

Technical Guideline

Raised priority crossings for pedestrian and cycle paths

September 2025

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1 Introduction

1.1 Non-signalised controlled crossing definitions

Raised priority crossings include speed control features (such as a raised platform or speed cushions) and require vehicles to give way to path users on the crossing. Raised priority crossings are a primary safe system treatment that reduces the likelihood and consequences of crashes. There are 3 types of raised crossing:

1. A raised pedestrian (wombat) crossing
2. A raised priority crossing (RPC), and
3. A separated pedestrian and cyclist crossing (cycle track crossing).

This document is focussed on crossing type 2, an RPC. However, the physical features of all three crossing types shall be designed similarly. This document includes case studies and information from a variety of crossing sites including wombat crossings, RPCs and cycle track crossings. Figure 1.1 shows an example of each crossing type.

Figure 1.1 – Non-signalised crossings where vehicular traffic gives way

<p>Raised Pedestrian (wombat) Crossing</p> <p>Reference: Queensland MUTCD Part 10</p> <p>Regulatory control: Pedestrian crossing signs and pedestrian (zebra) markings</p> <p>Operation: Vehicle traffic gives way to path users. Road rules require bicycle/PMD riders to stop before entering crossing</p> <p>Common applications: Sites with mostly pedestrian demand. Complex sites such as slip lanes, roundabouts, or side-road crossings with high vehicle volumes.</p>	
<p>Raised Priority Crossing (RPC) - shared paths</p> <p>Reference: Queensland MUTCD Part 10</p> <p>Regulatory control: GIVE WAY /STOP signs and line marking.</p> <p>Operation: Vehicle traffic gives way to path users.</p> <p>Common applications: Side road crossings shared paths.</p> <p>Note: Note: W8-32 name plate signs 'pedestrians and cyclists' should be installed underneath the 'Give way' sign</p>	
<p>Separated cyclist and pedestrian crossing</p> <p>Reference: RPDM Part 4A and Selection and Design of Cycle Tracks (TMR)</p> <p>Regulatory control: Give way signs and pavement marking, bicycle symbols and green treatments, separate footpath.</p> <p>Operation: Vehicle traffic gives way to path users.</p> <p>Common applications: As part of separated cycle track projects.</p>	

1.2 Definition of raised priority crossings

For the purposes of this document, a priority crossing is defined as a place where drivers are required by regulatory GIVE WAY or STOP signs to give way to path users. This may designate path user priority (mid-block) or reinforce path user priorities defined in the road rules (refer to Figure 1.2). Where a priority crossing is signed on a flat top raised platform the treatment is referred to as a raised priority crossing (see Figure 1.2).

Where raised platforms are installed as provided on crossings, priority should always be provided to path users.

Figure 1.2 – Example of a raised priority crossing for a shared pathway, Bli Bli, Qld



Note: W8-32 name plate signs 'PEDESTRIANS BICYCLES' should be installed underneath the 'GIVE WAY' sign.

Raised priority crossings incorporate several road safety and accessibility features into a single treatment. This document's title is a shortened version of all the combined road safety features for this treatment. The term 'raised' is a substitute for 'flat top road hump' and the term 'priority' is a substitute for 'give way controlled'. The elongated technical name for this combination of road safety features for this treatment is: 'Intersection offset flat top road hump with give way controlled road crossings for pedestrian and cycle paths', shortened to 'Raised priority crossings for pedestrian and cycle paths'.

Raised priority crossings on shared pathways across local roads can support a Safe Systems approach to road safety, reduce the level of traffic stress, increase visibility, reduce motor vehicle kinetic energy at a key conflict point and improve level of service for all path users.

1.3 Purpose and scope

This document sets out normal design domain guidance related to raised priority crossing design. It also contains case studies and past research findings to assist practitioners in achieving optimal outcomes when implementing raised priority crossings.

This document focuses on considerations for planning and designing raised priority crossings of shared pathways across local side roads, slip lanes and at mid-block. Raised pedestrian crossings (wombats) and raised separated pedestrian and cyclist crossings provide similar benefits for accessibility and safety, and this guidance may also relate to these facilities. Figure 1.1 shows all of these treatments.

This document should be read in conjunction with Queensland *Manual of Uniform Traffic Control Devices* (Queensland MUTCD) Part 10, *Queensland Guide to Traffic Management* (QGTM) Part 6, and *Road Planning and Design Manual 2nd Edition* (RPDM) Parts 4, 4A and 6A. There is a risk that, without this document, priority crossings may be applied inappropriately or underused in the network.

1.4 Related documents

This document should be read in conjunction with the guidelines described in Table 1.4.

References cited in this document are listed following:

- ARRB. 2021. *Raised Safety Platforms: Phase C: Final Report on the Short-term Evaluation of their Safety Performance*. Prepared for VicRoads. Victoria.
- Austroads. 2015a. *Level of Service Metrics (for Network Operations Planning)*. Sydney. NSW.
- Bitzios. 2023. *Queensland Priority Crossings Behaviour Research*. Prepared for the Department of Transport and Main Roads. Queensland.
- CDM Research. 2024. *Traffic survey and road design review of raised crossings*. Prepared for the Department of Transport and Main Roads. Queensland.
- CDM Research. 2018 "*Evaluation of the Mann Street Cycleway, Cairns*". Prepared for Queensland Department of Transport and Main Roads.
- CDM Research. 2016 "*Evaluation of the Mooloolaba to Minyama Separated Bikeway, Stages 1, 3 and 4a*". Prepared for Queensland Department of Transport and Main Roads.
- CDM Research. 2016b "*Safety assessment of the Somerset Path Priority Crossing*". Prepared for Queensland Department of Transport and Main Roads.
- CDM Research. 2015 "*Observational study of cyclist priority cycleway crossings*". Prepared for Queensland Department of Transport and Main Roads.
- O'Brien Research. 2015 "*Observational study of cyclist priority cycleway crossings*". Prepared for Queensland Department of Transport and Main Roads.
- Swain, R., Oswin, P., Truelove, V., & Larue, G. S. (2023). *Children's and parents' perceptions on safe routes to schools: a mixed-methods study investigating factors influencing active school travel*. *Journal of Urban Design*, 29(2), 208–230.
<https://doi.org/10.1080/13574809.2023.2223517>

- Victoria Walks. (2021) "Getting to the bus stop".
https://www.victoriawalks.org.au/bus_access/

Table 1.4 – Summary of related documents

Reference	Title
AGRD Part 4	<i>Austroads Guide to Road Design Part 4: Intersections and Crossings –General</i>
AGRD Part 4a	<i>Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections</i>
AGRD Part 6	<i>Austroads Guide to Road Design Part 6: Roadside design, safety and barriers</i>
AGRD Part 6A	<i>Austroads Guide to Road Design Part 6A: Pedestrian and Cycle Paths</i>
AGRD Part 6B	<i>Austroads Guide to Road Design Part 6B: Roadside Environment</i>
AGRS Part 2	<i>Austroads Guide to Road Safety Part 2: Safe Roads</i>
AGRS Part 3	<i>Austroads Guide to Road Safety Part 3: Safe Speed</i>
AGRS Part 7	<i>Austroads Guide to Road Safety Part 7: Road Safety Strategy and Development</i>
AGTM Part 8	<i>Austroads Guide to Traffic Management Part 8: Local Area Traffic Management</i>
AS 1742.10	<i>Manual of uniform traffic control devices. Part 10: Pedestrian control and protection</i>
AS/NZS 1158.3.1	<i>Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements</i>
AS/NZS 1158.4	<i>Lighting for roads and public spaces Part 4: Lighting of pedestrian crossings</i>
Austroads-Pedestrian Tool	<i>Austroads Australasian pedestrian crossing facility selection tool (V.2.2.2)</i>
Austroads-SS, 2018	<i>Towards Safe System Infrastructure: A compendium of current knowledge</i>
Austroads-SSI, 2017	<i>Understanding and Improving Safe Systems Intersection Performance</i>
Queensland MUTCD Part 10	<i>Queensland Manual of Uniform Traffic Control Devices Part 10</i>
Queensland MUTCD Part 13	<i>Queensland Manual of Uniform Traffic Control Devices Part 13</i>
QRSTUV: Guide to Schools	<i>Queensland Road Safety Technical User Volumes (QRSTUV): Guide to Schools</i>
RPDM Part 4	<i>Road Planning and Design Manual 2nd Edition, Volume 3, Part 4: Intersections and crossings general</i>
RPDM Part 4A	<i>Road Planning and Design Manual 2nd Edition, Volume 3 Part 4A: Unsignalised and signalised intersections</i>

Reference	Title
RPDM Part 6A	<i>Road Planning and Design Manual 2nd Edition, Volume 3 Part 6A: Pedestrian and Cyclist Paths</i>
RPDM Part 6B	<i>Roads Road Planning and Design Manual 2nd Edition, Volume 3 Part 6B: Roadside Environment</i>
TN128	<i>TN128 Selection and Design of Cycle Tracks</i>
TRUM Volume 1 Part 5	<i>Traffic and Road Use Management Manual, Volume 1 Guide to Traffic Management, Part 5: Road Management</i>

2 Safety performance of raised crossings

2.1 Safe System integration

The Safe System philosophy for road safety assumes that crashes will occur and should be managed in such a way that the consequences should not result in fatal or serious injuries. Typical approaches for reducing severity are separating users or keeping relative velocity between road users within acceptable limits (*Austrroads Guide to Road Safety (AGRS) Part 2: Safe Roads*). Raised crossings engage the second approach.

Cyclists are overrepresented in crash data for priority controlled (GIVE WAY or STOP sign) intersections (Austrroads-SS, 2018). A Safe System recommends the application of risk management-based approaches to create safer environments (Austrroads-SS, 2018).

Table 2.1 describes how Safe Systems principles (Austrroads SS, 2018) can be applied to priority crossings to reduce risk to cyclists. Many of these risk management approaches will also apply to pedestrians.

Table 2.1 – Safe Systems principles applied to cycling facilities at priority crossings

Principle	Application to priority crossings
Functionality	Roads and pathways hierarchically defined in the network. Priority crossings provide the same priority as the parallel traffic lane and take priority over local side roads.
Homogeneity	Priority crossings can be designed to provide more homogenous speeds that give users more chance to see each other and respond to movements.
Predictability	Road user environment and road user behaviour that support road user expectations. This can be achieved by providing clear visual cues, line marking and signage to reinforce priority.
Forgiving ness	To limit injuries to pedestrians and cyclists, vehicle speeds need to be reduced to under 30 km/h and desirably under 20 km/h at the crossing point where users may interact with vehicles (Austrroads SS-2018).

Principle	Application to priority crossings
State awareness	The ability of road users to assess their capability to undertake a task. Priority crossings put the responsibility on the licensed and most capable road users to give way. Conventional crossings rely on pedestrians and cyclists, some of whom may be young, or have vision or mobility impairments to take responsibility for crossing tasks.

*Adapted from Austroads AP-R488-15 *Safe System in the Planning Process*.

2.2 Crash reduction factors for different crossing facilities

AGRS Part 2 provides information on the use of crash reduction factors in road safety evaluation. Crash reduction factors for different crossing types are published in the model parameters of the *Austroads Pedestrian Tool*. These factors estimate risk reduction from different crossing treatments based on international research. Crash reduction factors are published in Table 2.2. Raised crossings incorporate similar safety features to zebra with platform.

Table 2.2 – Crash reduction factors for crossing types

Crossing Treatment	Crash Reduction Factors
Grade separation	86%
Zebra with platform (with or without kerb extensions)	63%
Zebra with median refuge (with or without kerb extensions)	56%
Median refuge (with or without kerb extensions)	56%
Signals (with or without kerb extensions)	45%
Zebra with kerb extensions	35%
Zebra only	0%

Source: Australasian Pedestrian Crossing Facility Selection Tool.

2.3 Safe system operating speeds for raised crossings (all types, see Section 1)

AGRS Part 2 describes primary and supportive safe system treatments. It distinguishes between primary treatments that virtually eliminate potential for high-severity crashes and supportive treatments that improve safety as a stepping-stone towards eliminating high-severity crashes.

Table 2.3 describes possible crash types at raised crossings, safe system threshold speeds for crash types and features that mitigate crash risks. Raised priority crossings should be designed to achieve safe system threshold speeds, or as close as practically possible to safe system speeds for these crash types. Raised crossing features to mitigate risk are also described in Table 2.3.

