How to preserve and improve safety with tight maintenance budgets

Fergus Tate New Zealand Transport Agency fergus.tate@nzta.govt.nz

Abstract

While there has always been a need to ensure road maintenance funds are spent wisely, funding reductions have moved the industry from an "optimum whole of life outcomes" focus,

In many cases those proposing such strategies quote studies showing the removal of lines or other delineation devices results in a reduction of travel speed (e.g. Burdett and Nicholson 2010) and given the strong link between speed and crashes (Elvik et al 2004; Kloden et al 2001) the proposers conclude removing markings reduces speed and thereby increases safety.

2. Context and Purpose

Figure 2 A section of low volume rural road

For example, before and after studies of road safety initiatives are typically implemented at

While the range of the crash reduction estimates in Table 1 above, appear confusing, closer inspection confirms that in general, installing a device in a higher risk location such as on curves, typically provides a higher crash reduction than when the device is installed in a lower risk situation such as on a straight. As a consequence estimates of network-wide performance are likely to be in between these values and depend on the ratio of high risk to low risk situations, i.e. additional delineation is more important on winding low volume rural roads. Alternatively removing delineation on straights may not result in a major increase in crashes.

The length of highway together with the average number of fatal + serious and all injury Run-Off-Road + Head-On crashes per annum is plotted against traffic volume in Figure 6.

Figure 6 Length of Highway, Average number of Fata I+Serious and All Injury, Run-Off-Road and Head-On Crashes per year versus AADT

Using the data in Figure 6, it is then possible to create a table such as that below (Table 2) where the expected number of additional crashes is predicted against the length of highway.

In Table 2 the crash increase for removing each of centreline, edgeline and marker posts are 1/(1-Crash reduction factor) with crash reduction factors of 0.3, 0.25 and 0.3 respectively and 0.45 for removal of all three. These values are taken from Table 1and the curve values have been used, because in general the highway sections being considered are 2 star roads with a high run off road protection score in KiwiRAP indicating these roads have more winding alignments and numerous roadside hazards. A quick look at the highway video suggested that a policy of only maintaining these devices on curves would result in only very limited savings as the majority of the route examined had either horizontal or vertical curves, or both,

Even more importantly, the above analysis is looking at policy as proposed for multiple lengths of highway, not individual sections. While the crash rates on these low volume roads are typically high, the actual number of crashes is generally low and subject to significant fluctuations. It is quite possible that when looking at shorter sections of road over short timeframes, crashes may drop below those recorded following treatment. While this might be viewed as justifying the works, crashes may also increase simply as a result of the statistical fluctuations associated with a small sample.

Finally, such a strategy is unlikely to align with the longer term view of Safer Journeys (Ministry of Transport, 2010) and the NZ Transport Agency's High Risk Rural Roads Guide (NZTA 2011). The latter in particular, identifies that for rural roads with high personal crash risk but low collective crash risk, the available safety benefits are limited and insufficient to justify even moderate capital expenditure. As a result the optimum safety strategy is Safety

FHWA (1998) Guidelines for the Use of Raised Pavement Markers: FHWA-RD-97-152 Date: September 1998