zone systems.

Enforcement was an impractical exercise given the need to follow a school bus while also attempting to stop vehicles nearby to ticket them. On busy fast roads this activity was seen as potentially unsafe.

Some drivers advised that, when leaving a stop, some vehicles would respond to the signals by letting the bus into the traffic stream.

Other operational benefits noted was that there is no need to fold the sign in when the bus was not in use, and that the active signs only could be used when transporting children in non-school related activities.

## 9 RECOMMENDATIONS

### 1 School Patrol Signs and School Zone signs

Consider permitting general use. Carry out further speed surveys on new sites if required.

### 2 Cow Crossing and School Bus Signs

Consider permitting general use.

### 3 Crash data

Carry out an ongoing annual review of crash data at all sites where signs are deployed.

## 10 TECHNICAL INFORMATION

All signs have two flashing super-bright amber-yellow low voltage LED displays flashing alternately at a rate of 1 hertz.

Pole signs have:

- A small indicator light on rear of sign to inform the operator the signal status.
- A time-out facility that turns the signals off automatically after a minimum of say 1 hour.
- Remote control devices that have encoded signals to avoid switching by interference.
- Remote controls with Lithium or rechargeable batteries to cater for the strength of signal being transmitted.
- School zone signs have a locally programmable timer for automatic switching.

School bus signs

The driver activates and de-activates the signals manually. A suitably conspicuous flashing light near the switch on the dashboard is required for the driver.

## 11 SUPPLIERS

### Trial Signage

RTL Signs (Auckland) Ltd

Traffic Management Services Ltd, Invercargill.

Allan Shaw Electrical, 82 Hassall Street, Timaru

### Other potential suppliers known are:

Litesignz (Christchurch) [www.litesignz.co.nz](http://www.litesignz.co.nz)

ASL (Aspect Solutions Ltd)  
(09) 966 3868 [zlawrence@nz-asl.co.nz](mailto:zlawrence@nz-asl.co.nz)

HTS Group Ltd <http://www.htsgroup.co.nz/>

## 12 CONTACTS

### Cow Crossing - Farmers

WR and SA Weir

Fairview RD2

**Timaru**

### School Patrol signs

Mr Derek Taylor

Highfield School

Rimu Street

**Timaru**

### School Zone rural

Mr Steve Zonnevylie

Barton Rural School

Fairview RD2

**Timaru**

### School Bus Temuka – Timaru

Mr Mark Cooper

Ritchies Coachlines

P O Box 752

**Timaru**

### School Bus Pleasant Point - Timaru

Mr Chris Gifkins

Atkinson and Dossett

97 Main Road

**Pleasant Point**

## 13 EVALUATION RESULTS

### Feedback from roadusers and others

#### Cow Crossing – Coonoor Road at Saltwater Creek

##### Stands out well – no concerns

- Great asset for motorists, excellent site for all to be able to see since is a little blind in that area for vision in small vehicle.
- Signs working excellent. Traffic slows well before stopping unlike before with single flashing beacon. These have been had no complaints. Only positive feedback.
- Highly effective. I am a regular daily user of this route and find the sign admirable.
- Have not seen it flashing.
- Have not seen but looks great and I am sure it is effective.
- Tells motorists what to do.
- This I believe is a good idea at a site where you would not normally expect a crossing i.e. serves visibility horizontally/vertically where no other immediate solutions exist.
- Have not seen.
- Haven't seen although I have used Coonoor Road.
- Clear, easy to read. Why the writing?

#### School Patrol – Wai-iti Road at Highfield School

- Stands out well, viewable good distance. Difficult in late winter sun but difficult to remedy and not applicable to school times.
- Good visual signs. May need a cover over lights while driving up Wai-iti Road as sun can blind a driver's vision.
- Not sure if seen by motorists in morning with heavy steady EASTERLY flows. Not slowing.
- This is very effective in warning traffic that a school patrol is operating, especially in fog or low light conditions. Very visible flashing orange lights, just great. Easy to use with remote control. Would like to see this adopted on a National basis.
- Extremely valuable. Have had many comments from parents about their visibility and impact on the driver. The crossing is a safer situation with their installation.
- Extremely effective. Believe these should be placed around all school patrol sites.
- Effective – catches the eye. Could be seen from a distance.
- What about "School bus loading zone – prepare to stop".
- Excellent
- Tells motorists what to do.
- Possibly beneficial if the site is difficult to see due to visual clutter. e.g. the site where the sign is, is partially obscured by the tree. The crossing start is not easy to see.
- Visible and effective.
- Hard to read, otherwise good.

