Safe System Assessment: delivering Safe System outcomes

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Abstract

Safe System Assessments quantify the alignment of existing roads or proposed designs with Safe System principles. The output is then presented to the project team who are encouraged to improve their alignment with Safe System principles. From the first 50 Safe System Assessments undertaken in Victoria, a number of design choices reoccur on large projects where there is the ability to improve alignment with Safe System principles and reduce fatal and serious injuries.

Background

The Safe System seeks to eliminate death and serious injury on roads. It consists of four elements; safer: roads, speeds, vehicles, and people; to which post-crash care is often added. The philosophy has been adopted by road authorities such as VicRoads. Converting the philosophy into action has been slower – because infrastructure projects usually adopt conventional practice and follow existing guidelines. Safe System Assessment (SSA) is a tool to convert Safe System principles into practice. SSA distinctly 'raises the bar' beyond the work of a Road Safety Audit (RSA). A RSA qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in a traditional sense, but does not measure compliance with Safe System principles.

Safe System Assessments (SSAs)

A SSA is an examination of an existing length of road or intersection or a proposed infrastructure project to assess the extent to which existing conditions, or proposed projects, align with Safe System principles, specifically, in eliminating fatal and serious injury crashes. Guidance on conducting SSAs is in Austroads (2016) and VicRoads (2018)

SSAs in practice

The Austroads Safe System Assessment Framework (2016) includes assessment of the road and travel speeds as well as other elements such as road user issues; vehicle-related issues; and post-crash care. The Framework when applied to infrastructure:

- Scores infrastructure (existing and proposed) on alignment with Safe System principles
- Scores are based on key crash types
- A full Safe System would have a score of zero

To ensure that Safe System elements are considered, or to measure how well a given project (e.g. an intersection, road length, area, treatment type etc.) aligns with Safe System principles, a Safe System matrix is used (Table 1). A full SSA also needs to consider these additional elements: Road users; Vehicles; Post-crash care.

Table 1. SSA framework for infrastructure projects (from Austroads, 2016)

	Run-off-road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	AADT; length of road segment	AADT; length of road segment	AADT for each approach; intersection size	AADT; length of road segment	AADT; pedestrian numbers; crossing width; length of road segment	AADT; cyclist numbers; pedestrians	AADT; motorcycle numbers; length of road segment
Likelihood	Speed; geometry; shoulders; barriers; hazard offset; guidance and delineation	Geometry; separation; guidance and delineation; speed	Type of control; speed; design, visibility; conflict points	Speed; sight distance; number of lanes; surface friction	Design of facilities; separation; number of conflicting directions; speed	Design of facilities; separation; speed	Design of facilities; separation; speed
Severity	Speed; roadside features and design (e.g. flexible barriers)	Speed	Impact angles; speed	Speed	Speed	Speed	Speed

Quantifying the benefits

The output of a SSA shows where a project scores in relation to alignment with Safe System Principles; with lower scores presenting better alignment with Safe System principles. Figure 1 below illustrates an output graph from a SSA.

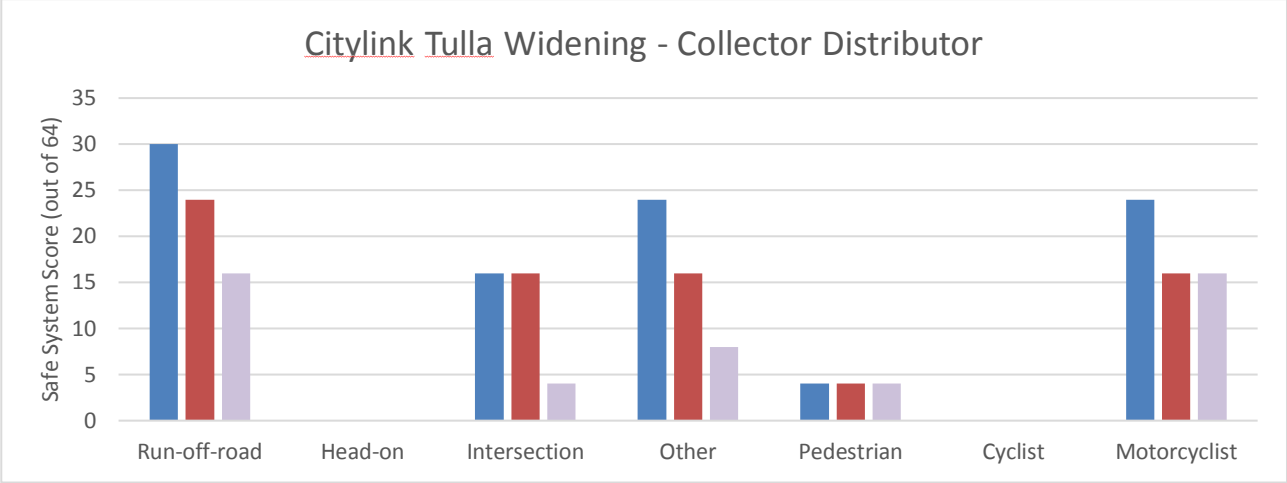

Figure 1. Improvements in road safety after undertaking a Safe System Assessment of the widening of the Tullamarine Freeway in Melbourne. The three bar charts show scores for the existing conditions (left), the original design (middle), and the post-SSA design (right).

In Victoria, over 100 SSAs have been completed on projects including Freeway upgrades, intersection upgrades, road duplications, route upgrade projects and new town bypasses. SSAs were also used in Austroads' Technical Report AP-T330-17 (2017) Safe System Infrastructure for Mixed Use Arterial Roads (along with Crash Reduction Factors) to quantify the benefits of road upgrade proposals.

Results

The preliminary results from reviewing the first 50 Safe System Assessments identified common issues of planning and road design that have less than desirable alignment with Safe System principles and appear frequently in large projects. These include unprotected roadside areas of interest, intersections with high potential kinetic energy crashes, mixing of high speed traffic with vulnerable road users and designs that cause maintenance and/or emergency vehicle access difficult and dangerous.

VicRoads is also working to predict fatal and serious injury reductions as a result of Safe System Assessment outcomes. Results from this analysis will be presented.

References

Austroads Research Report AP-R509-16, (2016) Safe System Assessment Framework, available online at: https://www.onlinepublications.austroads.com.au/items/APR509-16

Austroads Technical Report AP-T330-17 (2017) Safe System Infrastructure for Mixed Use Arterial Roads, available online at: https://www.onlinepublications.austroads.com.au/items/AP-T330-17

VicRoads (2018) Safe System Assessment Guidelines (Draft January 2018), available shortly.