

# Speed Management on Rural Roads: The Effect of Pavement Markings



## Introduction

The installation of painted centrelines and edgelines is encouraged on New Zealand rural roads, as they are believed to improve safety compared to the case of fewer markings.

Markings can be beneficial in that they provide information to the driver about road alignment, help the driver maintain appropriate lane position and reduce mental

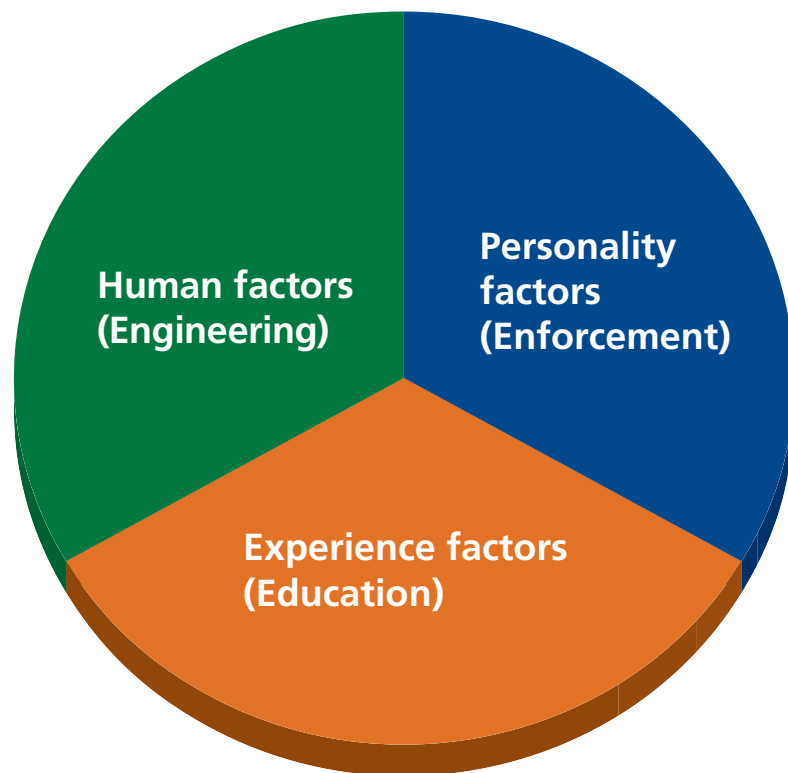
effort (Steyvers and de Ward, 2000). To date, no study has isolated the separate effect of centrelines and edgelines on speed.

It is known that speed affects both accident incidence (frequency) and severity. Fatal accidents have been related to speed using the following formula devised by Elvik et. al (2004).

$$\frac{\text{Fatal accidents before}}{\text{Fatal accidents after}} = \left( \frac{\text{Speed after}}{\text{Speed before}} \right)^4$$

If speed is affected by pavement markings, it is likely due to some kind of unconscious process. Speed choice is complex, with many influencing factors as suggested in Figure 1.

Figure 1: Influences on driver speed choice: factors and remedies



## Methods

Three matched pairs compared roads with no markings to roads with centreline-only. Four pairs compared four further centreline-only sites to sites with centreline plus edgeline. Examples of each condition are shown below.

Figure 2: Study site examples



A before/after test compared one of the centreline-only sites with itself, after installation of an edgeline, as shown below.

Figure 3: Before/After study



## Results

Results showed significant increases in speed at sites with increased delineation. The overall differences in speed distributions for all sites combined are shown in Figure 4.

Figure 4: Relative speed frequencies on rural roads

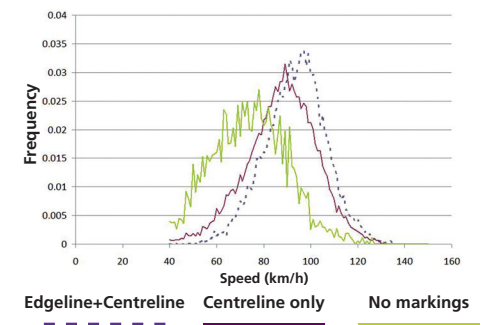
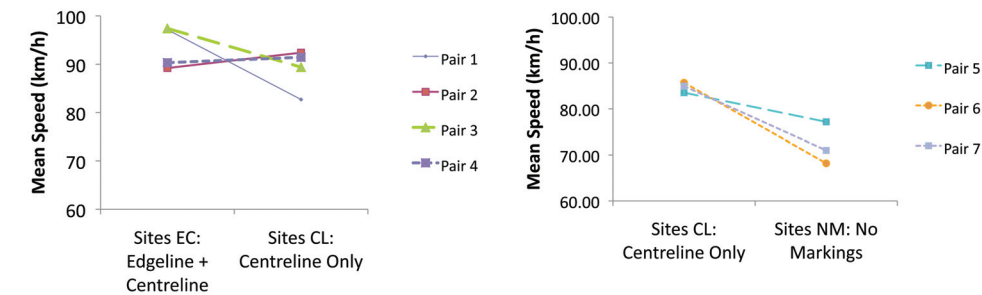


Figure 5 shows the differences in mean speed within pairs. All observed increases in speed were statistically significant.

Figure 5: Speed differences across pairs



## To mark or not to mark?

As the safety benefits of centrelines and edgelines are not quantitatively clear, benefits from their absence may be implied from this research in terms of reduced speeds.

It is suggested that rural road guidelines are amended such that pavement markings (edgelines and centrelines) be implemented only where a quantifiable safety benefit from their introduction can be confidently expected.

While this research does not prove any particular theory of driver behaviour, it supports provision of a road environment consistent with driver expectation. Further research into the mechanisms behind driver speed choice would be beneficial, as would ongoing collaboration between psychologists and engineers working improved safety through the design of self-explaining roads.

## Authors

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## References

Elvik, R., Christensen, P. and Amundsen, A. (2004) Speed and Road Accidents: An Evaluation of the Power Model, Report 704, Institute for Transport Economics, Oslo, Norway, 134pp.

Steyvers, F.J.J.M and De Waard, D. (2000) "Road-edge delineation in rural areas: Effects on driving behaviour", Ergonomics, Vol. 43, No. 2, pp.223-238