

The impact of road infrastructure treatments on reducing road trauma in WA

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Looking back over the last couple of decades, progress in road safety in WA has been inexcusably slow and an unforgivably high number of people continue to be killed and seriously injured (KSI) every day on WA's roads.

The WA Government has set a target to reduce KSIs by 50-70 per cent by 2030 compared with a 2015-2019 baseline. RAC has set more ambitious targets to halve the rate of KSIs on our roads by 2025, from a 2020 base. We have been exploring which road safety countermeasures should be prioritised in order to meet these targets, and this bulletin explores the potential role of road infrastructure treatments.

The role of road treatments in crash severity

Road treatments can reduce the risk of crash types associated with fatal and serious injuries, including head on crashes, crashes involving hitting something (e.g. a person, object or animal), right turn crashes and (chiefly for motorcyclists) right angle crashes. For example, in urban areas crashes at intersections are particularly common, and an appropriate infrastructure intervention might be a roundabout, which reduces the impact angle and speed of the crash. In regional areas, run-off-road crashes tend to be more common and an appropriate infrastructure treatment might be increasing the width of the sealed shoulders. This highlights the potential for road treatments to save lives.

Modelling the impact of road treatments in WA

In 2022, RAC commissioned the Centre for Accident Research and Road Safety – Queensland (CARRS-Q) to identify and analyse the road safety countermeasures that would have a significant impact on reducing the number of KSIs on WA roads within the next 5-10 years.

Analysing the WA crash data

Following a literature review looking at the effectiveness of past road infrastructure improvements, WA crashes involving three road user groups (motor vehicle occupants, motorcyclists and cyclists/pedestrians) were analysed to understand which roadway attributes were associated more strongly with fatal or serious injury and which were associated more strongly with minor injury or no injury.

Roadway attributes could only be included in the analysis where they are recorded in WA crash data for the vast majority of crashes.

Roadway attributes that were analysed included:

- » roadway features (e.g. intersection type);
- » presence of traffic lights or traffic signs;
- » road gradient;
- » road curvature; and
- » road seal.

Evaluations of previous impactful infrastructure improvements identified in the literature review were used to provide an estimate of the percentage reduction in KSIs resulting from infrastructure improvements, and how many KSIs could be prevented from 2022 to 2030, were able to be calculated.

What were the findings?

How do roadway attributes impact risk of fatal or serious injury?

The literature review found that a range of road treatments are effective for higher speed roads including:

- » improving the skid resistance of the road surface;
- » improving road markings and treatments (e.g. audio tactile line marking, painted wide centrelines, islands, turning slots);
- » improving roadside safety (e.g. sealed shoulders, flattening side slopes, roadside barriers, roadside hazard removal); and
- » installing roundabouts and passing lanes.

For urban environments (with vulnerable road users, such as pedestrians and cyclists, more likely to be present), additional effective road treatments include:

- » traffic calming (e.g. narrower roads, raised safety platforms, speed humps and gateway treatments);
- » traffic signals and mini-roundabouts;
- » bicycle lanes (particularly with physical barriers); and
- » pedestrian facilities (e.g. refuges, signals, kerb extensions).

According to the crash data modelling in Table 1, motor vehicle occupants, motorcyclists and cyclists and pedestrians are all less likely to be killed or seriously injured in a crash at a roundabout than in a crash at a standard 4-way intersection, and they are all less likely to be killed or seriously injured where traffic control measures such as traffic signals are present than when they are not.

