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From	Networks, Policy and Planning Group
Authorisation	Lyndon Hammond, Manager Networks
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Active warning signs (not at schools) – Guidelines

1 Purpose

This Traffic Note provides guidance for road controlling authorities (RCAs) on the use of active warning signs (not at schools) - that is those warning signs that have a variable electronic display component which becomes active when the activity or hazard described by the sign is likely to be occurring on or close to the roadway.

A number of types of active warning signs have recently been approved including:

- (a) Active - flashing light signs (with reflective symbols and text) for livestock, curve, truck, pedestrian, cyclist and equestrian hazards;
- (b) Active LED (light emitting diode) signs for the hazards mentioned in (a) above and for “person working”, “exclamation mark”, “car skidding”, “person holding flag”, “lane change ahead”;
- (c) General warning (variable) sign for text only.

These signs were approved in the Notice in NZ Gazette dated: 24/7/2008, No. 116, p. 3082 (See appendix B).

There are also three types of active warning signs which have been approved previously:

- Speed Indicator Devices, which show the speed of a vehicle to its driver, (refer to Traffic Note 23)
- School zone active warning signs, (refer to Traffic Note 56);
- Traffic Signals/Roundabout Queue warning sign and yellow signals combination, (refer to Manual of Traffic Signs and Markings, Part 1, page 6 - 89 for sign PW – 64 [updated Nov 2007] 1). This sign has (downwards from the top) a yellow light, a standard diamond shape symbolic ‘traffic signal’ or ‘roundabout’ sign, another yellow light and a rectangular sign with one of three legends “PREPARE TO STOP” or “HIDDEN QUEUE” or “QUEUED VEHICLES”. This Traffic Note provides some additional guidance on installing queue warning signs.

2 Background

In many overseas jurisdictions, flashing lights are used to give additional emphasis to the warning or instruction given on a sign. In New Zealand such use has been restricted to variable message signs including

¹ See Land Transport Rule 54002: Traffic Control Devices 2004, clauses 6.5(5) to 6.5(10) and Schedule 1, sign W10-5 Advance warning traffic signals.

those installed on Auckland and Wellington motorways, some road work vehicles, variable speed limits in school zones and advance warning of traffic signals.

There is sometimes a need for warning signs that become 'active' only when a temporary condition exists. However, in many situations the high cost of full variable message signage cannot be justified.

The Timaru District Council and the Invercargill City Council proposed a trial of the use of flashing lights signs including: Stock crossings ('cow' symbol with the words PREPARE TO STOP) and School zone ('children' symbol with the words SCHOOL ZONE). These signs were distinguishable from other signs by having reflectorised symbols or wording on a black background and orange lights in the top left and right corners which flashed alternately when the sign was activated. Land Transport NZ approved a trial of these signs.

Subsequently the use of these signs has been approved on a continuing basis. Recommendations for the use of active warning signs for schools are set out in Traffic Note 56. This Traffic Note 57 sets out recommendations for the use of other approved active warning signs.

Transit NZ has been using an active "Hidden Queue" sign on some state highways.

3 Objectives of active warning signs

Active warning signs are intended to meet the following objectives:

- To highlight and draw drivers' attention to a particular type of hazard at a site where the standard reflectorised warning signs have been tried and have been found not to be sufficiently effective in warning drivers to modify their behaviour so they safely negotiate the hazardous site;
- To provide a safer environment for workers and road users at road construction and maintenance sites and for pedestrians, cyclists and horse riders during times of activity on or near the roadway;
- To reinforce driver expectation of, and engender correct responses to, the hazard depicted by the sign.

4 Selection criteria

4.1 Selection options for standard reflective warning signs

Generally the following procedure should be followed in deciding whether an active warning sign is appropriate at a particular site:

- (a) Standard reflective warning signs should usually be used to warn drivers of hazards likely on or near the roadway ahead. Most of these have a diamond shape with a black symbol in an orange, yellow or yellow/green background (except the 'lane change ahead' signs which have a rectangular shape on a white background). They often have a supplementary text sign below the diamond and should normally be erected on the left side of the carriageway.
- (b) If a standard sign (of a size appropriate for the permanent speed limit) is not sufficiently effective, then the following enhancement measures should be considered:
 - A larger-sized sign of the same type;

- Dual or gated signs (i.e. an additional sign located on the right side of the driver's carriageway or mounted above the roadway on a gantry or bridge);
- An extra reflective warning sign in advance of the standard warning sign in its usual position;
- If the hazard requires a special permanent message which cannot be satisfactorily conveyed by any of the approved standard symbolic warning signs, then a General warning sign (W19-1) with an appropriate text message can be installed. The NZTA regional engineer should be notified of the wording on this sign and the reasons why a standard symbolic sign was not appropriate for the site.

