Rural Road Crash Prediction Models – The Next Generation

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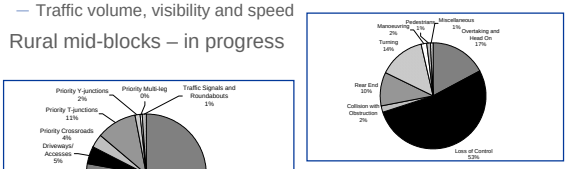
Background

- Rural crash data from 2005
- Rural intersections study (complete)
  - Traffic volume, visibility and speed
- Rural mid-blocks – in progress



Study Staging

- 1. Scoping
- 2. Pilot Study
- 3. Main Study

- Industry Workshops
  - W1 - Oct 2005 - Outlining background and need
  - W2 - Sep 2006 – Recent work and Scoping stage
  - W3 – Oct 2007 - Scoping outcomes & Pilot scope

Previous Studies

Item	McLarin et al	Chadfield	Jackett / Koorey and Tate	Turner	Cenek et al	Turner
Volume	✓			✓	✓	✓
Horizontal (overall)	✓			✓	✓	✓
Vertical (overall)	✓				✓	
Lane (width)	?	✓		✓		✓
Shoulder (width)		✓		✓		
Shoulder (slope)		✓				
Horizontal (consistency)			✓			
SCRIM					✓	
IRI (roughness)					✓	
Hazards						✓

Scoping Stage Objectives (Completed)

- Investigate current crash prediction models to determine which variables have found to be important and to identify existing model deficiencies;
- Identify which road and traffic related features could potentially be included in the resulting model, to prioritise these, and identify what variable sets may be available to quantify these features;
- For each possible variable develop a definition and identify whether the data is readily accessible, (accepting that for some features and variables it may be necessary to develop or modify an existing collection method);
- Develop a Data Collection Methodology that can be used by surveyors to collect field data (some data is already available from other sources); and
- Develop sampling framework for the pilot and preliminary sampling framework for the main study, suitable for budget allocation.

>>> PRODUCE A SCOPING REPORT

Important Variables

- Variables to be included in models:
  - Traffic Volume
  - Access Density (manual)
  - Horizontal Geometry
  - Horizontal Geometry Consistency
  - Seal width
  - Shoulder Environment (manual)
  - Roadside Hazards (manual)
  - Region
  - SCRIM Coefficient

Access Density

- Potential classifications include:
  - Dairy/Cafe or other roadside store
  - Dairy farm
  - Rural House
  - Greenhouse
  - Garden centre
  - Sawmill
  - Winery
  - Cattery or kennel
  - Quarry
  - Stable
  - Fruit stand
  - Chicken/Pig farm
  - School
  - Lodge/Bed and Breakfast
  - Gas station
  - Motel/Hotel
- House/farm accesses - unit measures per letterbox
- Others accesses – rate as low/medium/high activity

Shoulder Environment

- Gravel and seal shoulders
- Recoverable slope
- Traversable slope
- Severe continuous hazards

Roadside Hazards

- A number of methods considered:
  - Detailed inventories (eg. roadside hazard study) – too costly
  - Photo classification systems (Zegeer) – not accurate enough
  - RISA method (used by Ian A) –about right
- Similar system to RISA, separating out continuous (shoulder environment) and discrete severe hazards

Type	Variable
Shoulder Environment	Seal Width (m)
	Unsealed Shoulder Width (m)
	Recoverable Slope Width (m)
	Traversable Slope Width (m)
Point Hazards	Wood Pole >200mm (no)
	Light Column <300mm (no)
	Concrete Pole – usually 'I' section (no)
	Heavy Street Pole >300mm without slip base (no)
	Signs Supports >120mm without slip base (no)
	Trees - trunk >100mm diameter (no)
	Culverts - road side (no)
	Culverts - road with non-traversable headwall (no)
	High impact roadside furniture (no)
	Non-traversable slope / perpendicular deep drain (m)
	End concrete barrier / bridge parallel to road (m)
	Concrete fence/barrier perpendicular to road (m)

Sampling - Key Regions

- Grouping based on:
  - Open road 85%ile speed
  - Regional under-reporting of serious crashes
  - % of SH crashes in dry weather
  - % of SH alcohol related crashes
  - % of SH crashes in dark
- Results of grouping
  - Three super region grouping
  - Auckland rural network (non-motorway)
  - West Coast

Pilot Study Objectives

- To manually collect data on road features specified in scoping report for 200x200m sections
- To develop preliminary crash prediction models for rural roads for main crash types
- To determine whether video data is a replacement for manual data collection in the main study
- To estimate the sample size required for the main study

Pilot Study

- Collected 200 x 400m sections on State Highways in Waikato
- Correlation between variables

Variable A	Variable B	Correlation
Recoverable Slope	Traversable Slope	0.43
Traversable Slope	Wood Pole	0.43
Culverts – road side	Farm / Residential	0.42
Traversable Slope	Non-traversable Slope	-0.31
Traversable Slope	Concrete Pole	0.30
Wood Pole	Concrete Pole	0.27
Wood Pole	Non-traversable Slope	-0.27
Traversable Slope	Trees	0.26
Unsealed Shoulder	Recoverable Slope	0.23
Wood Pole	Farm / Residential	0.22

Data Processing and Model Building

- Electronic data provided by The University of Canterbury
- Significant work has been undertaken to 'clean' the data by the University
- Currently developing preliminary crash models utilising all the manual and electronically sourced data.
- Pilot study models to be produced by early 2009

Main Study

- Sample size to be refined based on variability observed in the pilot study data.
- Would like to collect the 'manual' data electronically in conjunction with data collection for other studies eg. Kiwi-rap
- The Kiwi-Rap program utilises video footage of each route (ARRB vehicle)
- This could lead to a substantial cost saving