Table 1: Infrastructure treatments associated with a decrease in fatal and serious injury risk

Infrastructure treatments	Road user	Decrease in serious injury risk	Decrease in fatality risk
Roundabout	Motor vehicle occupant ¹	↓ 25%	↓ 26%
	Motorcyclist ^{1,4}	↓ 8%	↓ 14%
	Cyclist/pedestrian ^{1,2}	↓ 17%	↓ 27%
Existing traffic control measures (e.g. traffic lights or signs)	Motor vehicle occupant ⁵	↓ 13%	↓ 14%
	Motorcyclist ⁵	↓ 22%	↓ 37%
	Cyclist/pedestrian ⁵	↓ 43%	↓ 59%

Note: ↓ decreased risk. Base comparisons: ¹ no road features, ² 4-way intersection, ³ 3-way intersection, ⁴ other features, ⁵ no traffic control measures



Policy actions to save lives

Overall, the most effective infrastructure treatment in terms of reducing fatal and serious injuries by 2030 was for intersection treatments – such as installing traffic signals, modifying signal phasing, installing traffic islands and turning bays, and improving warning signs – across all WA intersections.

Table 2 shows a breakdown of the percentage reduction in KSIs and predicted KSI savings for each infrastructure treatment type from 2022 to 2030.

Table 2: Predicted KSI saving for each infrastructure treatment from 2022 to 2030

Infrastructure treatments	Implementation location and target mode of transport	% reduction in KSIs (based on literature review)	Predicted KSI savings (2022 to 2030)
Intersection treatments e.g. installing traffic signals / modifying phases, installing traffic islands and turning bays, improved warning signs	» All WA intersections » All modes	20%	1,907 people*
Vulnerable road user treatments e.g. separation, bike lanes, treatments to reduce conflicts at intersection	» Metropolitan WA » Cyclists & pedestrians	40%, where treated	461 people^
Low-cost rural treatments e.g. sealing shoulders, audible edgelines, median, centreline	» Regional WA » Motor vehicle occupants & motorcyclists	40%, for run-off-road and head-on crashes	1,140 people*

* this estimate is based on sum of reductions for motor vehicle occupants and motorcyclists only

^ this estimate assumes half of locations at which KSI occurred are treated

Implementation considerations

Careful planning and consideration is required to ensure infrastructure treatments are feasible and appropriate for the context. While the results provide us with some interesting data about the impact of infrastructure treatments on road crashes in WA, it's important to consider the cost and practicality of their implementation. For example, traffic lights may be an effective infrastructure measure to reduce intersection crashes, but what are some things that need to be considered prior to implementation? Some of these considerations are presented below.

Intersection treatments

By nature, intersections can be particularly risky as they are places where higher volumes of different road users meet, usually at different speeds; travelling from, and in, multiple directions. Intersection treatments, such as traffic lights, can improve the safety of intersections by separating conflicting movements in time and can increase the efficiency of traffic flow. Modifying signal phasing at traffic lights to improve safety can include implementing a fully protected turn, meaning there is no conflict between turning vehicles and vehicles going straight. Traffic islands and turning bays allow road users to wait to turn or cross in a location that does not conflict with other road users. Improving warning signs (e.g. advanced warning signs) also allow drivers to prepare to slow down in advance of an upcoming intersection.

According to the CARRS-Q report, cost can be a significant challenge to installing infrastructure-based safety improvements, such as building a 4-way intersection and installing traffic lights, and network-wide implementation may not always be feasible. In addition, pressure to reduce congestion and travel delays may hinder implementation of safety measures which are perceived to slow traffic or interfere with traffic flow. At some locations, other intersection treatments such as mini roundabouts are cheaper and effective alternatives which can be implemented on a wider scale.

Vulnerable road user infrastructure treatments

Vulnerable road users have little protection when interacting with traffic, so separating these road user groups using off-road paths or protected bike lanes reduces the risk of a collision with vehicles. Protected bike lanes are on-road cycling facilities in which there is a physical barrier (kerb or bollards) between the bicycle lane and the traffic lanes, which protect cyclists from a potential conflict. Treatments to reduce conflicts between road users at intersections include pedestrian crossings and signal treatments, designed to reduce conflicts between drivers and those crossing the road, as highlighted earlier.

