Getting the Most from the Safety Analyst Software Tool

MTO Increases Versatility of Safety Analyst Tool

Since 2009, the Safety Analyst (SA) software tool has been the industry standard across North America, used by highway agencies for highway safety management. The Ontario Ministry of Transportation's (MTO) use of this statistical analysis tool is unique.

In keeping with the ministry's commitment to innovation and safety, MTO adopted the Safety Analyst software tool in 2012. This tool was designed by the Federal Highway Administration (FHWA) to support highway agencies' safety decision-making. Released by the American Association of State Highway and Transportation Officials (AASHTO), this tool provides state-of-the-art statistical analysis for identifying and implementing site-specific highway safety improvements.

Prior to the ministry's adoption of Safety Analyst, statistical analysis for safety decision-making was conducted manually with spreadsheets, requiring a great deal of time and effort and increased the potential for human factor errors. Manual analysis is very difficult; for example, defining a collision pattern is often challenging because of a number of factors including site type, traffic exposure, and the overall collision experience. The tool eliminates human factor errors, easily analyzes a multitude of incident factors, and can complete statistical analysis in a few hours instead of months.

Safety Analyst Software Customization

The software's basic manufacturer's configuration defaults to diagnoses for non-freeway roads and intersections but was designed for analysis flexibility. Freeways and ramps are a large part of Ontario's provincial highway network, so it was necessary to modify Safety Analyst to diagnose and analyze scenarios involving freeways and ramps. Consultant team CIMA+, TES Information Technology Ltd., Navigats Ltd., and Persaud and Lyon Inc. partnered with MTO to configure Safety Analyst completing the required modifications.

To develop diagnostic scenarios for freeways and ramps, the ministry first conducted a review of the collision history associated with freeways and ramps and identified collision patterns. See Figure 1 for an example of a diagnostic scenario Safety Analyst produces. As noted in Figure 2, the predominant collision impact types associated with freeways are single motor vehicle (SMV), sideswipe, and rear-end collisions, which constitute almost 96 per cent of all collisions on freeways. As a result, it was decided that the SA diagnostic scenarios should be modified to address these collision patterns. These modifications provide flexibility for scenario adjustment. For example, ministry users can select or skip diagnostic questions based on whether the freeway design is rural or urban.

The second ministry-specific modification to Safety Analyst is the MTO Site Prioritization Tool (SPT). This innovative modification is unique to the ministry. The SPT takes SA's Ontario highway incident data analysis and ranks collision sites according to chosen specifications. The ministry's SPT takes different types of network screening, such as expected collisions and excessive collisions, and combines them into one adjusted rank. Locations that are high in this combined rank are identified as areas for potential improvement.

Safety Analyst Components

Safety Analyst comes with four components:
• network screening
• diagnosis and countermeasure
• economic appraisal and priority ranking
• countermeasure evaluation

Many jurisdictions have configured only one or two of the components. MTO has fully configured all four components of the SA software, using all of the Safety Analyst components for comparing and prioritizing different projects and solutions according to different criteria, for instance net benefit or benefit/cost ratio.

Safety Analyst Recommendations

Safety Analyst is capable of making suggestions for road safety improvements including the installation of roundabouts, rumble strips, or median barriers. The software tool does not replace or eliminate the role of ministry experts; a technical >