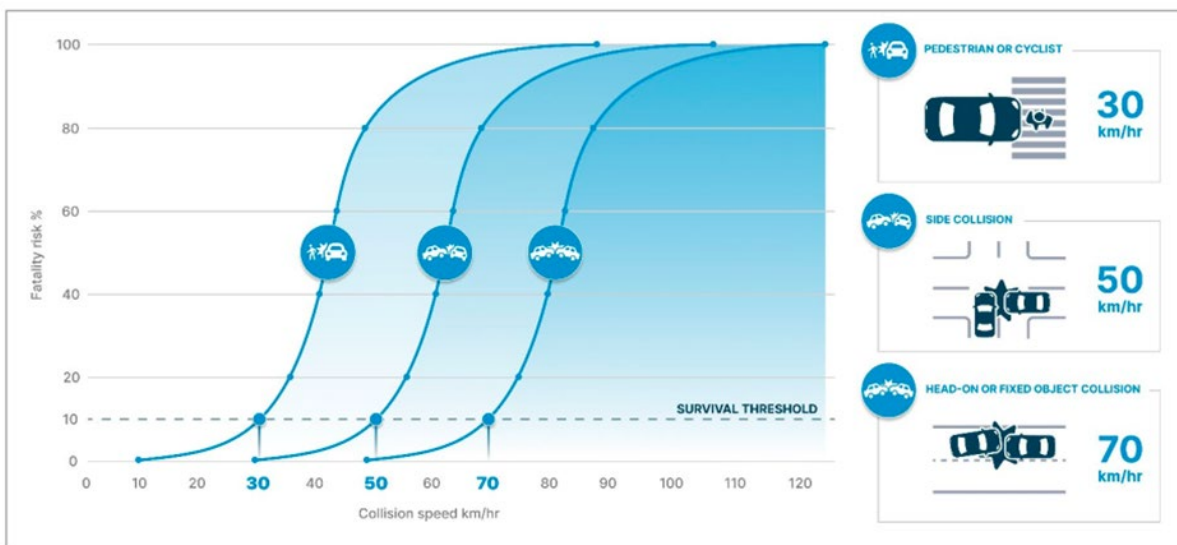
Table 2.3 – Safe system thresholds for different crash types

Crash Types	Safe System Threshold Speed*	Raised crossing features to mitigate crash risk
Pedestrian / cyclist crash with motor vehicle	30 km/h	Raised platform / speed control treatments to reduce vehicle speeds on platform.
Right angle collision between vehicles	50 km/h	Replacing T-intersection with roundabout with raised crossings are primary safe system treatments that reduce likelihood and severity of vehicle to vehicle and vehicle to path user crash risk. Providing a raised crossing on the through road, may also be a primary safe system measure for right angle collisions. Crossing set back from through road. Channelised right turn lanes, removing right turn movements, or reducing vehicle speeds on through roads, where existing speeds exceed safe system thresholds are supportive measures.
Head-on and rear-end crashes between vehicles	70 km/h	Crossing set back from through road. Consideration of channelised left turn lanes, or reducing vehicle speeds on through roads where existing speeds exceed safe system thresholds

* Source Austroads Guide to Road Safety Part 3.

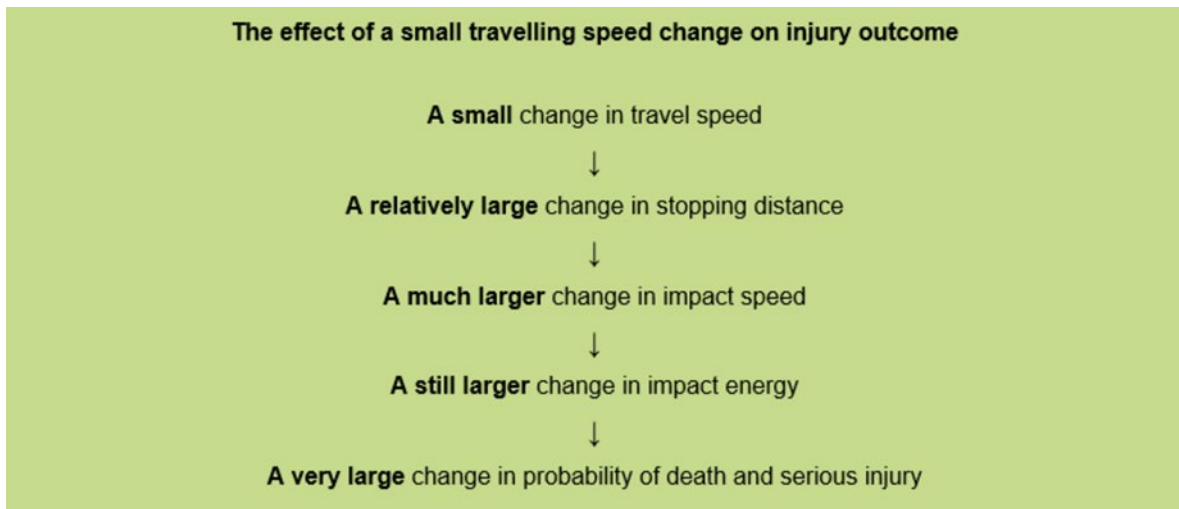
Where safe system speeds cannot be achieved, significant safety benefits can still result from small changes in vehicle operating speeds as shown in Figures 2.3(a) and 2.3(b).

Figure 2.3(a) – Safe system operating speeds for various crash types



Source: Austroads Guide to Road Safety Part 2

Figure 2.3(b) – How a small change in speed changes injury outcome



Source: Austroads Guide to Road Safety Part 3.

2.4 Crossing evaluations

There is now a reasonably extensive record of real-world experience designing and operating priority crossings for pedestrians and cyclists in Australia and overseas (e.g. CDM Research, 2015). These studies also consider control sites where at grade pedestrian (zebra) crossings, or refuge crossings have been installed. Table 2.4 summarises recent research into these types of facilities. Case studies from this report are provided in Section 6 and include sites with multi-lane zebra crossings, road cushions, a refuge crossing and an at grade zebra crossing.

Table 2.4 – Summary of evaluations of raised crossing in Australia

Reference	Evaluation focus	Important Overarching Findings
CDM Research-2024	Undertake an observational study of existing raised crossing sites to inform Queensland guidance	<ul style="list-style-type: none"> • Almost 1,500 interactions observed across 40 sites. The vast majority of path users slowed or scanned the road before entering crossings. • At mid-block sites with raised crossings, 53% of path users adjusted their path of travel, compared to 80% at untreated sites. • At side road sites with raised crossings, 48% of path users adjusted their path of travel, compared to 91% at untreated sites. • Average vehicle / motorist speed at mid-block raised crossings was 25 km/h compared with 43 km/h for at grade sites.

Reference	Evaluation focus	Important Overarching Findings
		<ul style="list-style-type: none"> • Speeds at crossings: <ul style="list-style-type: none"> – Mid-block - each degree of ramp gradient decreases average motorist speed by 2.3 km/h and every metre of crossing length increases motorist speed by 0.6 km/h. – Minor street T-intersection - each degree of ramp gradient decreases average motorist speed by 0.6 km/h and every metre of crossing length increases motorist speed by 0.5 km/h. Every additional metre of sight distance from the side street increases motor speed by 0.05 km/h. • More detailed information from this study including case studies is provided in Section 5.
Bitzios-2023	Speed of vehicles at 10 raised priority crossing sites using CompassIOT data collected between 2020 and 2023.	<ul style="list-style-type: none"> • The average vehicle speed at priority crossing sites decreased by 19% after installation and the 85th percentile speed dropped by 11%. • 85th percentile vehicle approach speeds were 23% lower at raised priority crossing sites compared to nearby sites. • Results (on average) show that priority crossings did not introduce harsh braking, excessive swerving or excessive g-forces.
CDM Research - 2021	To assess the rear-end collision risk associated with raised priority crossings	<ul style="list-style-type: none"> • Assessed 4 sites in Brisbane (Carl St at O’Keefe St, Bowen St, Dock St and Merton Rd). Study observed 1,257 interactions where a motorist was turning into the terminating street in the presence of a bicycle rider or pedestrian and another motorist was trailing behind the turning motorist. • There was no indication that priority crossings experience a higher likelihood of rear-end crashes than non-priority. • The evidence from this study suggests the risk of motorist rear-end crashes is not significantly increased through the conversion to priority crossings. Indeed, it may be that in some instances, the crash risk is reduced if the priority crossing assists in clarifying the priority rules for road users.

Reference	Evaluation focus	Important Overarching Findings
ARRB-2021	Measure the safety benefit of raised platforms associated with changes in behaviour and vehicle speeds, focussed largely on signalised intersections.	<ul style="list-style-type: none"> • The average 85th percentile speed reduction was 21% at approaches to crossings. The platforms influenced vehicles speeds 80-100 m from the treatment. • Platforms were not found to modify the risk of rear-end crashes. There was no indication that the priority crossings experience a higher likelihood of rear-end crashes than non-priority crossings. In some instances, priority crossings may reduce crash risk if the crossing assists in clarifying priority rules for road users.
CDM Research 2015, 2016	Evaluate the effectiveness of raised priority crossings	<ul style="list-style-type: none"> • Captured over 1000 interactions between bicycle riders and motor vehicles at priority crossings of side streets. • Motorists gave way to cyclists in between 94% and 99% of interactions on 4 priority crossings (CDM Research, 2015). • There was no evidence to suggest that the priority allocation (ie. who has right of way) of the crossing fundamentally affected the safety performance. • Factors such as speed, visibility and setback of the crossing may be more important than priority in affecting safety. • A follow-on study of 2 priority crossings was undertaken along Somerset Street in Brisbane (refer to Section 7.11) and treated intersections on the Mann Street Cycleway in Cairns. The intersections performed to a satisfactory level of safety with a level of risk similar to other sign controlled residential street intersections. Recommendations were made to optimise the performance of specific crossings by modifying site specific attributes. See Section 7.11 for further information on site.

3 Planning considerations

AGRS Part 2 defines the vision and objectives of the road transport system to include enabling people and goods to move safely and efficiently and to provide a safe and reliable system that is accessible, affordable, and sustainable for all users.

Crossing treatments provide an important function in this system, ensuring conditions enable all users to cross roads. Table 3 summarises preliminary considerations for planning for raised crossings. Refer Section 4 for detailed guidance. Figure 3(a) shows a crossing facilitating safe access for all users to bus stops.

Table 3 – Summary of preliminary planning considerations for raised crossings

Issue	Scoping considerations
Accessibility	<ul style="list-style-type: none"> • Raised crossings are a form of controlled crossing that provides access for all users, including people with vision and mobility impairments and children. Uncontrolled crossings such as refuges do not provide for all users in many contexts, because they rely on path users to detect gaps in traffic, and this may not be possible for children and people with vision or cognitive impairments. • Crossing design should ensure access for users of all ages and abilities including people with a vision impairment, people with a physical or mental disability and children who are less able to accurately judge gaps in traffic. As traffic volumes increase, risk to users using uncontrolled crossings also increases. • User surveys show that people walking and riding consider unprotected crossings as risky. Figure 3(b) shows secondary school students and carers/parents risk scores for various crossing treatments. Parents for the most part scored unprotected side roads as risky or very risky, with students considering them neither risky nor safe.
Value for money	<ul style="list-style-type: none"> • Raised priority crossings are often provided for 25-30% of the cost of a signalised crossing while also delivering a better crash reduction factor. This makes raised crossings a cost-effective crossing that provides access for all users in many contexts.
Network context	<ul style="list-style-type: none"> • Raised priority crossings should be considered at side roads, mid-block, roundabouts and slip lanes. At slip lanes and roundabouts, pedestrian crossings (zebras / wombats) are more commonly installed. • Requirements for provision of crossings at roundabouts are provided in RPDM Part 4B Roundabouts. Raised pedestrian (wombat) crossings have been used at multi-lane roundabouts. Section 7.3 is a case study of a pedestrian (wombat) crossing at a multi-lane roundabout and Section 7.4 is a multi-lane pedestrian (wombat) crossing offset from a roundabout. • A raised priority crossing is a fall back from converting a minor side road to a cul-de-sac or roundabout when better aligning access with functional road hierarchy is not feasible. • Refer to Queensland MUTCD Part 10 for installation requirements for raised crossings.