The CARRS-Q report noted that safety improvements for vulnerable roads users can be challenging to implement due to limited budgets and space considerations, leading to potential trade-offs between the installation of relatively expensive infrastructure at targeted locations (e.g. protected bike lanes) versus lower cost but more widespread installation of protective measures (e.g. non-separated bicycle facilities).



Low-cost rural road treatments

Rural road treatments commonly include a range of low-cost measures. A sealed shoulder is the portion of road between the white painted edge line and the verge which has been sealed with a hard surface material and is not gravel or dirt - a sealed shoulder gives a driver more chance to correct themselves if they veer over the edgeline. Audible edgelines also help to prevent veering off the road - the raised pieces of material spaced along the line create a continuous noise or vibration if a driver runs over it and prompts them to get back into the middle of the lane. Finally, a median or centreline is a line that runs down the middle of the road to separate oncoming traffic. Wide centrelines provide greater separation between opposing directions of traffic than standard centreline markings, helping to reduce the likelihood of head on crashes.

It was noted in the CARRS-Q report that the cost of implementing safety improvements across a large, low-volume network such as in WA is tough. Generally, the benefits of safety improvements are greater where traffic volumes are greater. This suggests the need for careful prioritisation of treatments, but this is not without its own challenges. It can be difficult to identify hazardous locations from crash histories, given sometimes lower traffic volumes mean crashes can be highly distributed across the regional network.

Low-cost rural road treatments in action: the Regional Road Safety Program

The Regional Road Safety Program (RRSP) is a landmark WA Government initiative delivering effective, low-cost safety treatments such as sealing shoulders, installing audible edge lines, medians and/or centre lines. The RRSP, announced by the Government in August 2019¹, was modelled to reduce regional road trauma by 60 per cent.

The program is a key advocacy priority for RAC, and we have helped to secure over \$1 billion of funding, with around 10,000km of road expected to be treated by mid-2025. We continue to advocate for additional funding so that the safety benefits are realised across the whole state regional network and also on high-speed local government roads.

Early evidence indicates that the RRSP is having a positive impact². Crash reduction analysis (to December 2022), which was undertaken across 163 Regional Road Safety Program projects, indicated a 50 per cent reduction in fatalities and a 35 per cent reduction in serious injuries when compared to the average of the five years prior. In the four years since the program commenced, there has been a 16 per cent reduction in fatal and serious injuries on state regional roads compared with the five years prior to the program commencing, whereas there has only been a 4 per cent reduction on local regional roads.

¹ WA Government (2019, 1 August). Federal backing sought for WA road safety initiative [Media statement]. Retrieved from: <https://www.wa.gov.au/government/media-statements/McGowan-Labor-Government/Federal-backing-sought-for-WA-road-safety-initiative-20190801> (accessed 25 July 2025).

² Main Roads WA. (2023). Success in Regional Road Safety Program. Retrieved from: <https://annualreports.mainroads.wa.gov.au/AR-2024/pdf/MRWA-Annual-Report-2024.pdf> (accessed 25 July 2025).

Where we stand

To reduce the unacceptable impact of road trauma in WA, RAC advocates and supports the Safe System approach, which seeks safe road users, safe speeds, safe vehicles, safe roads, and post-crash care.

RAC's Vision 2030 sets ambitious targets for reducing the rate of fatalities and serious injuries on WA roads and looks to a future where all parts of the Safe System approach have been strengthened.

This project has improved our understanding of the infrastructure treatments predicted to have the most impact on reducing fatal and serious injuries, which will inform our advocacy priorities. Our other publications explore further the crash characteristics most strongly associated with fatal and serious injury and the potential for speed limit reductions and safer vehicles to prevent these devastating crashes.

To learn more about how we are already **advocating change**, head to our website to read our most recent Public Policy document, Social & Community Impact Report and State and Federal Budget Submissions. RAC's public policy positions reflect where we stand on issues that support our Vision and help achieve our targets. Our policies are developed based primarily on the best available evidence, including the findings from projects like this.



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