

THE NZ TRANSPORT AGENCY HIGHWAYS AND NETWORK OPERATIONS TRAFFIC CONTROL DEVICES TRIALS UPDATE

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Abstract

Safer Journeys – New Zealand’s road safety strategy to 2020 (Ministry of Transport 2010) – 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, Safe Vehicles, and Safe Road Users.

From a review of international research, the NZ Transport Agency’s Highways and Network Operations Group has identified and begun trials of three traffic control devices which seek to support the Safe Roads and Roadsides, and Safe Speeds cornerstones. This paper outlines the progress of the trials which are for:

- wide centrelines;
- rural school speed management; and
- rural intersection active warning signs.

Key words: wide centreline, rural school speed management, rural intersection active warning signs.

1. Introduction

Safe Roads and Roadsides, and Safe Speeds are key areas of focus within Safer Journeys – New Zealand’s road safety strategy to 2020 (Ministry of Transport 2010). The strategies vision, a safe road system increasingly free of death and serious injury, challenges us to see road deaths and serious injuries as preventable. The strategy takes a Safe System approach and includes the following objectives:

- make the road transport system more accommodating of human error;
- manage the forces that injure people in a crash to a level the human body can tolerate without serious injury; and
- minimise the level of unsafe road user behaviour.

Statistics published in the High Risk Rural Roads Guide (NZ Transport Agency 2010) show that 86% of crash types occurring on New Zealand rural roads (posted speed limits \geq 80km/h) over the period 2005-2009 are one of three main crash types:

- head-on (25%)
- run-off-road (lost control off road – curves or straights) (45%)
- at intersections (16%)

In addition to this vulnerable road users account for 3% of fatal and serious crashes on New Zealand rural roads.

Also published in the High Risk Rural Roads Guide are statistics which show there is a significant increase in the number of injuries for those involved in head-on type crashes (1.7 times the amount of New Zealand fatal and serious crashes) due mainly to there being more than one vehicle involved.

The NZ Transport Agency's Highways and Network Operations Group trials for wide centrelines, rural school speed management, and rural intersection warning signs are initiatives supporting the Safe System vision through reducing the crash risk and crash severity on high risk rural roads.

2. Wide centreline trial

2.1. Background

The wide centreline trial is an initiative that involves installing two lines in the centre of the road at variable widths to provide greater separation for opposing traffic and reduce the likelihood of cross-centreline crashes.

Similar road markings are being used internationally. A trial of wide audio tactile centreline configurations in New South Wales, Australia (Connell et al 2011) showed that a 1.2m-wide centreline treatment resulted in reduced speeds and greatly improved lane discipline.

Other studies undertaken in New South Wales, Australia (Levett et al 2009) have also shown that crashes and crash severity were reduced after a 1m wide centreline was installed. Although the crash data from this study was not over a long period, the results indicated that there is a positive effect from the wider centreline separation, and that fatigue, distraction and possibly speed crashes could be expected to be reduced.

The NZ Transport Agency's Highways and Network Operations Group two year trial of the wide centreline began in October 2010.

2.2. Road marking

The wide centreline road markings incorporate two painted lines approximately one metre apart to provide greater separation between each lane of the road. The lines are painted as a dashed white line on sections of the road where passing is permitted, and a solid yellow line in no passing areas. The standard dashed yellow markings that warn drivers of a no-passing area ahead are also used. The line markings may be supplemented with rumble strips. Photographs of the wide centreline with rumble strips are provided below (Figures 1 & 2).

Figure 1: Wide centreline markings on State Highway 1 north of Huntly where passing is permitted



Figure 2: Wide centreline markings on State Highway 1 north of Huntly where passing is not permitted



2.3. Sites

Trial sites have been selected by the NZ Transport Agency based on the following criteria:

- the road is considered a high risk rural road (a rural road where the fatal or serious crash rate or crash density is high in comparison with other roads, and/or it is a high or medium high collective risk and/or high personal route as defined by KiwiRAP – New Zealand’s joint agency road assessment programme);
- there is a history of cross-centreline crashes;
- the traffic volume is moderate to high (greater than 8,000 vehicles per day);
- a minimum seal width of 10m is desirable; and
- no forward works are planned at the trial site which could affect the monitoring.