Issue	Scoping considerations
Operating speeds	<ul style="list-style-type: none"> • Crossing platforms are typically designed to reduce vehicle operating speeds at crossings by 20 km/h. Where there is a 50 km/h operating speed (85th percentile speed), platforms often achieve safe system speeds of 30 km/h at the crossing and are a primary safe system treatment. At sites with a 60 km/h operating speed, a new platform would be expected to reduce the operating speed on the crossing to approximately 40 km/h. • Platforms are still likely to significantly reduce chances of death and serious injury crashes where smaller reductions in speed are achieved (see Figure 2.3). Consistent with <i>Austroads Guide to Road Safety (AGRS) Part 3 'even small reductions in travelling speed can have large effects on injury outcomes'</i>. (AGRS Part 3). • Platforms reduce motor vehicle speeds at key conflict points (crossings) and do not result in or require area-wide or whole-of-road speed limit reductions to be effective. • Section 7.2 is a case of a pedestrian (wombat) crossing on a 60 km/h road approved for road trains with a high proportion of heavy vehicles. Section 7.8 is a case study of speed cushions installed at approaches and departures of an at grade zebra crossing on a road with a 60 km/h posted speed limit. • Refer to Queensland MUTCD Part 10 for installation requirements for raised crossings including references to operating speeds.
Turn lanes, left-in and left-out, and crossing setbacks	<ul style="list-style-type: none"> • A vehicle storage setback is desirable but not always required where operating speeds on the major through road are ≤ 50 km/h with low to moderate traffic volumes or conflicting movements at a particular time of day. • Where vehicle operating speeds are higher than 50 km/h, vehicle occupants are at risk of death and serious injuries from side impact crashes, for example between right turning and through moving vehicles. • Where vehicle operating speeds are 70 km or higher, vehicle occupants are also at risk of death and serious injuries from rear-end crashes. • In these circumstances, setbacks to crossings, channelised / auxiliary turn lanes, roundabouts or left-in, left-out movements may be more appropriate to reduce risk of serious injury pedestrian, side-impact and rear-end crashes. • Where vehicle speeds are greater than 50 km/h, one or more of these treatments should be considered. See Figure 3.4. and Figure 3.5. • Where there may also be a demand for crossing the major through road, a roundabout with raised crossings may provide a more suitable treatment option (See <i>Austroads Guide to Traffic Management (AGTM) Part 6</i> and <i>Queensland Guide to Road Safety (QGRS) Part 6.</i>).

Issue	Scoping considerations
Sight lines for riders and pedestrians	<ul style="list-style-type: none"> • Where bike riders approach the crossing in a straight direction (i.e. side road crossings or mid-block crossings with paths in the same direction of movement) it is desirable to provide unobstructed sight lines between riders 10 m back from the crossing to approaching drivers. These sight lines are conducive to both riders and drivers being able to observe each other in time to react and prevent a crash. • Sight lines for pedestrians are easier to achieve. Unobstructed sight lines should be provided from pedestrians at least 1 m from the crossing. See Section 4 for more information on sight lines. • Sight lines are typically affected by property boundaries (fences and walls), crossing setback and on-street parked vehicles.
Horizontal and vertical geometry	<ul style="list-style-type: none"> • Raised platforms are preferably installed on straight sections of road to minimise stability issues for trucks and motorcycles. In other locations, ramps should be constructed perpendicular to the direction of vehicle travel. See Figure 3(c). • When locating crossings on crests, careful consideration must be given to ensuring Approach Site Distance (ASD) is achievable around crests. Refer to Section 4.5 • When installing crossings on streets with longitudinal gradients exceeding 3%, consideration should be given to reducing the crossfall on the crossing consistent with RPDM Part 6A. This may be achieved by adjusting ramp gradients each side of the crossing to accommodate a crossfall for a person walking across the platform of 2.5%, or 3% where the platform is asphalt (See AS 1428.1). Ramp gradients should be measured relative to the existing longitudinal grade (See Figure 4.3.3(a)). Consideration may be given to using a speed-cushion on the higher side of the crossing instead of a ramp. • Where a suitable crossfall cannot be achieved in retrofit projects, practitioners should seek to optimise the crossfall for a person using the crossing with a performance-based solution. Options that can be considered include reducing the width of the crossing, installing road cushions at the uphill approach, incorporating works as part of a road rehabilitation where there is greater scope to reprofile the road.
Lighting	<ul style="list-style-type: none"> • Upgrading existing lighting is more cost-effective than providing new lighting where none exists. Site inspections should consider what existing lighting is present at a site. • Existing refuge crossings are usually lit. From a lighting perspective, these sites may be more cost effective to upgrade.

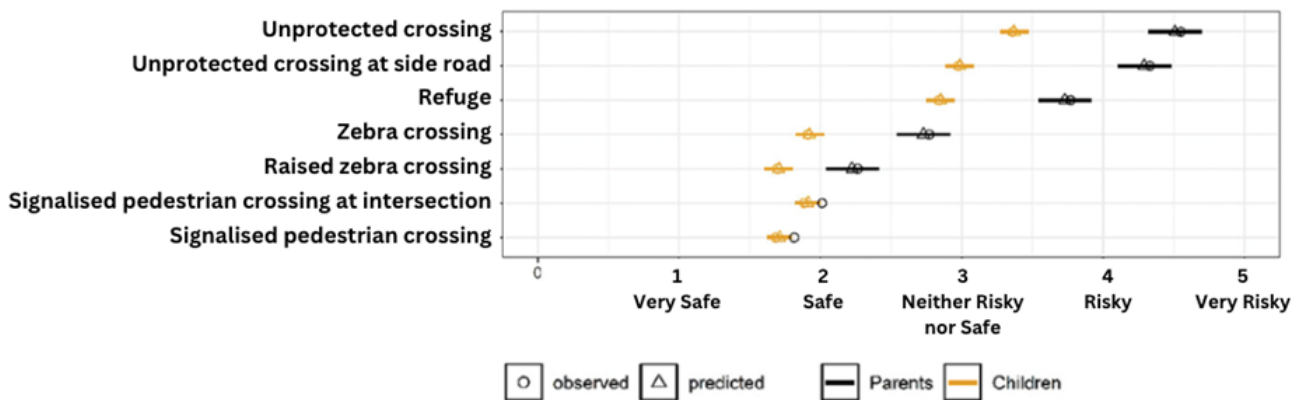
Issue	Scoping considerations
Drainage	<ul style="list-style-type: none"> • At some sites, raised priority crossings will require significant drainage works to protect users or property. From a drainage perspective, the order of preference for raised priority crossings is as follows: <ul style="list-style-type: none"> – On crests. – Directly downstream of existing on grade inlets, as upsizing or duplicating inlets to reduce surface flows can be a relatively inexpensive upgrade. Also bypass flows are a minimum at this point if shallow box drainage through the crossing is required. – Mid-block or directly upstream of drainage inlets. This could require new inlets on both sides of road and flows may be high requiring larger boxes or grated drains through raised priority crossings. – At sag points. This could require duplication of drainage on both sides of the raised crossing or significant box drainage through raised crossings. Also has the greatest risk of creating a nuisance due to ponding or cutting the link if inlets become blocked. In other cases, the walkway will remain dry after an event even in the case of inlet blockage. • Raised crossings should be considered at greenfield sites as there is more flexibility in early planning stages to achieve good outcomes for all. • Consider potential for localised low points or trapped sags that may pond. Elimination of ponding may be achieved many ways such as correcting the road surface to drain freely, modifying the ramp location or altering ramp steepness. • For greenfield sites the drainage should be designed with the placement of crossings to maximise usability and safety for users. However, consideration should be given to avoiding sag points where possible. If this cannot be achieved a local crest may be developed to push sag points away from the crossing.
Bus routes	<ul style="list-style-type: none"> • In Queensland, a significant proportion of raised crossings are constructed on bus routes. A 2024 review of 157 sites with raised crossings found 81 were on bus routes (See Figure 3(a)). Platforms should be designed to conform to requirements for buses (see Section 4). • Victorian research identified that walking is the main way people get to bus stops and approximately one-third of users are aged 10-19 (Victoria Walks, 2021). They also identified a large number of bus stops were on high-speed roads but only a small number of bus stops include crossings.
School crossings	<ul style="list-style-type: none"> • QRSTUV: <i>Guide to Schools</i> allow for raised pedestrian crossings to be installed in school zones. It describes requirements around supervision for crossing facilities and the benefits of raised crossings for reducing vehicles speeds.

Issue	Scoping considerations
Intersections	<ul style="list-style-type: none"> Where safer crossings are required in the vicinity of an uncontrolled intersection, consideration should be given to providing transformational safe system treatments that protect all users from serious injuries or fatalities. Raised intersections, and roundabouts fitted with raised crossings may be suitable treatments in these contexts.

Figure 3(a) – Crossing facilitates access for all users to bus stops



Figure 3(b) – Risk score for various crossing types identified by secondary school students and parents/carers



Source: Swaine et al, 2023.

Figure 3(c) – Left: Raised intersection with priority crossings (Northcliffe Tce, Surfers Paradise). Right: Ramps designed perpendicular to vehicular path of travel (Ward St, Tweed Heads)



Note: Right image shows red surfacing treatment beneath zebra crossing markings. Red pavement treatment should not be provided under crossings (see Table 4.2).

Source: Nearmap 2024

Figure 3(d) – Urban channelised right turn on approach to a raised priority crossing provides a safe place for vehicles to slow down and store whilst checking for vehicles and path users (Winton Way and Coronation Drive, Tannum Sands)



Note: It is recommended that left or right turn turn-lanes are marked. See RPDM Part 4A.

Figure 3(e) – Auxiliary and Channelised turn lanes at approaches to separated pedestrian and cyclist crossing provide (Banaya Ave and Terrance Ave, Nirimba)



Source: Nearmap 2024

4 Design guidance

4.1 Benefits and challenges of installing raised priority crossings

The benefits of raised priority crossings include:

- providing a more direct route for cyclists and pedestrians, and providing a higher level of service that decreases cyclist travel time and effort required
- address severance issues for people walking and riding. This may be especially important for children, people with disabilities and older people
- typically cost between a quarter and a third as much as an equivalent signalised pedestrian crossing
- reducing vehicle speeds at the conflict point, which increases time available for perception reaction
- improving safety by reducing both the likelihood and severity of crashes. In most contexts a raised priority crossing is considered a primary safe system treatment
- attracting riders away from higher risk on-road routes
- improved cycling participation as facility provides for riders of all ages and abilities
- improving the visibility of pedestrians, and people with a disability, to drivers
- removing kerb ramps which can be difficult to negotiate for some people with a mobility impairment

- can be retrofitted to roundabouts, side road intersections, slip lanes and mid-block, and
- providing an acceptable path cross fall where a path crosses a side street on a gradient.

Challenges with raised priority crossings include:

- they may require modifications to drainage which can be expensive to retrofit (see road cushion example for alternative treatment)
- can create issues with underbody clearances on bus routes if they are not designed appropriately, and
- additional maintenance requirements around pavement treatments and some drainage features.

4.2 Design attributes for raised crossings

Design attributes that contribute to the safety of priority crossings are identified in Table 4.2. Research into priority crossing operations suggests that compromises can be made with regards to some attributes, but not all. The attributes in Table 4.2 are classified into levels of importance as follows:

- **Essential** – all listed attributes should be incorporated into all projects.
- **Important** – attribute should be incorporated. A maximum of one of these attributes can be omitted, but only if all other attributes in the table are managed such that each attribute contributes to minimising risk to users.
- **Highly desirable** – attributes should be incorporated wherever possible. These attributes work together. If one attribute cannot be provided, it should be compensated for by increasing performance of other attributes.
- **Supportive** – these attributes support the risk management-based approach and should be used to support other measures.

Figure 4.2(a): Raised priority crossing (McCall Place, Bli Bli)



Source: Nearmap (2025)

Figure 4.2(b): Raised pedestrian crossing incorporating red pavement treatments on ramps. Red pavement should not be provided beneath zebra crossing markings. Gore Hwy, Milmerran



Table 4.2 – Attributes that improve safety performance of priority crossings

Importance	Attribute	Comments	Criteria	Guidance
Essential	Motorist speed at the crossing point	<ul style="list-style-type: none"> • Speeds strongly influence crash severity. Low, equitable speeds increase response times and allow negotiation and communication between motorists and pedestrians / cyclists. Where existing speeds are high, crossings should be designed to reduce vehicle speeds when they approach the crossing. • Appendix 4 describes examples of how Queensland MUTCD Part 10 requirements are applied at raised priority crossings and raised pedestrian crossings. 	<ul style="list-style-type: none"> • Maximum vehicle speed at crossing point. 	<ul style="list-style-type: none"> • 20 – 30 km/h desirable. • Design crossings to optimise speed reduction at crossing. Any reduction in operating speed at crossing improves safety. See Section 4.3 for predicted vehicle speeds dependent on crossing and platform attributes. • See Queensland MUTCD Part 10 for 85th percentile operating speed requirements.
	Lighting	<ul style="list-style-type: none"> • Lighting the crossing allows time for drivers to observe and react to pedestrians and riders on the crossing. • Lighting the approaches allows drivers to observe a rider and react before their paths cross on the crossing. • Lighting requirements are affected by approaching vehicle speeds and surrounding land use. 	<ul style="list-style-type: none"> • Luminaires on the crossing facility. 	<ul style="list-style-type: none"> • If 85th percentile vehicle speeds at crossing \leq 20 km/h, apply AS/NZS 1158.3.1. (Minimum lux on platform 3.5). • For mid-block, apply AS/NZS 1158.4 on the crossing.
	Regulatory signs and lines	<ul style="list-style-type: none"> • Required to establish the priority rules to road users and approach of a raised platform. • STOP signs and holding lines may be used if sight lines to path users are poor. 	<ul style="list-style-type: none"> • Consistent with road regulations. 	<ul style="list-style-type: none"> • GIVE WAY or STOP signs and line marking at vehicle approaches.

