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## On-roadway flashing light pedestrian crossing warning - information

### Introduction

From 1 April 2011, the Land Transport Rule: Traffic Control Devices (TCD Rule) provides for the installation of an on-road flashing light system to warn drivers of the presence of a pedestrian waiting to cross a pedestrian crossing.

The system involves the installation of lights placed laterally across the roadway and a series of three lights longitudinally before the pedestrian crossing. The lights flash in the direction of approaching drivers when a pedestrian is detected waiting to cross. Pedestrians are expected to use the crossing in the same way as they do for a normal pedestrian crossing (the lights are not generally visible to them) and motorists apply the normal giving way rule.

Such systems are installed in overseas jurisdictions with measurable success in terms of reduced driver speeds, greater awareness of pedestrians, improved compliance with giving way to pedestrian rules and increased safety for pedestrians.

### New Zealand trials

Trials of these devices were carried out at two sites in Christchurch and one in Auckland to validate overseas findings, identify installation requirements and evaluate any operational issues.

Results from the trials were positive with the warning light system shown to be effective in heightening driver awareness and impacting on their behaviour in ways that reduce risk to pedestrians. In particular the following outcomes were reported (MWH 2008):

- increases in the proportion of drivers stopping for pedestrians waiting to cross
- increase in the numbers of drivers stopping on or before the limit line
- a reduction in the number of observed pedestrian vehicle 'conflicts' to almost nil at each site
- reductions in both mean and 85%ile speeds during critical times
- the majority of drivers interviewed agreed the warning lights had assisted them recognise when a pedestrian is at or on the crossing
- pedestrians indicated they felt safer particularly on the Auckland multi-lane pedestrian crossing.

### Detection

The TCD Rule does not specify the form of detection but does require the system to be 'illuminated only when a pedestrian waiting to cross is detected and remains illuminated only for a period sufficient to permit the pedestrian to cross the pedestrian crossing' [paragraph 8.2(12)(b)].

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Two methods of detecting pedestrians were used in the trials - pressure sensitive pads installed on the footpath or photoelectric light beam detectors installed on each side of the pedestrian path to the crossing. Consideration was also given to installing infra-red detectors but these were not favoured due to perceived difficulties in accurate detection.

Both systems proved reliable. The photoelectric system was capable of detecting direction of pedestrian movement and curtailed the light display when a pedestrian had completed the crossing. However, the pad system did detect pedestrians leaving the crossing and extended the display when no pedestrian was waiting to cross or on the crossing.

At one site there were reports of pedestrians crossing and the lights not illuminated. It was discovered pedestrians at the site often started to cross away from the correct path and consequently were not detected. As drivers who use the site regularly will come to expect the advance warning this lack of detection could be critical and may mean a pedestrian 'barrier' is required to ensure detection occurs.

To reduce false detections by pedestrians walking along the footpath, it is highly desirable that kerb build-outs are installed so only pedestrians intending to use the crossing are detected.



**Figure 1: Hereford Street site, Christchurch**  
Note detection units, kerb build out and barriers to channel pedestrians. Source: MWH 2008

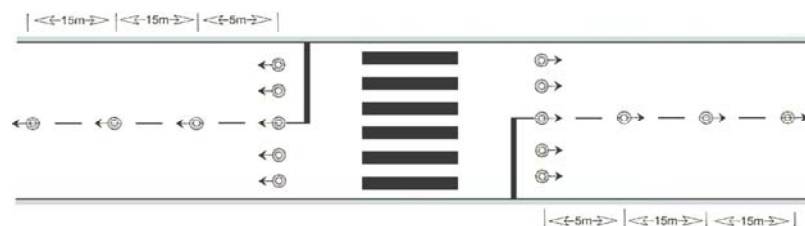
## Lights

### Layout

The TCD Rule requires the lights to be 'installed as described in diagrams M1-4 of schedule 2' [paragraph 8.2(12)(a)]. The diagrams show:

- five equally spaced lights installed laterally before the limit line across the full width<sup>1</sup> of the crossing, and
- on the centreline or lane line, as appropriate, three lights installed at 5m, 20m and 35m from the limit line.

The lateral lights should be installed so they are not aligned, as much as is possible, with vehicle wheel tracks. The trials showed five lights are effective for crossing widths of between 6 and 10m, however, more lights may be considered necessary where crossing widths exceed 10m.



**Figure 2: layout for two-lane, two-way road depicted in the TCD Rule**  
Apart from the relative position of the limit line to the laterally placed lights and the specific distance for the longitudinal lights the diagrams are intended to assist in an understanding of the requirements contained in the body of the rule rather than provide a design specification.

<sup>1</sup> Note the 'full width' of a pedestrian crossing where there is no median or island kerb is from one side of the roadway to the other, otherwise from the left hand kerb to the central island or median.

### ***Power***

The lights utilise LEDs and therefore power consumption is low. This allows for consideration of solar panels and deep cell batteries as a means of providing power to the system.

### ***Display timing and frequency***

The TCD Rule does not specify timing or frequency for the light display.

All trial sites ran the lights for approximately 6-7 seconds and this was found suitable for the sites involved. The systems were, however, capable of being adjusted up to about 20 seconds to allow for crossing width and observed crossing times. However, it is important that the lights do not flash for excessive periods to maintain their value as a warning of pedestrian presence.

A delay of between 0.4-0.6 seconds between detection and start of the flash was initially used on an assumption pedestrians would pause for those times before stepping onto the crossing. At some sites this delay was reduced to zero as pedestrians tended to cross on, or very shortly after, arrival at the kerb edge. Careful observation of behaviour at a crossing where the system is to be installed is necessary before installation and reviewed over time after commissioning.

The flash frequency at the Christchurch sites was 0.6 second 'on' followed by 0.4 seconds 'off'. However, the system in Auckland followed a pattern used in some overseas jurisdictions and was comprised of a sequence starting with 0.458s 'on', 0.193s 'off' and then six pulses of 0.041s 'on' spaced by periods of 0.207s 'off'. This 2.139 second sequence then repeats.

The surveys were not capable of distinguishing the effect of the different displays. However, substantially similar results were achieved at all sites suggesting the sequence differences do not have a measurable impact.

### **Location**

Warning lights should be located at sites where the accident history and local knowledge reveals that some additional advanced warning is necessary. These could be locations where:

- the pedestrian crossing is in an unexpected location such as a mid-block site or near a roundabout where the surrounding environment on the approach or immediate departure side of the crossing competes for driver attention
- the alignment of the road could lead to significant 'sun-strike' issues
- roadside structures create local shadows significantly affecting the ability to see pedestrians when drivers are approaching the crossing and are in bright daylight.

Improving safety at a crossing site requires careful appraisal of options including installation and maintenance costs and the impacts on all road users. However, on-road flashing warning lights is now an additional option available for consideration by road controlling authorities.

### **Reference:**

*Results and recommendations from a pedestrian crossing warning lights trial*, prepared for Christchurch and Auckland City Councils with Land Transport NZ, MWH New Zealand Ltd, Christchurch, 2008.