**School Zone 1 – Fairview Road at Barton Rural School**  
***(8:30am-9:00am and 3:00pm-3:20pm on school days)***

- Not traveled at these times to comment.
- Good signage, very visual.
- This sign is very effective in warning of a school zone, with a lower speed limit with it. I would like to see this adapted on a National basis. As for this sign - very effective in fog or low light conditions.
- This sign needs additional comments e.g. Slow down, Be careful, Be alert.
- Needs to be around all schools.
- Not seen in action. Visible when not lit.
- These have been brilliant. Visible from a long way away. Significant change in driver attitude when flashing. Our opinion of course. Had problems with getting the timing right e.g. daylight saving cross over etc. On the whole most worthwhile.
- I do pass this flashing sign on occasion and find it incredibly effective from a long distance.
- Have not seen it but looks great and I am sure is effective.
- Driver response = look out for kids.
- Possibly beneficial if the site is difficult to see due to visual clutter. e.g the site where the sign was, was partially obscured by the tree, the crossing start is not easy to see.
- Not seen.
- What is a School Zone? Hard to read with fluoro yellow.

**School Zone 2 – Pages Road at Mountain View High School**  
***(8:24am-8:55am and 3:25pm-3:50pm on school days)***

- Very noticeable on dull or cloudy days. Adequate on bright days.
- May need a cover over lights to assist in seeing when sun low in winter.
- Great, working well.
- This sign is very effective in warning of a school zone, with a lower speed limit with it. I would like to see this adapted on a National basis. Very effective in fog or low light conditions.
- All of these signs need additional comments e.g Slow down, Be careful, Be alert.
- Very effective. Seen from a distance. Visible – slows vehicles.
- Brilliant. When do we get one? – Roncalli College
- Excellent. We desperately need something similar for McKenzie St/Orari Station Road. Come watch what happens between 3:00pm and 3:15pm some time. There needs to be some way of enforcing a 20km (legal requirement!) speed limit past school at this time. We have no 'bus bays', a narrow road and some 350 students boarding buses (12 of them) as well as the other 250 town students leaving by only 3 entrances across the school frontage. (There are not other exits). We are not allowed a pedestrian crossing. – Geraldine High School.
- Excellent. Alerts you instantly.
- We would love something like this – traffic is slow to respond to the 100kmph/50kmph change close to our main entrance and it would increase our pupils' safety.
- Signs clearly visible and there has been a noticeable decrease in traffic speed since they were installed. Very effective.
- Colour contrast quite good. 'School Zone' should be in lower case.
- Have not seen.

- What is a school zone? Hard to read. Hard to read with fluoro yellow.

### **School bus Signs:**

- 1 Pleasant Point – Timaru bus (Atkinson and Dossett Ltd)
- 2 Temuka – Timaru bus (Ritchies Ltd)

- Stands out better on Atkinson Dossett Bus due background colours. Good reminder to motorists.
- Very visual.
- Appears to be effective on rural roads.
- I would like to see these bigger and minus the walking children. Instead an instruction of some sort directing traffic to their obligations in red.
- All of these sign need additional comments e.g. Slow down, Be careful, Be alert.
- Excellent.
- Not effective. People know the bus is a school bus and to slow down.
- Excellent. Why couldn't all buses carry such warning systems???
- Excellent. This helps. Should be statutory on all buses.
- Excellent. Alerts you instantly.
- These are excellent. I would like to see them on all school buses using main highways. Thanks for the opportunity to participate in the trial.
- Flashing lights always get attention and response/reaction. It seems knowing then what to do is the issue. Lack of driver education (to slow to 20kph either direction) also difficult from 100kph on highway. We could add signage: "When lights flashing SLOW to 20kph" although no room on front of bus – back only.
- Am not sure of what the benefit/objective of this is given.
- Have not seen.
- Good. Would be better with flashing lights on the bus too. Use yellow not fluoro.

## 14 ACTIVE WARNING SIGNS TRIAL - EVALUATION

During 2005 the following traffic safety signs with associated flashing signals are being trialed in the Timaru District. Further information is available at the website: <http://www.ltsa.govt.nz/roads/traffic-notes/traffic-note-14-appendix3.html> or from the Timaru District Council Land Transport Unit.

As part of the evaluation of the trial we invite comment on the deployment of the signs in particular their effectiveness in contributing to road safety.

Thank you for your input.

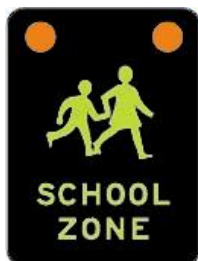
### **Cow Crossing - Coonoor Road at Saltwater Creek**



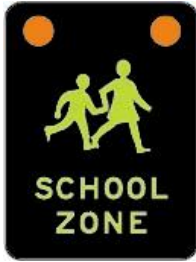
### **School Patrol - Wai-iti Road at Highfield School**



### **School Zone 1 - Fairview Road at Barton Rural School (8:30am-9:00am and 3:00pm-3:20pm on schooldays)**



**School Zone 2 - Pages Road at Mountain View High School  
(8:25am-8:55am and 3:25pm-3:50pm on school days)**



**School bus Signs:**

- 1 Pleasant Point – Timaru bus (Atkinson and Dossett Ltd)**
- 2 Temuka – Timaru bus (Ritchies Ltd)**



Name: .....

Organisation (if any):.....

Phone No: .....

Please return to: Land Transport Unit  
Timaru District Council  
P O Box 522  
Timaru District Council  
  
Attention: Brian Ward