Raised priority crossings for pedestrian and cycle paths

Importance	Attribute	Comments	Criteria	Guidance
	Tactile Ground Surface Indicators (TGSIs)	<ul style="list-style-type: none"> Direct and alert users to crossings. Where crossings combined with centre island width ≥ 2.4 m, TGSIs should be installed both sides of island. 	<ul style="list-style-type: none"> Hazard and directional TGSIs. 	<ul style="list-style-type: none"> Refer AS 1428.4.1 Figure C10(b).
Important	Supplementary signs and linemarking	<ul style="list-style-type: none"> Including the 'PEDESTRIANS BICYCLES' sign improves understanding of the treatment (See Queensland MUTCD Part 10, Sign W8-32). Broken centre line communicates bi-directional path movements to drivers. 	<ul style="list-style-type: none"> W8-32 (PEDESTRIANS BICYCLES). Broken centre line contrasting colour to surface treatment. Piano key markings on ramps (see Queensland MUTCD Part 10). 	
	<p>Raised crossing – platform height</p> <p>Raised crossing – platform gradient (changes in grade)</p>	<ul style="list-style-type: none"> Raising crossings is an effective way of reducing motorist speed, crash likelihood and severity. The platform height and the change in grade influence its effectiveness. If a minimum height platform is used (for drainage purposes), a steeper ramp is needed to achieve target vehicle speed. If shallower ramps are used (bus routes), other design features are needed to achieve target speeds. Further guidance for ramp design and predicted vehicle speed is provided in Section 4.3 and RPDM Part 4. 	<ul style="list-style-type: none"> Height of platform. Change in grade for intersection crossings. Change in grade for mid-block crossings. 	<ul style="list-style-type: none"> Desirable: 100 mm. Acceptable 50 mm or greater. 1:6 to 1:15* for side road crossings. 1:12 to 1:20* desirable for mid-block crossings (See AGRD Part 4 raised zebra platform design and Section 4.3).
	Kerb radius into side street	<ul style="list-style-type: none"> A tighter kerb radius encourages lower speeds. Consider using mountable aprons to encourage tighter turns for small vehicles, while being mountable for the design vehicle. 	<ul style="list-style-type: none"> Radius of corner aprons. 	<ul style="list-style-type: none"> 5 m for small vehicles.

Raised priority crossings for pedestrian and cycle paths

Importance	Attribute	Comments	Criteria	Guidance
	Coloured surfaces	<ul style="list-style-type: none"> • Delineate the crossing location, reinforce the priority of path users, communicate to path users that environment has changed. Contrast with adjacent ramp surfaces. • Note: green surfacing should not be used on shared paths as green should only be used on dedicated cycling facilities. Green surfacing may be used adjacent to a pedestrian / zebra crossing. For shared paths yellow is preferred as it contrasts well with asphalt ramps and surfacing. See Figure 1.1. for examples. • Red surface treatments may be used on ramps or in advance of crossings (See Figure 4.2(b)). Red surface treatments should not be used beneath zebra crossing linemarking, as the contrast is insufficient for some path users with vision impairments. • For concrete platforms, a full depth pavement colour should be used as surface treatments affect slip resistance. 	<ul style="list-style-type: none"> • Crossing colour 	<ul style="list-style-type: none"> • Coloured yellow treatment continues for 2–5 m on pathway approaches and contrasts with black / asphalt ramps and black/dark linemarking. • Australian Standard Golden Yellow Y14 or may be used for raised priority crossing pavement surfaces.
	Visibility	<ul style="list-style-type: none"> • Visibility contributes to good safety outcomes. It is desirable but not essential where other attributes (especially motorist and rider speeds) are achieved. 	<ul style="list-style-type: none"> • Unobstructed sight lines from drivers turning into side street to cyclists using path is desirable. • Approach Sight Distance (ASD) to crossing must be available on the minor road approaches at side roads, and all approaches at mid-block (see AGRD Part 4A). • Parking restrictions 20 m at approaches See Section 5. 	
Highly desirable	Rider speed	<ul style="list-style-type: none"> • Design speeds are ideally achieved by using suitable approach geometry. Speed should not be controlled by introducing hazards such as chicanes or bollards. 	<ul style="list-style-type: none"> • Bicycle / e-scooter speed range. 	<ul style="list-style-type: none"> • 15–25 km/h.

Raised priority crossings for pedestrian and cycle paths

Importance	Attribute	Comments	Criteria	Guidance
	Set-back	<ul style="list-style-type: none"> A set-back allows a vehicle to store between the through traffic lane and the crossing. It mitigates against vehicles storing on the crossing and allows drivers to consider the crossing separately to the intersection. Optimum set back is a compromise between having vehicle storage space and not diverging from desire lines or reducing sight lines. If set back can't be achieved, sight lines should be good, and rider and motorist speed controlled to about 20 km/h. 	<ul style="list-style-type: none"> Desirable set back from traffic lane. Where traffic volumes on side road 1000 vpd or less and vehicle operating speeds on through road ≤ 50 km/h. 	<ul style="list-style-type: none"> 5–7 m. 0–7 m set back may be appropriate.
Supportive	Motorist volumes	<ul style="list-style-type: none"> Volumes up to 5000 vpd on the side road appear to function adequately. Volumes appear unrelated to safety outcomes but may affect motorist delays. 	<ul style="list-style-type: none"> Vehicles per day. 	<ul style="list-style-type: none"> < 5000 vpd desirable but not essential.
	Warning Signs	<ul style="list-style-type: none"> Can be used in advance of facilities where visibility of the crossing or the regulatory signs is obscured. 	<ul style="list-style-type: none"> W3-2A (GIVE WAY sign ahead). Refer to Queensland MUTCD Part 10 for warning sign guidance. 	
	Intersection movements	<ul style="list-style-type: none"> Limiting movements at intersections can improve the ability of users to judge gaps between traffic. 	<ul style="list-style-type: none"> Remove left out movements (more commonly associated with near misses in observational data than other movements). Install a centre median to reduce movements to left in left out. 	
	Crossing distance	<ul style="list-style-type: none"> Shorter crossing distances reduce exposure for path users, encourage lower speeds and reduce costs associated with platform construction. 	<ul style="list-style-type: none"> Length of crossing (m) 	<ul style="list-style-type: none"> 5.5 m

*Gradients of 1:15 are acceptable on bus routes (Queensland *Manual of Uniform Traffic Control Devices* Part 13). As a standalone treatment, they may be ineffective at reducing speeds to the acceptable range. Other design features such as tighter horizontal geometry may also need to be incorporated to achieve target design speeds.

4.3 Vehicle speeds

4.3.1 Optimisation

Platform design should seek to optimise vehicle speeds at the crossing site, with consideration to:

- Providing a safe operating environment where the likelihood and consequences of crashes are low. Ideally vehicle speeds at the crossing will be below 30 km/h. However, any reduction of speed below 50 km/h significantly reduces the severity of these types of crashes (see Section 2.3).
- Providing an appropriate vertical alignment for vehicles, including any buses or heavy vehicles that use the route.
- Minimising negative impacts on people living or using spaces adjacent to the crossing.

To balance these objectives platforms are usually designed to reduce vehicle speeds by approximately 20 km/h from the existing operating speed.

4.3.2 Recommended ramp gradients for platforms

Queensland MUTCD Part 10 provides guidance for 85th percentile speeds at crossings. The following information may be used as a guide to estimate vehicle speeds for different ramp gradients at mid-block crossings. Refer to Queensland MUTCD Part 13 for platform length, height and ramp gradient on bus routes.

Appendix 4 provides case studies for how Queensland MUTCD Part 10 requirements can be applied at raised crossings.

Table 4.3.2 – Recommended ramp gradients for platforms

85 th percentile vehicle speed at crossing	Divided carriageway		Undivided carriageway	
	Approach ramp grade	Comfortable max speed (km/h)	Approach / departure ramp grade	Comfortable max speed (km/h)
50 km/h	1:15 (6.7%)	30 km/h	1:20 (5%)	40 km/h
60 km/h	1:20 (5%)	40 km/h	1:25 (4%)	50 km/h

Source: Austroads Publication AP-R642-20 Effectiveness and Implementation of Raised Safety Platforms.

For crossings on side roads, refer to Table 4.2 and Figure 4.3.3(c).

4.3.3 Predicting vehicle speeds model

Further information for predicting vehicle speeds at crossings can be found in Queensland research into existing facilities. An observational study that considered 40 Queensland crossing sites developed regression models to predict 85th percentile motorist speed at mid-block and T-intersections. The study considered sites with existing posted speed limits of 40 – 60 km/h. These models may be used to predict vehicle speeds for mid-block and T-intersection sites based on the change in grade between the road and the crossing ramp (see Figure 4.3.3(a)). The relationship is described below and in Figures 4.3.3(b) and 4.3.3(c):

- **Mid-block crossing sites:** Increasing the ramp slope by one degree decreases the average motorist speed by 2.34 km/h. For example, if the ramp grade were increased from 1:12 (4.8°) to 1:8 (7.1°) the average motorist speed is predicted to reduce by $(7.1 - 4.8) \times 2.34 = 5.4$ km/h. Increasing crossing length by 1 m increases average motor vehicle speed by 0.60 km/h.
- **T-intersection crossings:** Every degree of additional ramp slope decreases the average motorist speed by 0.62 km/h. Increasing the crossing length by one metre increases average motorist speed by 0.45 km/h. Every metre of additional sight visibility along the minor street increases average motorist speed by 0.05 km/h.

Significant reductions in vehicle speeds were also recorded at a site with road cushions installed either side of the crossing. Section 6.2.7 describes a case study showing the use of this treatment.

Figure 4.3.3(a) – Change in ramp gradient for crossing design



Figure 4.3.3(b) – Mid-block crossings - predicted motorist speed with change in ramp grade

