Evidential-Based Guidelines for Temporary Speed Limits

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Introduction

Road works zones are associated with an increase in accidents compared to the pre-work period [1, 2], with excessive speed being a major causal factor [3, 4]. This study examined the setting of Temporary Speed Limits (TSLs) for road work sites conforming to the Transit New Zealand Code of Practice for Temporary Traffic Management (CoPTTM) [5].

The two main aims of the study were to determine whether driver speeds were reduced to the level of the TSL and whether driver perceptions were related to their observed speeds. A secondary aim was to examine whether the level of visibility at a site affected driver speeds. Observed vehicle speeds were used to judge the effectiveness of the current guidelines.

Method

Eight sites were selected with TSLs in place, covering four levels of TSL. These were 100 to 70 km/h, 100 to 50 km/h, 100 to 30 km/h, and 50 to 30 km/h. There were two visibility conditions: continuous, where the end site was visible from the start of the beginning; and non-continuous, where the view of the site was obstructed (e.g. by a hill or a corner).

At each site driver approach speeds and work site entry speeds were recorded, along with vehicle number plates. A pen-and-paper survey, which included road work risk perception items and attitudes to road works items, was sent to 100 drivers from each site. The risk perception items related to both the site where the driver was observed and road-work sites in general. The survey data was matched to driver speed data. The overall response rate for the survey was 58.6%.

Results and discussion

Driver site entry speeds (85th percentile or mean) were lower than the approach speeds for all sites (Figures 1 and 2). This indicates that drivers perceived a need to reduce speed. Speeds also tended to decrease as the TSL decreased, although the non-continuous 100 to 50 site entry speed was approximately the same as the non-continuous 100 to 70 entry speed. However, the speeds at the work site were always higher than the set TSL. While the TSLs set under the current CoPTTM guidelines appear to be accurate in part, as lower TSLs are associated with lower speeds, drivers were still travelling faster than desired.

For all of the TSL conditions, except the 50 to 30 km/h condition, the mean approach and site entry speeds differed significantly ($p < .05$) between the visibility conditions. However, speeds were not consistently higher for one condition. There was a tendency for both approach and entry speeds to be higher for the non-continuous visibility condition, but there was only one TSL condition where the site with the higher approach speed also had the higher entry speed, the 100 to 50 km/h condition. Due to project limitations only 8 sites were used, and it was not possible to match them on characteristics other than TSL and visibility. It is likely that other, unmatched, characteristics had a greater effect on driver speeds than site visibility.

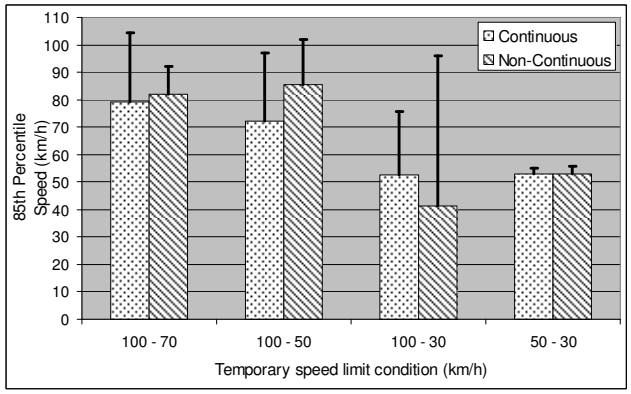

Figure 1: 85th percentile speeds by temporary speed limit and visibility condition. The bars represent the site entry speeds and the black lines represent the approach speeds.

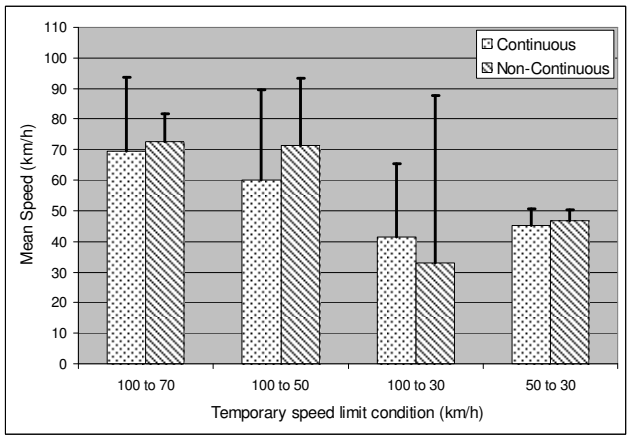

Figure 2: Mean speeds by temporary speed limit and visibility condition. The bars represent the site entry speeds and the black lines represent the approach speeds.

Very few significant relationships were found between driver's subjective risk perceptions, either for the site specific items or the general items, and their observed speeds. This is consistent with previous research examining subjective risk perceptions and observed behaviours [6, 7]. This finding suggests that while drivers do perceive a need to reduce speeds around road work sites, shown by the difference between approach and site entry speeds, their subjective perceptions of risk do not affect their speeds.

Conclusions

Although the current CoPTTM guidelines are useful, in that the sites with lower TSLs as associated with lower entry speeds, in general drivers are travelling faster than the TSL.

This indicates that further measures need to be taken to reduce speeds (e.g. [8]), or sites need to be designed to be safer at higher speeds.

The results of the driver survey indicate that the main influence on driver speeds is the actual structural characteristics present at a site, and not the driver's subjective risk perceptions of various site characteristics. This means that it is not possible to determine which characteristics will produce the greatest speed reductions by asking for subjective perceptions.

The small number of sites tested for this project limited the number of site characteristics that could be examined. For any future research a wider range of sites would be used. Field testing is the best way to determine which site characteristics will reduce speeds in road work zones.

References

1. Khattak, A. J. et al. Accident Analysis and Prevention 34: 19-29, 2002.

2. Migletz, J. et al. Transportation Research Record 1657: 24-30, 1999.

3. Li, Y. et al. 2007 Mid-Continent Transportation Research Symposium, http://www.ctre.iastate.edu/pubs/midcon2007/LiHuman.pdf.

4. Mitchell, R. et al. Accident Analysis and Prevention 36: 851-860, 2004.

5. Transit New Zealand. http://www.transit.govt.nz/technical/copttm.jsp.

6. Gregersen, N. P. Accident Analysis and Prevention 28: 243-250, 1996.

7. Farrand, P. et al. Transportation Research Part F 4: 201-212, 2001.

8. Fildes, B. N. et al. Perceptual countermeasures: Literature review. http://www.monash.edu.au/muarc/reports/atsb4_94.pdf.