4.2 Selection of type of active signs

Active warning signs should be restricted to sites where the RCA considers that none of the standard warning sign options, as described in section 4.1 above, will provide adequate warning to approaching drivers. Usually these signs will only be appropriate on main routes or where the speed limit is greater than 70 km/h.

Active warning signs can be used in either a temporary or permanent situation as follows:

- (a) For **temporary installations** where there are construction, maintenance or special events activities on or close to a road. Traffic safety should be provided by means of an RCA-approved temporary traffic management plan.

Active warning signs should only be used where the RCA:

- agrees that the standard warning signs set out in CoPTTM (or the Local Roads supplement to CoPTTM) have been tried at similar sites and have been found not to be adequate and
- has approved a traffic management plan setting out the location and conditions of use at a particular site or for a particular activity in a defined area.

The traffic management plan should limit the use of active warning signs to sites and traffic conditions where they are actually needed, generally in line with the principles that apply to permanent active warning signs.

- (b) For **permanent installations** an active warning sign could be provided where:

- (1) there is an **intermittent hazard**, which would generally occur when a particular activity is happening on or close to the roadway (such as queued vehicles, pedestrians, cyclists, trucks or animals), or the road condition has become dangerous (such as ice/grit), or
- (2) there is **significant curve** requiring drivers to lower their speed to negotiate safely .

If the RCA, after considering all the options for using standard reflective warning signs set out in section 4.1, decides that those options would be inadequate and that drivers need additional warning of a hazard, then the RCA may approve the installation of active warning signs showing:

- (i) **'Cow' or 'sheep' symbol** and 'PREPARE TO STOP' in advance of approved Stock crossings. This sign should be activated only when livestock are crossing the roadway by either an approved livestock detecting device or by a manual switch operated by a person approved by the RCA.
- (ii) **'Curve with arrow head' symbol** and 'advisory speed in km/h' in advance of significant curves where drivers are likely to need to adjust their speed to negotiate safely. This active sign could connect to a device for detecting the speed of an approaching vehicle. If this sign is fitted with orange warning lights, they should only be activated when the speed of an approaching vehicle exceeds a pre-set (safe) speed. If the advisory speed is also indicated on chevron sight boards installed on the outside of the curve, then the advisory speed figure on the sign can change to the words 'SLOW DOWN' if the vehicle's speed is greater than a pre-set value.
- (iii) **'Pedestrian', 'Cyclist', 'Rider on horse' or 'Truck' symbol** and 'SLOW DOWN' in advance of locations where there are likely to be pedestrians, cyclists, equestrians or heavy vehicles on or crossing the roadway. Detectors may be installed in appropriate places to activate these signs. Alternatively the signs could be manually activated locally by a person approved by the RCA and operate for a defined period which would allow the pedestrian, cyclist, horse rider or truck to get clear of the hazardous site.
- (iv) **General warning using variable text:** (such as HIDDEN QUEUE). This sign should only be erected where the RCA considers that the standard warning symbols listed in paragraphs (b)(i) to (iii) are not adequate to convey the nature and details of the hazard.

If the hazard is intermittent queues of vehicles, then detector loops or other suitable devices for detecting queued vehicles should be installed in appropriate positions in advance of the sign in order to activate the 'HIDDEN QUEUE' sign.

If possible the message should be conveyed on one screen of text, particularly where the speed of approaching vehicles exceeds 50 km/h. There should be no more than three lines of text and no more than 2 screens of text. If the speed limit exceeds 50 km/h and the message is a long one, then two variable message signs, one positioned after the other, may be needed. If 2 alternating screens on one sign are used to convey the complete message, then a driver should be able to read through three screens of text before he or she passes the sign (so he/she can be sure that the complete message has been received). In this case, the text must alternate between the 2 screens and not scroll between them. See also NZTA VMS Operating Policy May 2008.

4.2 Activation of sign by approaching vehicle

In addition to the methods of activating signs in 4.1, the RCA may approve a device for measuring the speed of approaching vehicles to be mounted in the sign or located close to it so that the sign only becomes active if an approaching vehicle's speed exceeds a pre-set speed.

5 References

Ministry of Transport: *Land Transport Rule 54002: Traffic Control Devices 2004*.

NZ Transport Agency/Transit NZ: *Manual of Traffic Signs and Markings, Part 1 Traffic Signs* (updated Nov 2007)

NZ Transport Agency: *VMS Operating Policy* May 2008.