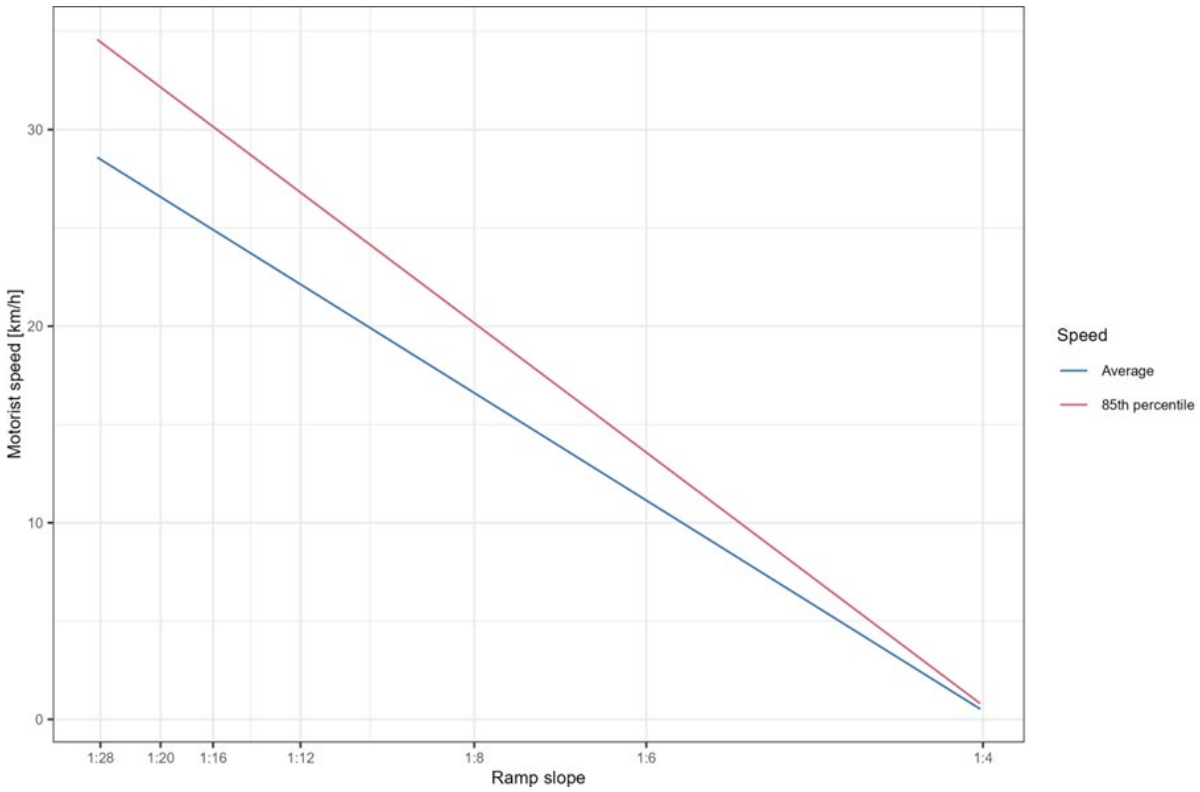
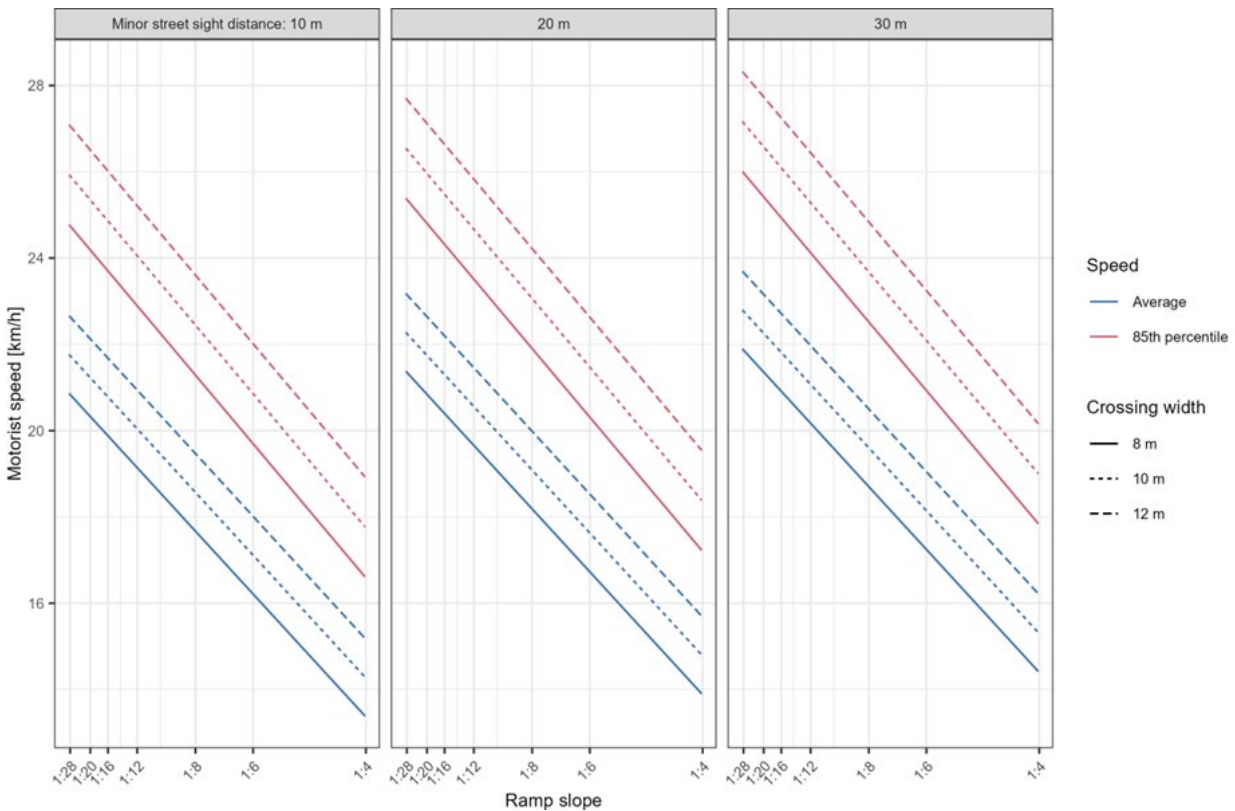


Figure 4.3.3(c) – Side road raised crossings - predicted motorist speed with change in ramp grade



4.4 Drainage

For greenfield sites the drainage should be designed with the placement of raised priority crossings located in an ideal location for usability and geometric safety. Notwithstanding this, it is still not ideal to have platforms located in sag points (see Section 3). At sag points, installing a raised crossing over a drainage pit may affect its maintenance, worsen its blockage, and reduce its ability to capture or bypass flows. If this is unavoidable, a number of design solutions may be appropriate to eliminate ponding potential such as creating a local crest, extending the platform length, or flattening the ramp to push the sag point away from the crossing. Water sensitive urban design approaches may also have synergies with raised crossing design.

When designing the drainage solution for either a brownfield or greenfield raised crossing, all minor and major storm requirements shall be in accordance with RPDM Parts 5, 5A and 5B. Of note are:

- Flow / ponding widths at the upstream side of the raised crossing. Requirements may be able to be relaxed in cases where approach speeds are slow, all other requirements such as depth are able to be met, and the raised crossing remains visible to motorists. Additionally, a risk assessment process is required to support any departures or relaxations to flow widths, as per RPDM Part 5. Sites are to be assessed on a case-by-case basis for approval and must show that compliance cannot be practically achieved and safety is not compromised.
- Where box or grated drain solutions are used:
 - The assessment should consider overflow routes for the fully blocked case to ensure that these will not cause damage or nuisance to downstream properties or infrastructure.
 - d_0V must be < 0.4 at all locations but particularly the inlet and outlet of drain as this is a high pedestrian risk area.
- Where an raised crossing is installed in a Local Government Authority (LGA) mapped flood area, afflux impacts must be checked to ensure they are within the acceptable limits of the asset owner and LGA.
- Where an raised crossing causes worsening to existing drainage, e.g. increased road flow widths, all impacted asset owners must be consulted and agree to the allowable impacts
- On roads with steeper gradients, velocities of upstream flows in larger storm events should be checked for water flowing over the raised crossing and breaking out of the normally controlled flow channel. Ensure break out flow does not impact sensitive land uses nearby or consider different design approaches (such as lower height platform or road cushions) to reduce break out flow issues.





Drainage networks may be designed to accommodate minor events in pipe networks and roads for overland flow paths for more extreme events. Raised platforms may interrupt kerb flow paths and prevent water from draining away from the major road. Options to address this issue include:

- upsizing pipes in the drainage system (expensive)
- incorporating box drains on the sides of platforms to retain drainage past the platform (see Table 4.4)
- constructing lower height platforms (below top of kerb height) and modelling to confirm flow path (see Table 4).
- requiring path users to traverse down kerb ramp, through drain channel and climb back up to the raised platform. This option achieves no height boost visibility benefit for smaller stature path users to be visible to drivers of vehicles with close range blind zones. Climbing up to the raised platform will also slow the speed of some pedestrians extending the time required for a driver giving way (see Figure 4.4).

Figure 4.4 – Raised crossing incorporating separation devices and kerb and channel to facilitate drainage



Table 4.4 – Options to manage drainage at priority crossings

Treatment	Considerations	Examples
Box drains	<ul style="list-style-type: none"> • Opening needs to be sufficient size to reduce likelihood of blockage as has occurred in North Street example. • Maintenance regime may be required. • Providing the cover over the drainage pit access. • Load-rated concrete infill utility trench covers may be an off the shelf solution for bridging the box drain. 	 <p>The Esplanade, Rockhampton</p>  <p>Warwick Allora Rd, Warwick</p>
Reduce platform height	<ul style="list-style-type: none"> • Minimum platform height is 50 mm. This is below kerb height and may allow overland flow paths to be preserved. • Ensure smooth transition from path to hump (1:20). • Ramp gradient 1:6 or steeper. 	 <p>Goonawarra Drive, Mooloolaba</p> <p>Note: Refer to Queensland MUTCD Part 10 for coloured surface treatment guidance and signage.</p>
Upsizing pipe network	<ul style="list-style-type: none"> • May be an option where short sections of network can be upgraded to an appropriate discharge point. 	
Road cushions instead of platform	<ul style="list-style-type: none"> • Have been shown to be an effective measure for reducing vehicle speeds at crossings. • Design to reduce likelihood of drivers swerving around cushions. • See case study Section 7.8. 	 <p>Kalana Rd, Aroona</p>

4.5 Sight lines

Sight distance requirements for pedestrian crossings are described in Queensland MUTCD Part 10, RPDM Part 4A and RPDM Part 6A. Transport and Main Roads sight distance requirements are harmonised (accepted with amendments) with AGRD Part 4A.

Consistent with this guidance, Crossing Sight Distance (CSD) is not required at crossings where path users have priority including pedestrian (zebra) crossings and raised priority crossings. Note that it is desirable to provide CSD even if the crossing user has priority.

Sight distance requirements at raised priority crossings include:

- Approach Sight Distance (ASD) - see RPDM Part 4A and Queensland MUTCD Part 10.
- Stopping Sight Distance (SSD) - see RPDM Part 6A.

Figures 4.5(a) to 4.5(c) show typical minimum sight distance requirements for raised crossings, with the following basis:

- Restricting parking at crossing approaches to support unobstructed sight lines between drivers and path users, including riders 10 m from the entry to the crossing. This space allows for an alert bike rider (1.5 second reaction time) travelling at 15 km/h to stop in dry conditions. These sight lines are also required to enable drivers to observe riders at least 10 m from the crossing.
- Providing ASD for the operating (85th percentile) vehicle speed at the site (see Figure 4.5 (a))
- Providing SSD for drivers approaching the crossing at lower speeds and increased alertness (alert perception-reaction time) in response to the raised platform (see Figure 4.5(b)). Note, providing SSD is a mandatory design condition for all roads and intersections.
- Providing time for a cyclist to stop if they observe a driver not preparing to yield.
- Restricting parking to provide unobstructed sight lines between users.

Where sight lines described above cannot be achieved, consideration should be given to minimise risks so far as is reasonably practicable such as restricting motor vehicle turn movements, reducing operating speeds, narrowing crossing distances, improving warning to users. Bollards, deflection rails and offset fences are not appropriate as speed control measures on paths. A Safe System Assessment may be appropriate for contrasting different treatment options at complex sites.

Figure 4.5(a) – Approach sight distance for crossings

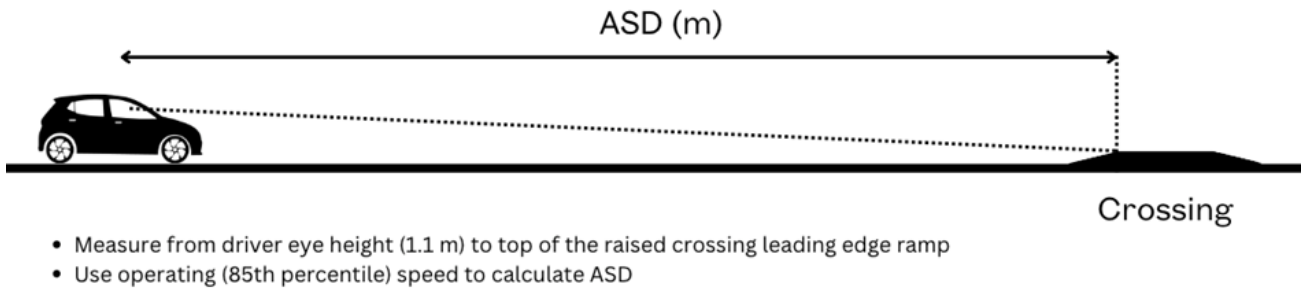


Figure 4.5(b) – Sight triangles for intervisibility between rider and driver at side road crossing