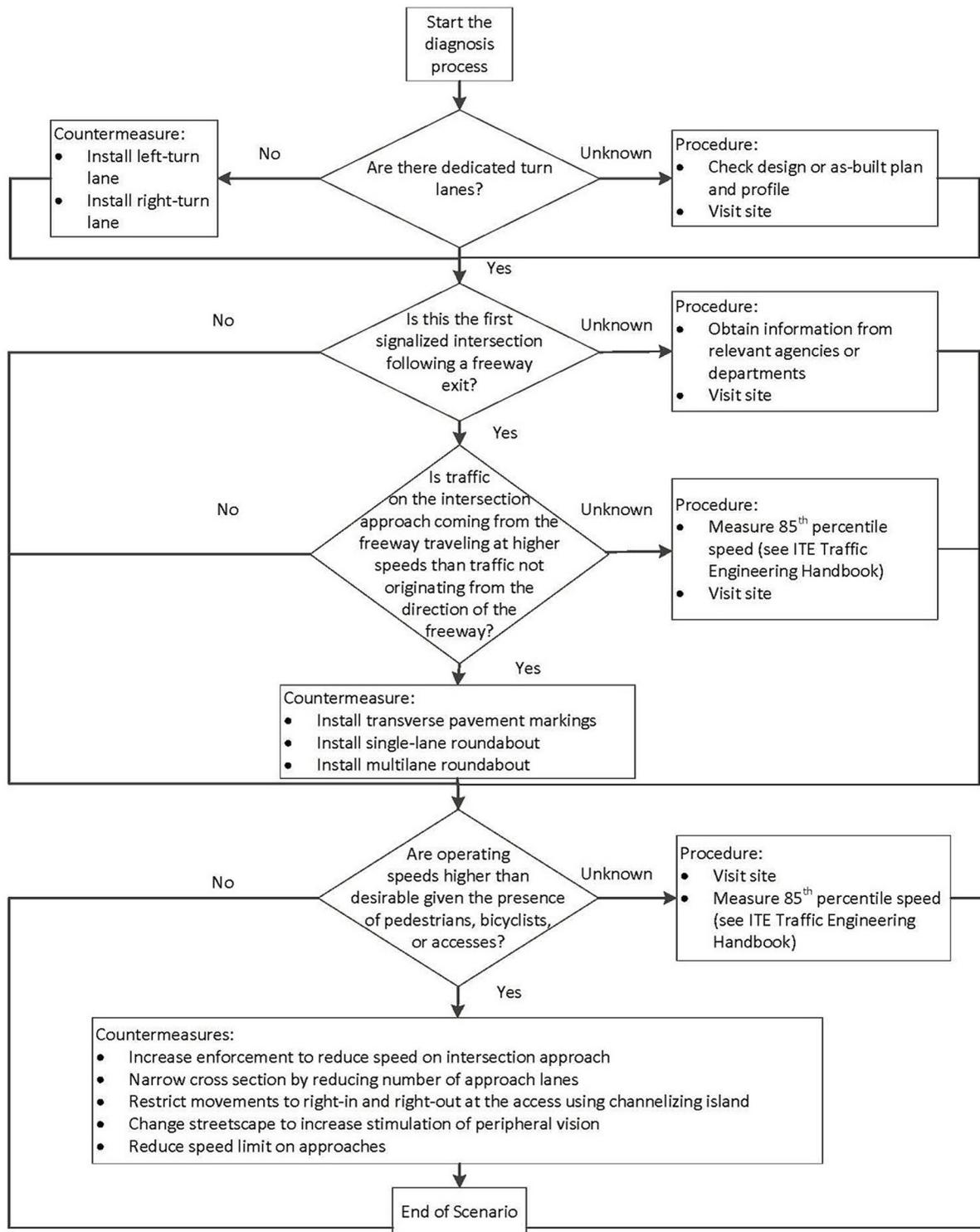## *MTO Increases Versatility of Safety Analyst Tool, continued*

Figure 1: One example of the many diagnostic scenarios created by Safety Analyst

Ontario

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Collision Type	Freeways	
	# of Collisions	Proportion of Total Collisions
Angle	1349	0.45%
Approach	5283	1.78%
Rear-end	117228	39.49%
Sideswipe	56065	18.89%
Single Motor Vehicle (SMV)	111833	37.67%
Single Vehicle unattended	1787	0.60%
Turning Movement	2555	0.86%
Other	764	0.26%

Figure 2: Table summary of the total number of collisions from January 1, 2006 through December 31, 2010 on ministry freeways.
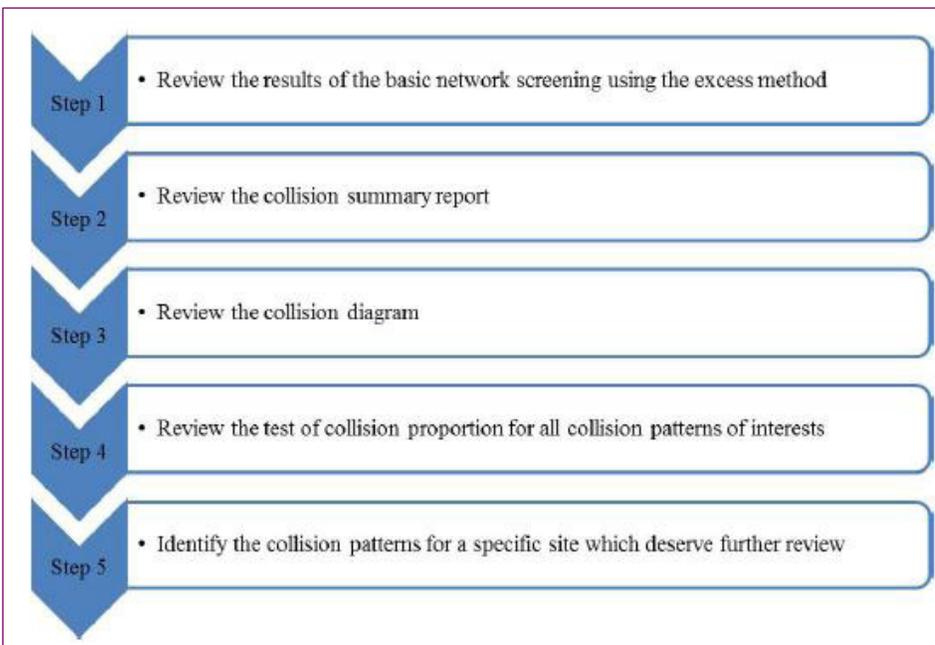

Figure 3: The expert system is used to identify potential countermeasures that address collision patterns identified during the diagnostic process.

expert evaluates the tool's suggestions and makes a recommendation for highway safety improvements (Figure 3). SA is a tool used to easily and efficiently analyze statistical data and assists in safety management recommendations for highway improvement decision-making priorities.