As at June 2012, eight sites have the trial markings installed:

- State Highway 22 west of Drury in the Auckland Region
- State Highway 1 north of Huntly in the Waikato Region
- State Highway 3 south of Rukuhia in the Waikato Region
- State Highway 29 west of Tauriko in the Bay of Plenty Region
- State Highway 35 east of Gisborne in the Gisborne Region
- State Highway 50A west of Hastings in the Hawke’s Bay Region
- State Highway 1 north of Waikanae in the Wellington Region
- State Highway 1 south of Woodend in the Canterbury Region.

Other sites on state highways are currently being investigated.

2.4. Monitoring

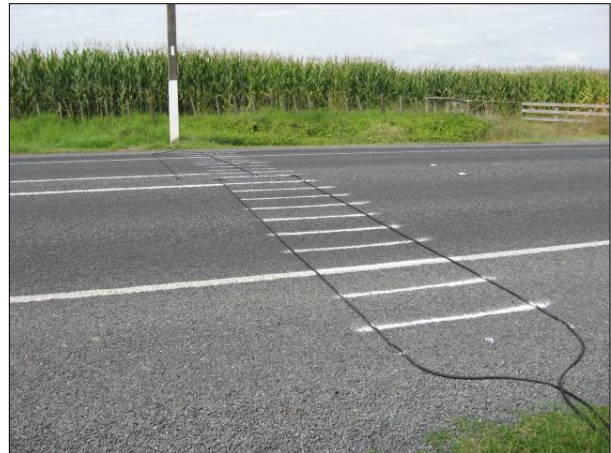
To assess the implementation of the treatment, the following monitoring is being undertaken:

- video surveys to compare vehicle position on the road before and after the new road markings are installed (Figures 3 & 4 show photographs of the survey);
- speed recording tube counters, approximately one month before and one month after the markings are installed;
- crash data obtained from the Police and the Crash Analysis System database one year after the installation; and
- a postcard survey to determine how road users perceive the wide centreline.

Figure 3: Vehicle position survey with speed recording tube counters



Figure 4: Vehicle position survey showing the markers used to determine the distance from centre of the road



2.5. Preliminary results

As at June 2012, before and after monitoring surveys have been undertaken at four of the trial sites. The lateral separation of vehicles is measured using two hour video surveys on both weekdays and weekends. Speed surveys are carried out using automatic tube counters capable of measuring 85th percentile free speeds over seven consecutive days. The results from these surveys are shown below in Table 1:

Table 1: Preliminary results

Trial site	Average change in lateral separation	Average change in traffic speeds
State Highway 22 west of Drury (with rumble strips)	+0.54m	-5.6km/h
State Highway 1 north of Huntly (no rumble strips)	+0.19m	+1.4km/h
State Highway 1 north of Waikanae (no rumble strips)	+0.28m	-1.8km/h
State Highway 1 south of Woodend (no rumble strips)	+0.14m	+0.65km/h

From these preliminary results it was found that the wide centreline has increased lateral separation across the above four sites by an average of 0.3m, and the average change in distance from the centre of the road across the four sites has increased from 1.2m to 1.5m.

Further surveys are being undertaken at other trial sites to add to this data set. Also, in addition to the above data set, speed recording tube counters have been used at approximately 1km out from each end of the wide centreline sites for controlling variables influencing speeds and crash changes (for example traffic volumes, weather, police enforcement, etc) and this data will be included in the final results.

3. Rural school speed management trial

3.1. Background

The aim of this initiative is to use a Safe System approach (through reducing crash forces to survivable levels) 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 the adjacent intersections. Generally rural schools have none or few pedestrians crossing the road outside the school, and therefore a 40km/h variable speed limit is not warranted or appropriate. This trial investigates if an appropriate speed environment for the turning traffic risk can be achieved using 60km/h or 70km/h variable speed limits, which are activated during the school arrival and departure times.

This two year trial began in May 2012.