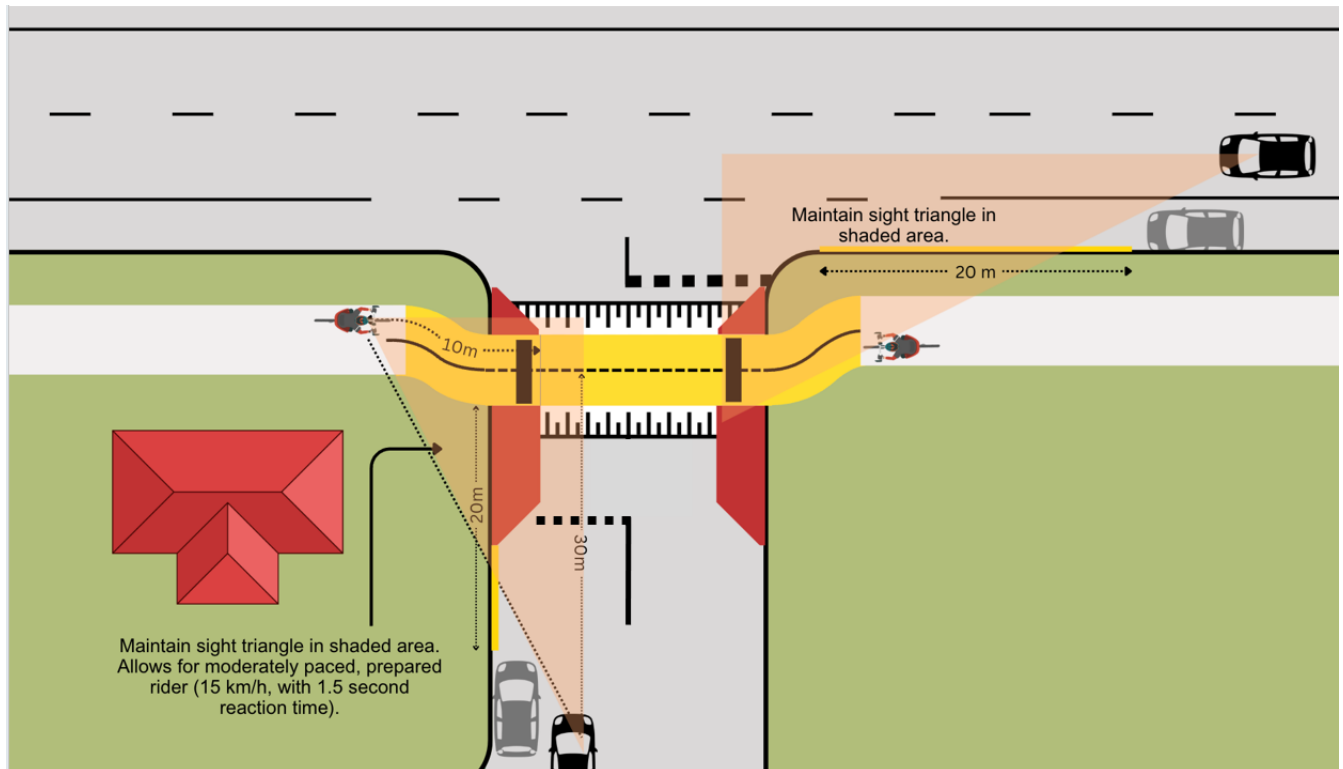
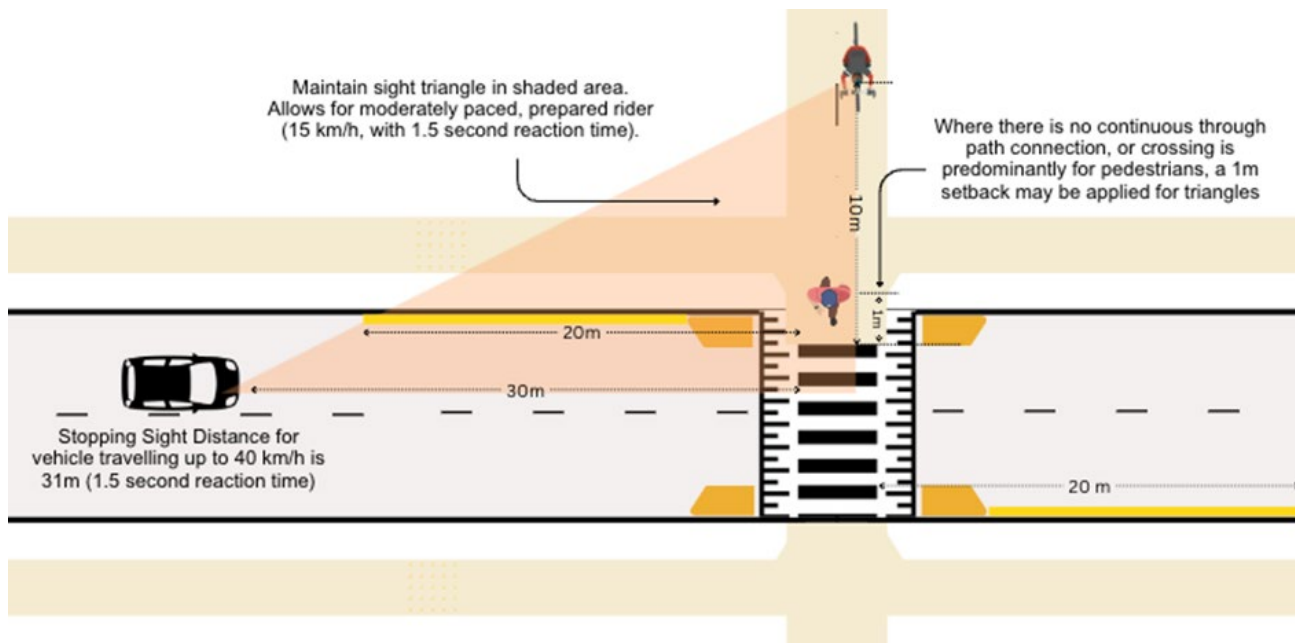


Figure 4.5(c) – Sight triangles for visibility at crossing mid-block crossing



4.6 Lighting

AS/NZS 1158.4 defines lighting categories and technical parameter ranges for pedestrian crossings on arterial, collector and local roads. The lighting parameter requirements are highest on arterial roads and reduce for collector and local roads. The standard requires a high level of lighting that may be impractical for priority crossings on local roads and side roads for the following reasons:

- providing flood lighting in residential areas can cause problems and complaints from nearby residents. AS/NZS 1158.4 allows for lower mounting heights and purpose designed LEDs for pedestrian crossing lighting, which helps to address these issues.
- the standard of lighting assumes a 50–60 km/h speed environment and may provide minimal benefit in situations where traffic vehicle speeds have been managed to 20–30 km/h
- higher lighting standards are unlikely to be accommodated in minor upgrades to lighting systems and may have a significant impact on project costs, and
- the choice of whether to install supplementary lighting at a pedestrian crossing in compliance with AS/NZS 1158.4 rests with the applicable road authority. In many situations, priority crossings and raised pedestrian (zebra) crossings are providing treatments that reinforce existing pedestrian priority at intersections, improve visibility and reduce vehicle speeds. Prescribing higher lighting standards may have the detrimental effect of reducing the number of appropriate sites for these facilities or increasing project costs, such that less facilities will be installed.

Consideration should be given to user needs, site characteristics, and the design attributes of the proposed crossing when selecting a relevant lighting standard to apply. It is recommended that the following standards are achieved for lighting priority crossings or raised pedestrian (zebra) crossings on local side roads:

- AS/NZS 1158.3- this requires a minimum of 3.5 lux on the entire platform, and
- 10 m of lighting on the approaches to the crossing.

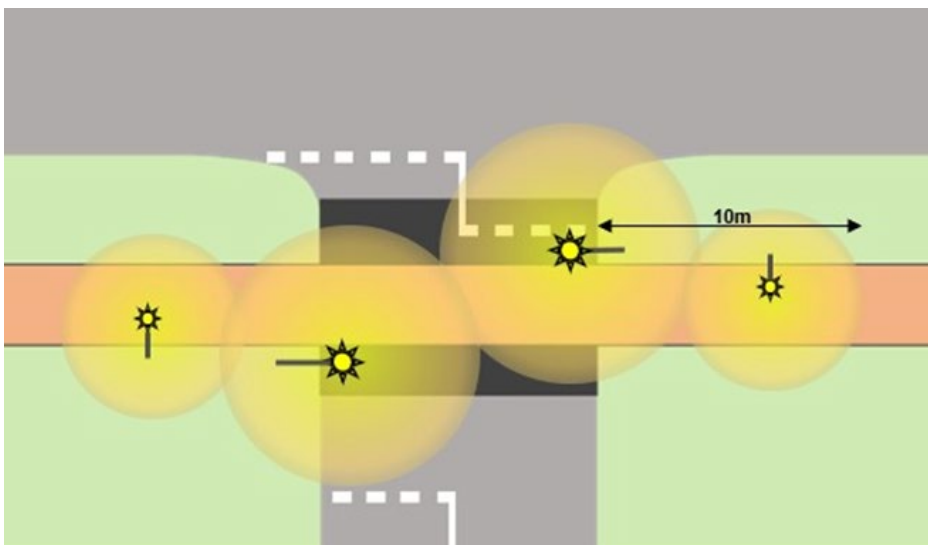
One interpretation of achieving 3.5 lux on the platform is to incorporate one major road luminaire at the crossing on the minor road. The luminaire wattage should be the lowest possible to achieve 3.5 lux.

For mid-block crossings or slip lanes on unlit intersections, refer to AS 1158.4.

Narrowing the crossing distance can create additional space to light the approaches to the crossing and minimise the amount of lighting required on the crossing.

Upgrading of existing lighting infrastructure to achieve compliance should be modelled first before additional lighting treatments are considered.

Figure 4.6 – Example lighting layout at raised priority crossing on side street




4.7 Platform materials

Raised platforms are generally constructed from concrete or asphalt. Examples of detailed design drawings for these treatments are provided in Appendix 1. Recycled rubber platforms have also been used at sites in Queensland (See Section 7.1).

Table 4.7 – Platform materials

Treatment	Advantages	Disadvantages	Examples
<p>Concrete platforms</p>	<ul style="list-style-type: none"> • Excellent design life (50 years approximately). • Precise gradients can be achieved. • Tool joints / sharp change in grade can be achieved. • Smoother top of platform. • Plain or full depth coloured concrete can be used to provide contrast between pathway and platforms. 	<ul style="list-style-type: none"> • Expensive. • Several separate pours are required and time consuming to set. • Road usually needs to be done one side at a time (this doubles construction time). • Pavement surface treatments not suitable on concrete surfaces because slip resistance decreases with age. 	 <p>Brisbane Road, Mooloolaba</p>  <p>River Esplanade, Mooloolaba</p>
<p>Asphalt platforms</p>	<ul style="list-style-type: none"> • More cost effective. • Shorter construction time. • Able to provide a sinusoidal ramp more suitable for bus routes. • Stamped treatments suitable for contrasting colours. • Easily able to correct. 	<ul style="list-style-type: none"> • Less precision in controlling gradients. • Reduced design life. • Platform may not be as level. 	 <p>Warwick Allora Rd, Warwick</p>  <p>Belford Road, Kew, Victoria</p>

Treatment	Advantages	Disadvantages	Examples
Rubber Platforms	<ul style="list-style-type: none"> • May provide lower cost solution. • Can be removed. 	<ul style="list-style-type: none"> • Existing systems require large number of bolt or fixing point attachments. • Asphalt may need to be replaced after removal. • Epoxy set fixings may increase pavement water intrusion 	 <p data-bbox="1045 551 1310 584">Pulgul St, Hervey Bay</p>

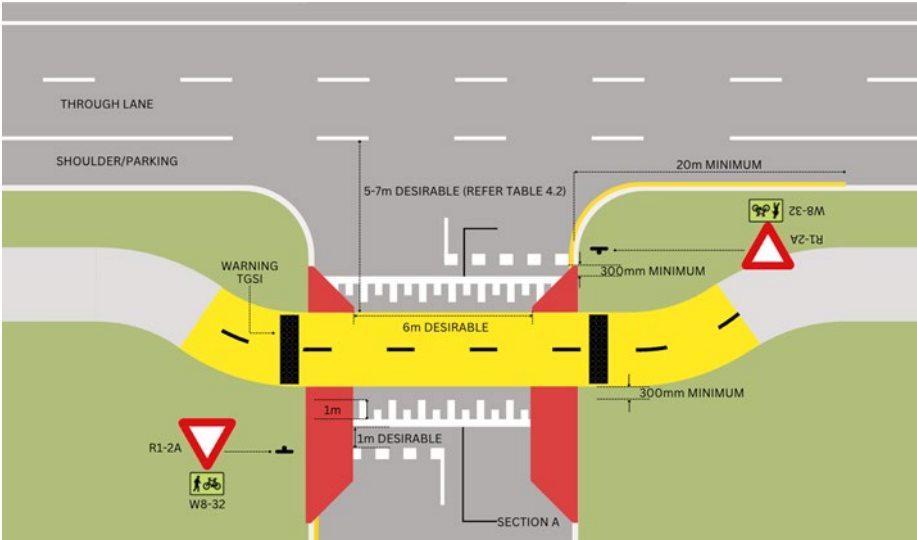
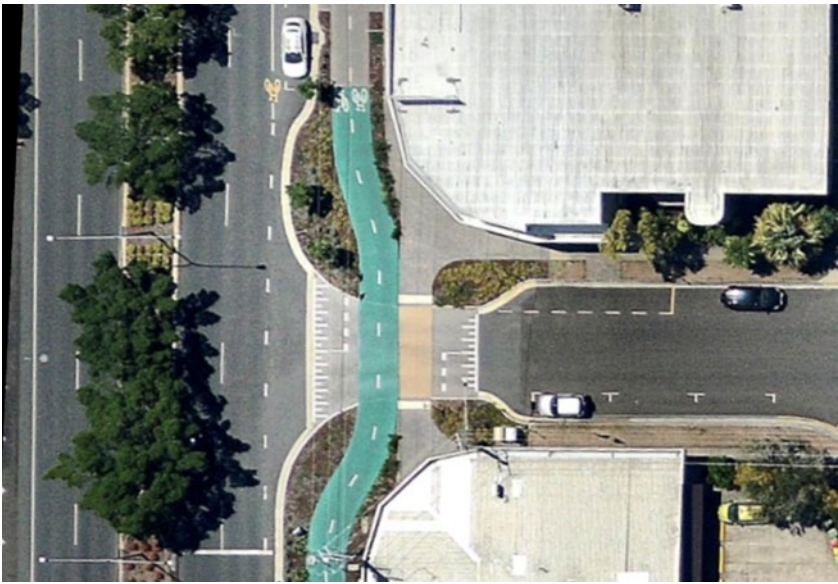
4.8 Set-back distance at side streets

Crossing set back is a compromise between providing sufficient space for a vehicle to store without blocking the path, not diverting path users too far from the desire line or reducing sight lines. On lower volume, lower speed streets, it may not be necessary to provide a storage space for vehicles. In proximity to higher volume, higher speed streets, set back becomes more important as it reduces likelihood of vehicles storing on the crossing and allows drivers to consider path and road intersections separately.

