

Making Evidence-based Crash Analysis as Routine as Sidra Analysis by using SESAP

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Abstract

Achieving safe system or vision zero outcomes at high-risk urban intersections, especially priority cross-roads and high-volume traffic signals is a major challenge for most cities. Even after decades of crash analysis and improvement works many of these intersections still perform poorly. While best practice for optimising the efficiency of intersections requires the use of modelling tools, like Sidra, this is rarely the case with safety analysis. This is despite the large number of evidence-based safety analysis models and tools that are now available to understand intersection crash risk. This paper outlines the SESAP (Site-specific Evidence-based Safety Analysis Process) that has been developed to enable road safety professionals to estimate and predict the safety of intersections and potential upgrades in New Zealand and Australia.

Background

Sidra is an intersection model that is used throughout New Zealand and Australia to quantify the efficiency of intersection. Best practice demands that almost all major upgrades to major intersections are modelled in Sidra to understand the change in vehicle travel time and operating costs; either positive or negative. Best practice in safety analysis does not currently require the same depth of analysis. It is still fairly common for professionals to 'estimate' the likely change in crashes (usually reductions) based on their 'safety experience'. At best, evaluations reference crash reduction factors and apply these to historical crash data, which in many cases doesn't accurately reflect the likely trend in future crashes. Only in rare situations does the safety analysis involve a detailed crash modelling and analysis, as presented in the case study examples in this paper.

Safety Analysis Tools

There are a number of existing analysis tools that are available for assessing the safety impact of existing and proposed intersection and route layouts and operations. Many tools have been developed in the USA, including IHSDM for rural roads, ISATe for interchanges, Highway Safety Manual safety toolkit for urban roads. These USA tools can easily be calibrated to local conditions. In New Zealand there are some analysis tools, including a spreadsheet tool for detailed safety modelling of traffic signals that considers layout, volume of different road users and the operation of the traffic signals. While the analysis tools are less developed than those in the USA, the NZ Crash Estimation Compendium (NZTA, 2016) contains the models and factors needed. Basic crash analysis tools can be developed relatively easily using these models in a spreadsheet tool.

Case Studies Analysis

The three case studies (high risk intersections in Christchurch, Tauranga and Nelson in New Zealand) demonstrate the process that can be used to estimate crash rates at intersections. Often high-risk intersections have an unusual feature or are complex and or the proposed solutions are innovative. The challenge then is to understand how the unusual layout or innovative design option is likely to impact on crash occurrence given the crash models tend to be for standard intersection designs. The analysis process has three steps. The first step is to predict the expected injury crash rate for the current intersection and each option using crash models and factors that most closely represent the intersection options (e.g. base model is a roundabout). Step 2 Assesses the differences that major differences between the intersection design and the base model, based on research or

expert opinion (e.g. for a signalised roundabout). The final step is to estimate the expected risk of serious injury and fatal crashes, using speed, X-KEMM-X or crash severity factors.

Reference

NZ Transport Agency, 2016. Crash Estimation Compendium: Version 1, Wellington, New Zealand.