3.2. Signs

The signs are a similar format and have the same terms of operation as the current 40km/h variable speed limit signs being used at schools in New Zealand, but will display either 60km/h or 70km/h, depending on the location of the school. The electronic 60km/h speed limit sign (Figure 5) is being trialled at schools situated on roads with a permanent 80km/h speed limit, and the electronic 70km/h speed limit sign (Figure 6) is being trialled at schools situated on roads with permanent 100km/h speed limits.

Figure 5: 60km/h variable speed limit school trial sign on State Highway 23 at Te Uku School (within permanent 80km/h speed limit).



Figure 6: 70km/h variable speed limit school trial sign on State Highway 27 at Kaihere School (within permanent 100km/h speed limit).



3.3. Sites

The main selection criterion for trial sites is the school's location (required to be on a road with either an 80km/h or 100km/h permanent speed limit). The other criterion is for a traffic turning risk to be present outside the school. This is assessed from traffic speeds and volumes, number of turning vehicles, sight distances, and the methods students travel to and from school.

As at June 2012, six sites have the trial signs installed:

- Whenuakite School, State Highway 25 south of Whitianga in the Waikato Region

- Kaihere School, State Highway 27 north of Morrinsville in the Waikato Region
- Te Uku School, State Highway 23 east of Raglan in the Waikato Region
- Pakipaki School, State Highway 50A south of Hastings in the Hawke's Bay Region
- Kai Iwi School, State Highway 3 west of Wanganui in the Manawatu/Wanganui Region
- Opiki School, State Highway 56 west of Palmerston North in the Manawatu/Wanganui Region.

Other sites on state highways and local roads are currently being investigated.

3.4. Monitoring

To assess the implementation of the treatment, the following monitoring is being undertaken:

- speed recording tube counters, approximately one month before, one month after, and six months after implementation;
- crash data obtained from the Police and the Crash Analysis System database one year after the installation; and
- feedback will be sought from the schools and community before and during the trial.

At the time of writing this paper, no results are available.

4. Rural intersection active warning signs

4.1. Background

This initiative will use electronic signs to display either a variable 70km/h speed limit or a "slow down" message to the through road traffic at an intersection due to the risk of a collision with a turning vehicle. The electronic signs will be activated by vehicles turning in or out of the side road(s).

A variable speed limit of 70 km/h has been selected because it was felt that this speed would be more acceptable to drivers, and it represents a reasonable compromise between a Safe System and a speed that matches the likely perceived risk at an intersection.

In Sweden average speed reductions of 16.7 km/h have been reported (Lind 2009) at an intersection with a 90 km/h posted speed limit, where a variable 70 km/h speed limit for the through road was displayed on electronic signs (activated by a vehicle present on a side road).

Rural intersection active warning signs have the potential to reduce the number and severity of crashes at rural intersections by:

- slowing traffic on major road intersection approaches, and therefore reducing crash likelihood and crash severity;
- increasing driver awareness, and therefore preparing drivers for a possible event; and
- improving gap selection.

The rural intersection active warning signs trial is due to begin in late 2012, and will be a two year trial.

4.2. Signs

The proposed trial signs are to be a combination of an intersection warning sign, and either an electronic variable 70km/h speed limit sign (Figure 7), or an electronic “slow down” sign (Figure 8).

Figure 7: Proposed 70km/h variable speed limit intersection active warning trial sign



Figure 8: Proposed slow down intersection active warning trial sign



4.3. Sites

As at June 2012, one site has been confirmed as a trial site:

- State Highway 1/Himatangi Beach Road Intersection, north of Foxton, in the Manawatu/Wanganui Region.

Other sites on state highways and local roads are currently being investigated.

4.4. Monitoring

To assess the implementation of the treatment, the following monitoring is being undertaken:

- speed recording tube counters will be used to analyse traffic speeds, at and prior to the intersections. Vehicle approach speeds will be measured continuously over a week at one month before, one month after, and twelve months after implementation;
- video data collection will be used to observe the system in operation and associated traffic movement patterns;
- crash data obtained from the Police and the Crash Analysis System database one year after the installation; and
- an intercept perceptions survey will be carried out on drivers who have just passed through the intersection.

At the time of writing this paper, no trial sites have been implemented.

5. Acknowledgements

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