Safety Analyst is also part of MTO's process for prioritizing and implementing safety and operational improvement projects. The safety benefits (expected reduction in collisions) calculated by SA in combination with calculated operations benefits (increased capacity, reduced travel time/delay) are used to score projects and rank them. The resulting ranking is used as a method to select those projects that will be implemented based on available funding. This method of ranking improvement projects, using Safety Analyst, reduces the time spent by staff documenting and selecting projects for implementation.

Because Safety Analyst is a statistical analysis tool, it is limited by available data. MTO is continuing to collect and update collision data and is seeking new methods of doing so. The Ontario Provincial Police (OPP) provides collision data to the ministry that is collected and recorded electronically, resulting in data that is easily added to the tool's data base. Due to annual variances in traffic collision data, long-term data will result in better statistical improvement conclusions. >

MTO Increases Versatility of Safety Analyst Tool, continued

MTO is a leader in safety and innovation, and will continue to modify and tailor Safety Analyst to get the most value from the software, to ensure Ontario's highways remain among the safest in North America. •

For more information, please contact:

Michael Pardo, Traffic Operations Engineer,
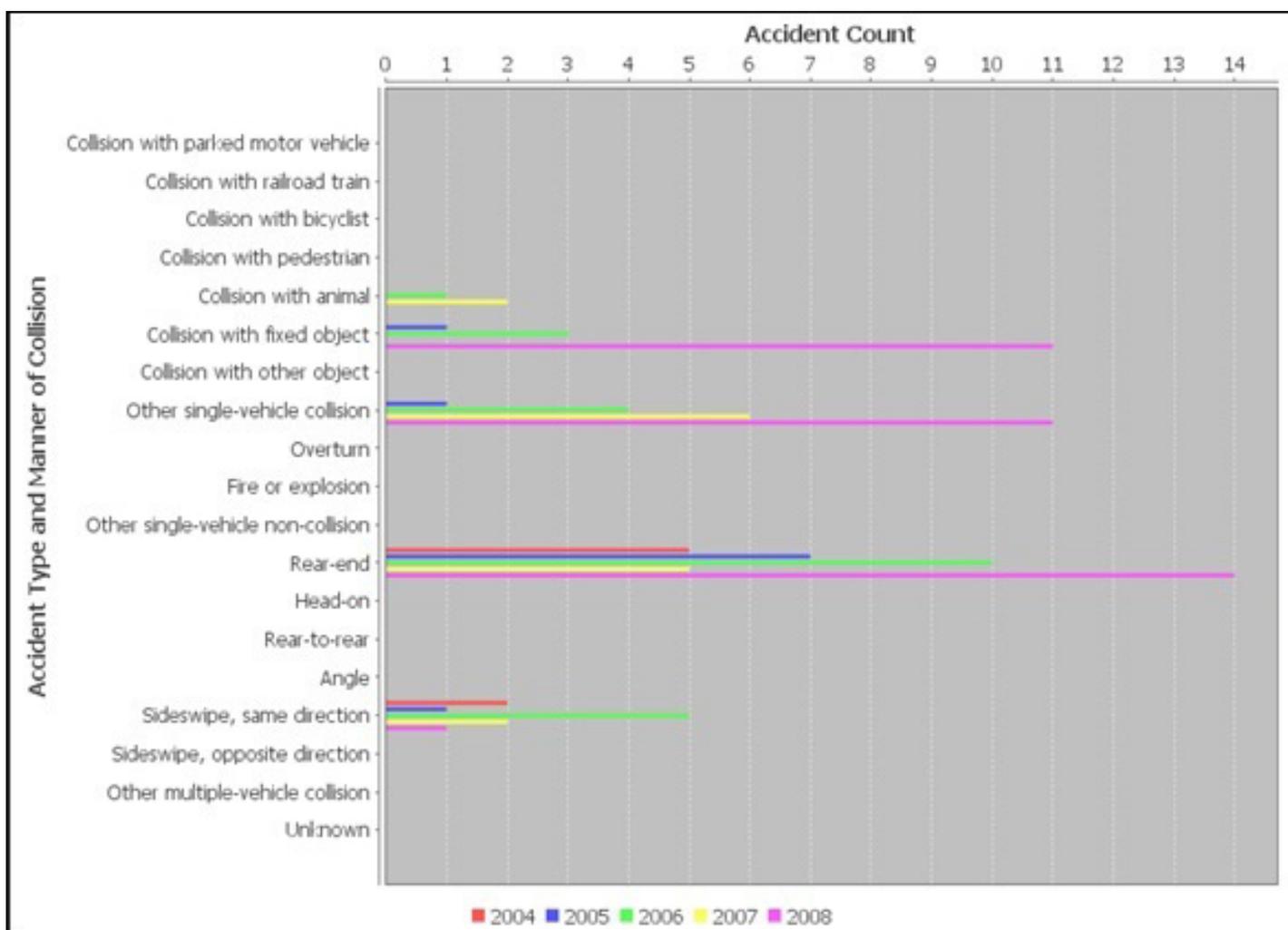Traffic Safety Management Section,
at 905-704-2943, or at Michael.Pardo@Ontario.ca

Figure 4: Safety Analyst display of collision data for each attribute