Road Safety Manufacturers Association: *RSMA Compliance Standard for Traffic Signs* July 2008.

Appendix A: Technical and installation information on active signs

A Locations of signs in relation to the activity

There are three options which can be considered:

- (1) An active warning sign can replace a standard reflective-only warning sign at the same position in advance of the hazard as the standard warning sign, or;
- (2) An active warning sign can be installed as an advanced warning sign before a standard reflective warning sign, or
- (3) An active warning sign can replace a standard reflective-only warning sign at the same position in advance of the hazard as the standard warning sign and the standard sign can be shifted to become an advanced warning sign.

B Duration of active component of sign

Generally the following active components should only be displayed while the hazard exists on or near the roadway:

- (a) Flashing orange or yellow lights;
- (b) W1-1 "person digging" and supplementary text;
- (c) W2-1 "exclamation mark" and supplementary text;
- (d) W3-2 or W14-7 "car skidding" and "ICE/GRIT" supplementary;
- (e) W4 series "lane change ahead" supplementary distance;
- (f) Text warning messages.

The RCA should ensure that active components are turned off when the hazard is not present. Additional detection devices may be needed to achieve this.

C Sign specifications

Active flashing light (with reflective symbol and text)

[minimum size as specified for sign W19-2.2 (with appropriate symbol and text) in Gazette Notice "New Traffic Signs (July 2008): see Appendix B]

Shape and size:	rectangle 700 x 900 mm
Background:	black
Symbol:	(as appropriate) 600mm wide x 480mm high
Colour:	(as specified for selected symbol) Retroreflective yellow, or Retroreflective fluorescent yellow-green
Text:	(as specified for selected symbol) 100mm high/14 mm stroke width (coloured) Retroreflective yellow or retroreflective, fluorescent yellow-green (as specified)

Note: The size of sign used in the trials in Timaru and Invercargill was larger (900 mm wide x 1200 mm high) and this size can be used in 50 km/h areas if considered appropriate. Larger sizes may be used, particularly where the speed limit is above 50 km/h or there is a wide or divided carriageway.



Active – LED (Light Emitting Diodes)

Shape and size: rectangle 700 mm wide x 1000 mm high

Background: black

Symbol: (as appropriate) - 600mm wide x 480mm high

Colour: yellow LED

Text: (as specified for selected symbol)
(coloured) yellow LED, letters 160 mm high/ Stroke width 25 mm

Active – flashing light (symbolic stock) sign

The Active LED sign is similar but can be installed without the flashing orange lights

Note: This is the minimum size as specified in the Gazette Notice. Larger sizes may be used, particularly where the speed limit is above 50 km/h or there is a wide or divided carriageway.

Active – General warning variable

Shape and size: rectangle sized to suit the message requirements

Background: black

Legend: (Such words as are necessary to convey the information to traffic in no more than 3 lines of text per screen and no more than 2 screens of text. If 2 screens are used the text must alternate between the 2 and not scroll between them).

Colour: yellow or white LED

Text size: letters 200 mm high/ Stroke width 31 mm

D Flashing light specifications

If installed in the sign, the lights should:

- be placed in the top left and right hand corners of the sign;
- be coloured orange;
- be at least 60 cm² each in area;
- be set to flash alternately at a rate of 1 Hertz; and
- have cowls installed if sun strike is likely to be an issue.

E Power supply

Options to be considered for supplying power to the active sign units include:

- solar power (which worked well within the Trial process) and is generally most suitable for rural areas;
- linking the battery for the sign to an adjacent street light circuit;
- linking the battery for the sign to a nearby power supply.

F Installation of the signs

Permanent signs can be attached to power poles so the units have a solid base. Where new support structures have to be erected they should be at least 100mm diameter with a foundation design that will prevent twisting yet remain frangible. Refer to *RSMA Compliance Standard for Traffic Signs* July 2008 at <http://www.rsma.org.nz/>.

They should be mounted high enough to provide a suitable clearance above the footpath or ground so they are less likely to be tampered with (particularly in urban areas). MOTSAM recommends a clearance of 2.5 metres above footpaths. However if the support pole is located close to the kerb where large vehicles (such as buses) are likely to stop, then a higher mounting height of 4.4 metres or more may be needed so that the sign is not damaged by high vehicles.

Signs should be placed so the driver's view of them is not obscured by vegetation. If necessary, trees located near the roadway should be pruned regularly to maintain the effectiveness of these signs.

Appendix B: Gazette Notice: New Traffic Signs (July 2008)

See attached Notice dated: 24/7/2008, No. 116, p. 3082.