INFRASTRUCTURE COUNTERMEASURES KEEPING VICTORIA ON TRACK

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INTRODUCTION

Collisions between trains and road vehicles, although rare, can have catastrophic consequences. In particular, where high speed roads meet rail lines there is potential for tragic outcomes as evidenced by the deaths of 11 people on 5 June 2007 at Kerang in Victoria's North West.

Victoria has close to 2000 railway level crossings of which over half are controlled with only stop signs or give way signs. The cost of upgrading all these crossings to active control (boom barriers and flashing lights) is in excess of $300 million. Thus, there is a need for lower cost methods of alerting drivers to the presence of a railway level crossing.

Towards Zero – A Strategy for Improved Level Crossing Safety in Victoria was released in late 2009. This ten year strategy sets out a number of initiatives to improve safety at railway level crossings. These initiatives are grouped into the sections; Infrastructure and speed limits, rolling stock (visibility), emerging technologies and behavioural issues and communications.

A range of railway level crossings infrastructure treatments have been identified in the Strategy and others have been suggested, identified and implemented by various stakeholders.

The Parliamentary Road Safety Committee, in its *Inquiry into Safety at Railway Level Crossings Safety* in 2009, suggested infrastructure treatments including perceptual countermeasures, enforcement cameras, variable speed limits, improved lighting and Yellow Box Markings. The Victorian Railway Level Crossing Safety Steering Committee has identified possible countermeasures, including rumble strips, Active Advanced Warning Signs (AAWS) and speed limit reductions, and private organisations continue to develop potential solutions such as active road studs and various low cost warning devices.

VicRoads is currently preparing a guide to assist in the development of railway level crossing infrastructure programs. The guide will identify situations where each specific treatment identified by stakeholders would be effective, and the estimated crash risk reduction that would be achieved with each treatment. This will enable infrastructure investment at railway level crossings to be compared in cost effectiveness terms.

VicRoads has conducted before-and-after studies on the effectiveness of rumble strips, AAWS and speed limit reductions at railway level crossings. The results of these studies are contributing to the guide for treatments at railway level crossings.

METHOD

As part of the $33.2 million program to improve level crossing safety in Victoria, $11.1 million was allocated to implement AAWSs at 53 sites on highways and major arterials across the State. ARRB Group was commissioned by VicRoads to investigated driver behaviour at two similar railway level crossing sites, one with AAWS from this program and one site without AAWS.

ARRB Group also undertook an investigation of various existing controls at railway level crossings and intersections. The investigation looked at whether drivers exhibited better compliance at active level crossings with flashing lights and boom barriers and traffic signals in front compared with level crossings with flashing lights only and flashing lights with boom barriers. They also compared these situations with road intersections controlled by traffic signals.

The Monash University Accident Research Centre was commissioned by VicRoads to conduct a driver simulation study involving the use of traffic lights at railway level crossings. This was part of a process to investigate the possibility of trialling the use of traffic signals at level crossings instead of flashing lights.

A Stakeholder Group was formed to oversee the driver simulation study. The Stakeholder Group consists of V/Line, Connex, VicTrack, Rail, Tram and Bus Union (RTBU), VicRoads, Department of Transport (DoT), MainCo and Public Transport Safety Victoria (PTSV).

ARRB Services was commissioned by VicRoads to investigate the effectiveness of rumble strips at rural intersections and at rail level crossings.

The research involved a before and after study at 28 treatment and control sites (14 rail level crossings and 14 intersections).

The sites were studied before and after the installation of the rumble strips using two different types of surveys: video monitoring and speed surveys using traffic counters.

RESULTS

Evaluation of Active Advanced Warning Signs (AAWS) using existing installations

Vehicles that observed an active AAWS and inactive railway crossing lights reduced their speed compared to free flow conditions on approach (130m in advance) to the railway crossing.

Vehicles that observed an active AAWS had a slightly larger reduction in speed from free flow conditions during the period when the flashing lights at the railway crossing are active, as compared to vehicles approaching the site without AAWS.

Violation rates between the non-AAWS site and the AAWS site were comparable.

Although other before and after studies of AAWS at railway level crossings have not shown statistically significant results in terms of speed, there is an assumed increase in driver alertness with the presence of AAWS at a crossing.

Due to low numbers of heavy vehicles at both sites, no meaningful data was obtained for this road user group.

Compliance with traffic signals at railway level crossings

Sites controlled by boom barriers had a higher number of violations of the flashing red lights compared with level crossings controlled by flashing lights only. The non-compliance at sites with boom barriers occurred in the period when the lights were flashing before the boom came down or after the boom rose. Motorists tend to treat the boom barrier as the control and the violations are either well before or after the passage of a train.

Compliance was better at railway level crossings with traffic signals in addition to flashing lights and boom barriers compared to sites with flashing lights and boom barriers only.

Compliance with railway level crossings with traffic lights is not as good as at road intersections controlled by traffic lights.

A simulator evaluation of driver responses to traffic lights at level crossings

In the simulated trial there was no difference in measures of driving performance between sites fitted with flashing red lights and boom barriers and those with traffic signals and boom barriers, and there were more violations at crossings with traffic lights alone than flashing red lights alone.

After consideration of the results of both traffic signals studies, the recommendation of the Stakeholder Group was that the results of both studies did not provide enough support to warrant proceeding with a field trial of traffic lights at level crossings; and there was not enough evidence to support allowing more resources for further studies to examine the future use of traffic lights as another form of active control at level crossings.

Before and After Evaluation of Rumble Strips at Railway Level Crossings

The video survey results indicated earlier observed braking at most treatment sites after the installation of the rumble strips.

Speed surveys showed reductions in mean speed at most treatment sites, but not at the control sites. It was concluded that rumble strips proved effective in reducing speeds at all measurement points for railway level crossing approaches. On approaches to road intersections it was found that rumble strips were only effective in reducing the speed at the 200m measurement point.

DISCUSSION

With limited funding available for improvements to railway level crossings countermeasures must be evaluated for their effectiveness and prioritised using a benefit cost analysis to ensure that funds are spent in the most efficient manner.

REFERENCES

Full research reports are available at http://www.vicroads.vic.gov.au/Home/SafetyAndRules/SaferRoads/RailwayLevelCrossingSafety.htm