The set back should be measured from the edge of the closest traffic lane to the path crossing. It is desirable to achieve sufficient set back to store one motor vehicle (5-7 m).

Table 4.8 provides guidance on treatments can be used to create space for crossings in constrained locations.

Table 4.8 – Making space to provide set-backs to priority crossings




Treatment	Considerations
<p>Realign traffic lanes</p>	<ul style="list-style-type: none"> • Realign traffic lanes further away from the intersection. • Provide parking only on the cycleway side of the road to support shifting traffic lanes. • Consider staggering parking so it is on one side of the road at the approach to intersection and the alternative side at departure. 
<p>Narrow crossing distance</p>	<ul style="list-style-type: none"> • Narrowing the crossing using kerb extensions can free up space to bend out path at a suitable radius and improve sight distance.  <p>Source: Nearmap (2017). Location: Brisbane Road, Mooloolaba.</p>

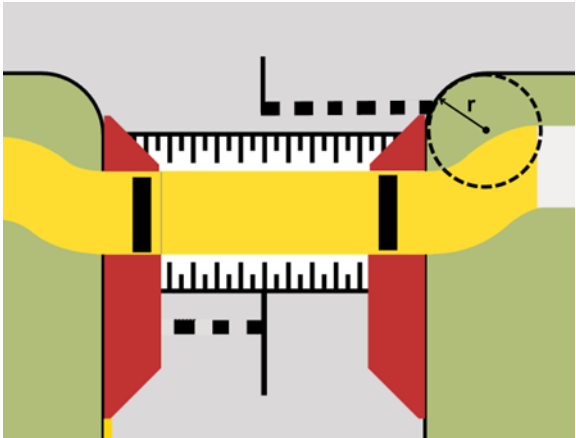

4.9 Horizontal geometry and kerb radii

Changes to horizontal geometry can encourage lower vehicle turning speeds and put drivers in a better position to look for path users by approaching the path head on.

Table 4.9 provides examples.

Table 4.9 – Examples of treatments that affect horizontal geometry

Treatment	Considerations	Examples
Aprons on kerbs	<ul style="list-style-type: none"> • Encourage passenger vehicles to follow a very tight kerb radius to promote lower vehicle speeds. • Design vehicles can mount the apron to make the corner. • Used widely in traffic calming and on roundabouts. 	 <p data-bbox="866 837 1345 869">Apron on a T intersection in Brisbane.</p>  <p data-bbox="866 1167 1425 1234">Drawing of splitter island being mounted by design vehicle. Source: Massachusetts Department of Transportation, 2006.</p>
Aprons on slip lanes	<ul style="list-style-type: none"> • Encourage passenger vehicles to approach intersection at high entry angle. • Design vehicles can mount aprons. • Used widely on roundabouts. 	 <p data-bbox="866 1653 1430 1753">Raised reflective pavement markers and line marking define a high entry angle slip lane, Camp Mountain Road, Samford.</p>

Treatment	Considerations	Examples
Smaller kerb radius	<ul style="list-style-type: none"> • Tight kerb radii promote lower vehicle turn speeds and put vehicles front on to crossing which improves visibility. • Minimum kerb radii determined by design vehicle. • Assume design vehicle can cross road centre line where a risk assessment confirms this is appropriate. • More effective with aprons. 	 <p data-bbox="871 701 1329 734">Distance r shows corner kerb radius.</p>
Median islands	<ul style="list-style-type: none"> • Discourage all vehicles from crossing the centre line • Can reduce vehicle speeds, particularly for right turning passenger vehicles, but can also result in the need for a larger intersection throat with larger kerb radii, which can increase left turn vehicle speeds 	 <p data-bbox="871 1234 1401 1305">Median islands on raised priority crossing. Amess Street, Melbourne.</p>

5 Typical layouts

This section contains examples of raised priority crossings with attributes from Table 4.2. Refer to Appendix 1 for drawings of structural elements. Refer to Sections 6 and 7 for case studies of actual treatments.

5.1 Shared pathways at side roads

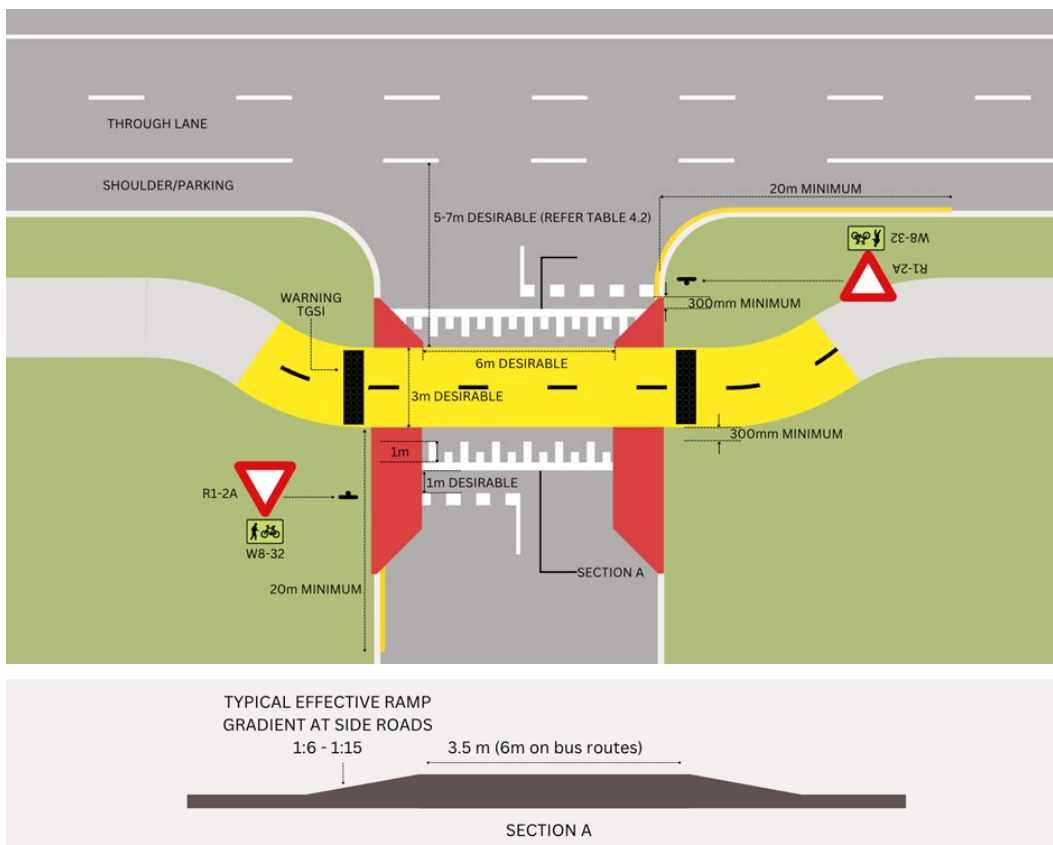
Raised priority crossings have been installed in a variety of settings in Queensland and Australia. These facilities have been evaluated and the important attributes listed in Table 4.2. Figures 5.1(a) and 5.1(b) provide examples of these facilities intersecting with and without parking. Common attributes of the examples include:

- raised priority crossing

- continuous coloured pavement on shared pathway across intersection, contrasting with the platform colour
- extended coloured pavement treatment and centre line 5-10 m past road edge, to reinforce the continuous nature of the shared path facility across the road
- centre line on crossing and for 5-10 m in advance of crossing
- tactile ground surface indicators
- regulatory GIVE WAY or STOP signage and line marking with W8-32 name plate signs 'PEDESTRIANS BICYCLES'
- yellow lines to prohibit parking at approaches
- aprons on intersection corners, or build outs to reduce crossing width
- lighting
- AS 1742.2 Section 5.2.5 defines the colour of yellow pavement marking as Y14. Y42 may also be appropriate.

Consideration should be given to including channelised right turn lanes, or prohibiting right turn movements into the crossing when vehicle operational vehicle speeds are > 50 km/h, to reduce risk to vehicle occupants from side impact crashes with other vehicles (See Figure 2.3 and Section 3).

Figure 5.1(a) – Typical arrangement of raised priority crossing at local side road



Mid-block raised priority crossings are similar to raised pedestrian crossings. The key differences between the functions of these types of facilities are:

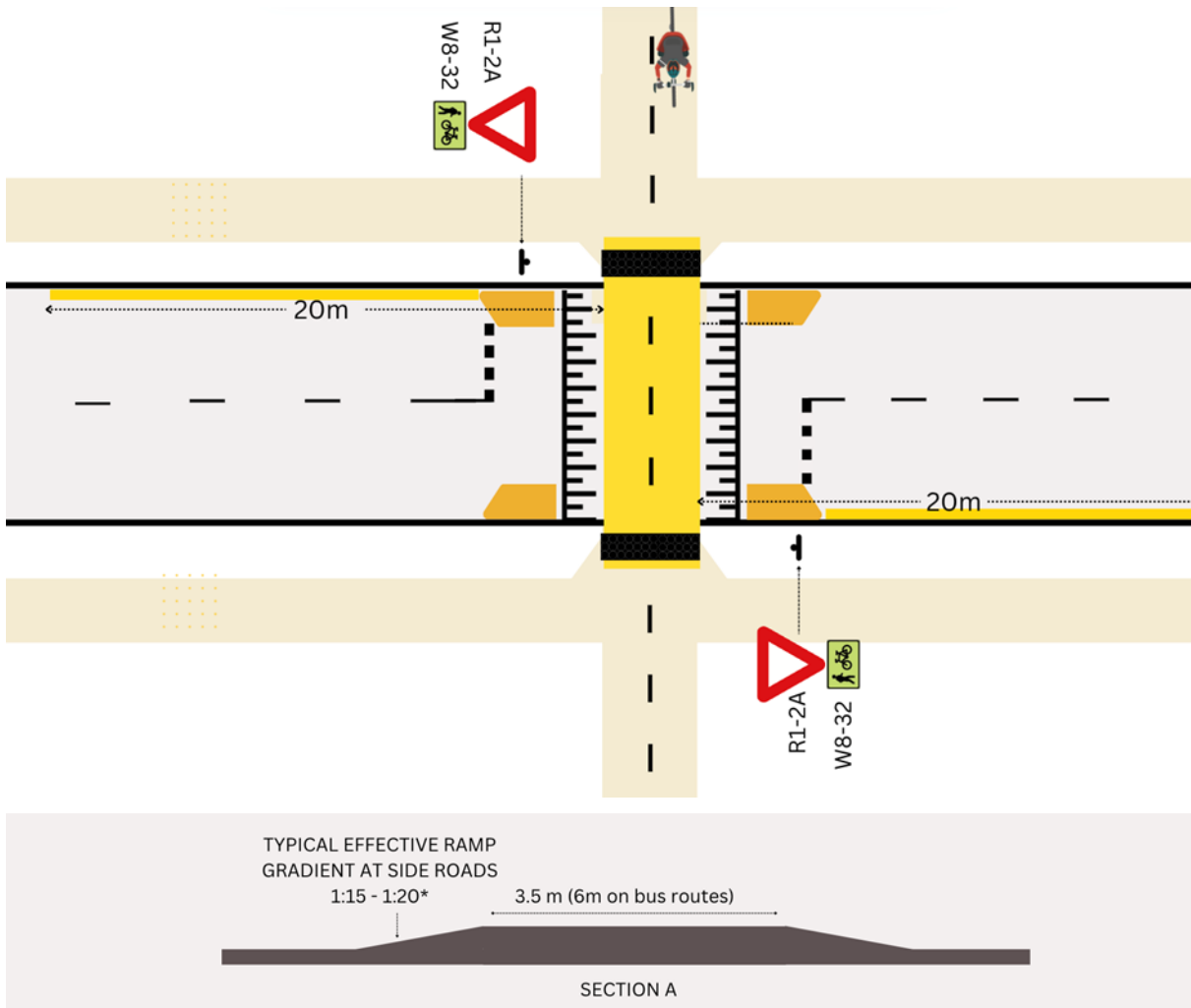
- pedestrian crossings allow cyclists to cross with priority after coming to a complete stop, and
- priority crossings allow cyclists to cross with priority without coming to a complete stop (after checking the road is clear).

