

Reducing 'Failed to Detect' Crashes at Rural Crossroads



Research Foundation



Rural crossroads can be high risk



Crashes at rural crossroads in New Zealand are often severe.



Crash analysis

Identifying 'failed to detect' crashes and causal factors

Approach

What are the human factors considerations for 'failed to detect' rural crossroads crashes?

What is the effectiveness of low-cost treatments that could be applied at scale?

Design mitigations and virtual simulation trial

Design cost-effective 'failure to detect' mitigations using existing TCDs and design a virtual simulation to test their effectiveness

Evaluate mitigations and recommendations

Analyse the findings from 60 participants in the virtual simulation trial and provide recommendations





The problem

Nearly **one third** of rural cross-roads crashes appear to occur because the yielding driver does not detect the crossroad ahead and fails to stop or give way.







4

1

21

1

3

1

3

2

4

40



Fatal or serious 'failed to detect' rural crossroads crashes 2018-2022

Crash factors

Simple Road environments

Long Straights, little traffic and where yielding drivers had priority at earlier intersections

Poor Visibility and Continuity Cues

Priority roads that are difficult to see and continuity cues such as hedges and power poles continuing through the intersection

Driver distraction or unfamiliarity with the Area

Driver distraction or being zoned out, unfamiliarity with the area, and speed





Simulation results

Participants

Number of participants who indicated they needed to stop or give way within the 'danger zone' of less than 100m prior to the crossroad.



Baseline

Solution Number of participants who saw the intersection dangerously late (within 100m)

Mitigation 2 Mitigation 1



Mitigation 1

Mitigation 2

Participant feedback



Oversized and gated stop signs

'I could see them earlier with less ambiguity about what they were.'



Stop warning signs

90% of participants said stop warning signs helped identify the crossroad more easily.



Stop warning signs with white backing

'The stop signs with the white background I found confusing as to what it was because I am not used to seeing stop signs this way.'

'The white border sign was much easier to spot- especially when the sign is near a field (the yellow can become camouflaged) so the white makes it easier to see.'

Reflective markers

'I did notice these, and I prefer them to none. They are a great secondary thing to scanning for signs. Signs can be too high off the road and hard to see at times.'

Road markings

'The **stop ahead** road markings give the first warning to reduce your speed and allowing the driver to reduce speed safely rather than at the stop sign or intersection.'

Conclusions and recommendations

STOP



'Failed to detect' profile

Rural crossroads have a unique crash profile which appears to relate to geometry, surrounding environment, and driver factors



On-road trials and roll-out

Install at selected locations, evaluate, and roll out further



2

STOP

Minimum standards

Minimum standards for rural crossroads may not be sufficient in many circumstances





Develop and identify

Develop a treatment hierarchy based on risk and identify high risk crossroads



Thought leadership

An investment strategy that:

- Identifies where 'failed to detect' crashes are most likely to occur •
- Applies treatments according to a treatment strategy (revisit high risk intersection guide?) ٠
- Implement at scale to get New Zealand wide benefits •
- **Evaluate benefits. Likely to be a high return on investment** ٠

hamish@mackieresearch.co.nz



Research Foundation