Figure 5.2(b) shows an example of a mid-block raised priority crossing which features:

- a higher order pathway crossing a local road
- posted traffic speed limit is 50 km/h or less
- good sight distance between users approaching the crossing and vehicles
- approach sight distance to the crossing facility from road users and path users
- a raised platform with a sinusoidal approach ramp
- regulatory signage and line marking
- build-outs to narrow crossing distance
- lighting on the crossing and 10 m approaching the crossing
- coloured pavement treatment and centre line 5-10 m past road edge, to reinforce the continuous nature of the shared path facility across the road, and
- centre line on crossing, and for 5-10 m in advance of crossing.

Where raised platforms are installed on bus routes, refer to Queensland MUTCD Part 13 for road hump profile and minimum hump length. Where road cushions are installed, refer guidance in AGTM Part8.

Figure 5.2(b) – Preferred arrangement of raised priority crossing mid-block



*See Section 4.3.

5.3 Slip lane crossings

Under Sections 81, 72(4) and 73(3) of the Queensland Road Rules, drivers must give way to pedestrians on slip lanes. Untreated slip lanes create uncertainty for path users and drivers as to who has right of way. Figure 5.3(a) shows an example of an existing raised pedestrian crossing on a slip lane.

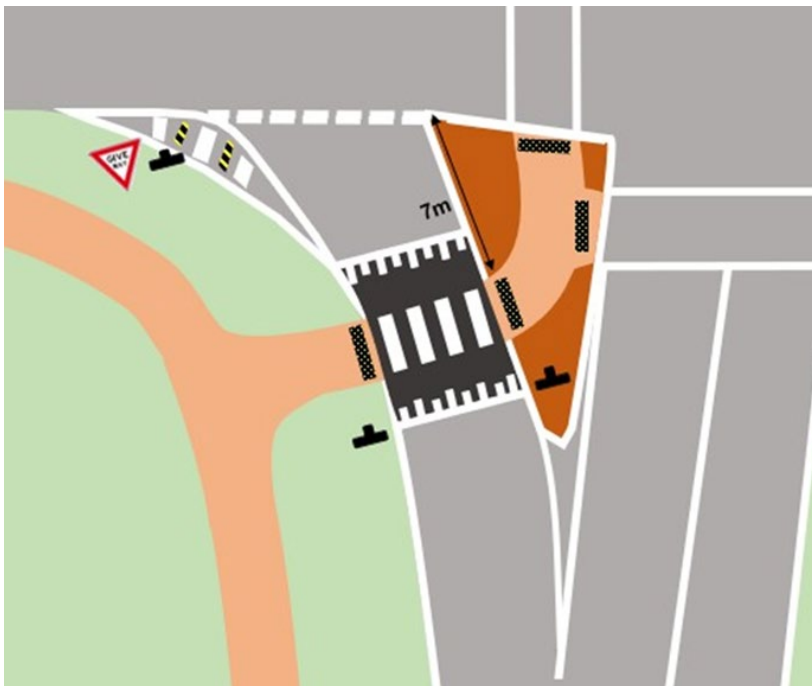
Figure 5.3(a) – Raised crossing with ramps perpendicular to direction of vehicle travel on slip lane, Entertainment Road, Oxenford, Qld



Key features of raised priority crossings on slip lanes are shown in Figure 5.3(b) and are as follows:

- a raised platform to reduce vehicle speeds and increase path user visibility (height and gradient varies between 1:15 and 1:20. See RPDM Part 4B)
- provide a high entry approach angle to traffic that encourages lower vehicle speeds (aprons, line marking and raised reflective pavement markings or speed humps can be used for this)
- 7 m offset between edge of crossing and through lanes at slip lanes is recommended
- ramps should be perpendicular to the direction of vehicle travel, and
- pedestrian crossing signage and line marking as per Queensland MUTCD Part 10.

Figure 5.3(b) – Example arrangement of raised pedestrian crossing on slip lane (see Queensland MUTCD Part 10) for linemarking and signage

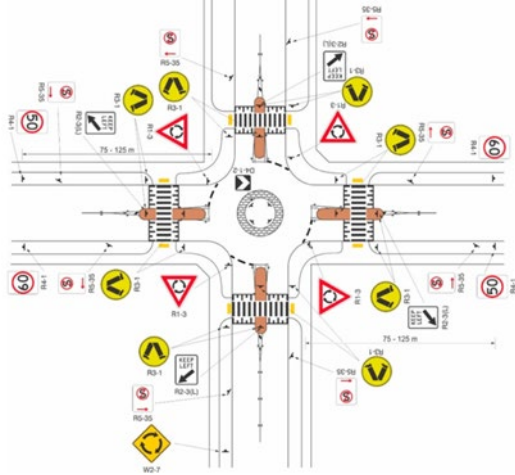


5.4 Roundabout crossings

Consistent with QGTM Part 6, urban roundabouts should be designed with single-lane approaches and departures, splitter islands and raised crossings that give priority to people walking and riding bikes on all approaches, unless higher-order crossings that remove conflicts altogether (grade separation) are provided. Crossings that give priority to people walking and riding bikes include a raised pedestrian (zebra) crossing ('wombat' crossing) with or without a separated cycle track. Queensland guidance for providing crossings at roundabouts is summarised in Table 5.4. Roundabouts are complex environments. In most instances, raised pedestrian (wombat) crossings, or raised separated pedestrian and cyclist facilities are recommended.

Table 5.4 – Summary of Queensland crossing guidance at roundabouts

Guideline	Relevant Sections	Important aspects of guidance
Selection and design of cycle tracks	Protected roundabouts	<ul style="list-style-type: none"> • Describes planning and design guidance for protected roundabout treatments incorporating separated pedestrian and cycle paths.
QGTM Part 6	Roundabouts	<ul style="list-style-type: none"> • Describes challenges for people walking and riding at most urban roundabouts. Including difficulty in achieving CSD unless vehicle speeds are very low and sight line high. • Describes preferred treatments at urban roundabouts.
RPDM Part 4B	Pedestrian and Cyclist Treatments	<ul style="list-style-type: none"> • Lists adopted design references for raised crossings at roundabouts. • Recommended ramp gradients for 85th percentile speeds at crossings. • Example layout plans and alternative arrangements such as road cushions to avoid drainage issues.
Queensland MUTCD Part 10	Crossings at Slip Lanes and Roundabouts	<ul style="list-style-type: none"> • Describes requirements for zebra crossings on slip lanes and roundabouts. <i>The conditions specified for crossings in Item (a) shall also apply to pedestrian crossing (zebra) installations on slip lanes and roundabouts, except that there is no restriction on speed limit but that the upper 15 km/h pace on the slip lane or roundabout measured at the point where the crossing is to be placed shall not exceed 60 km/h. If any of these requirements are not met, a signalised crossing of the slip lane or roundabout may be appropriate.</i>

Guideline	Relevant Sections	Important aspects of guidance
	<p>Typical Arrangement Diagrams.</p> <p>Regulatory and warning signs at roundabout with raised pedestrian crossings</p>	<ul style="list-style-type: none"> Regulatory warning sign arrangement. 

6 Observational Studies

6.1 2024 Observational study

This section provides collated information from 40 crossing sites in Queensland. The information forms part of a study undertaken in 2024 on behalf of Transport and Main Roads (CDM Research 2024). The section includes information comparing attributes across the sites, and more detailed information about key sites in the study.

Figure 6.1(a) – Speed distributions raised pedestrian crossing, raised priority crossing and control sites

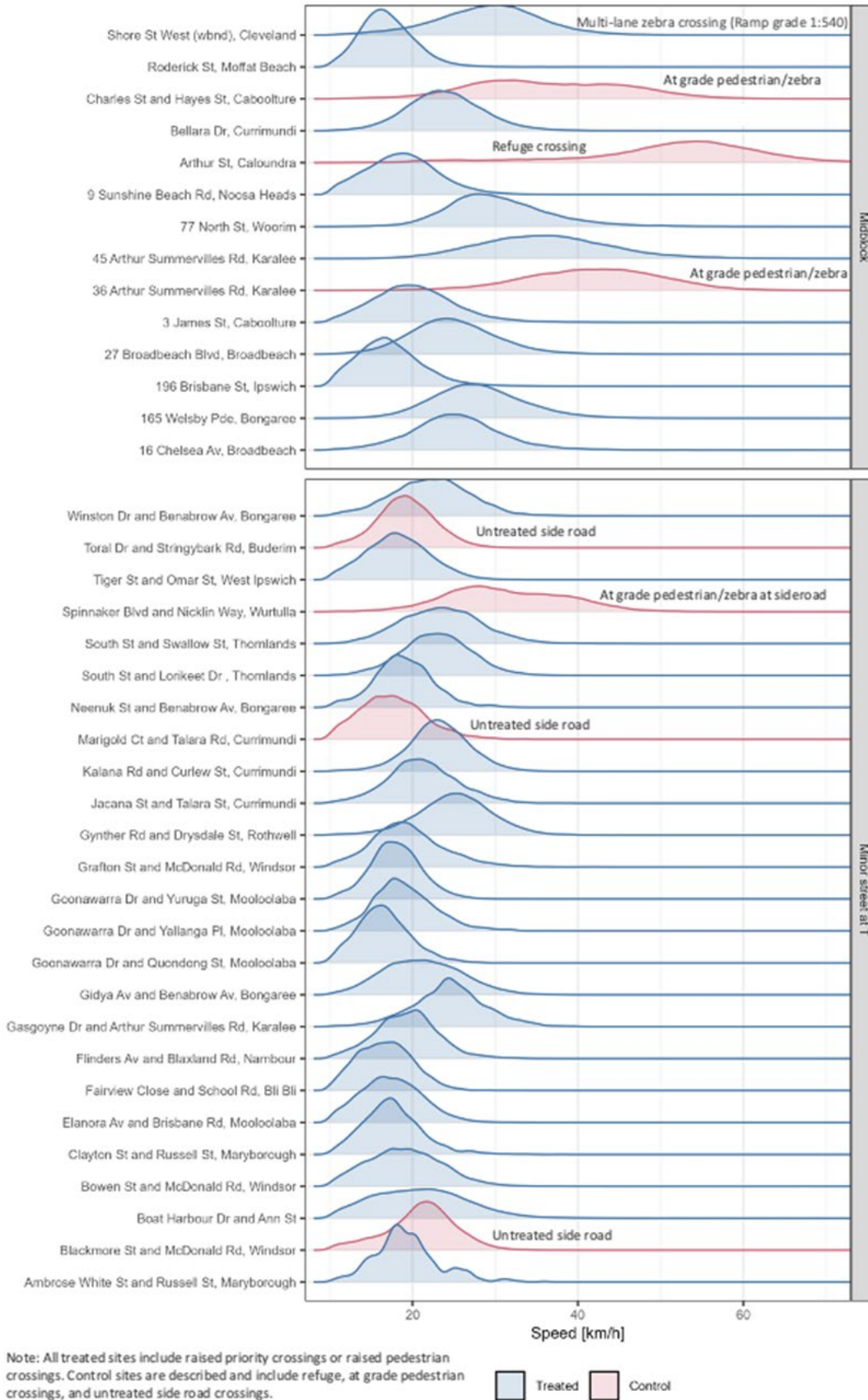
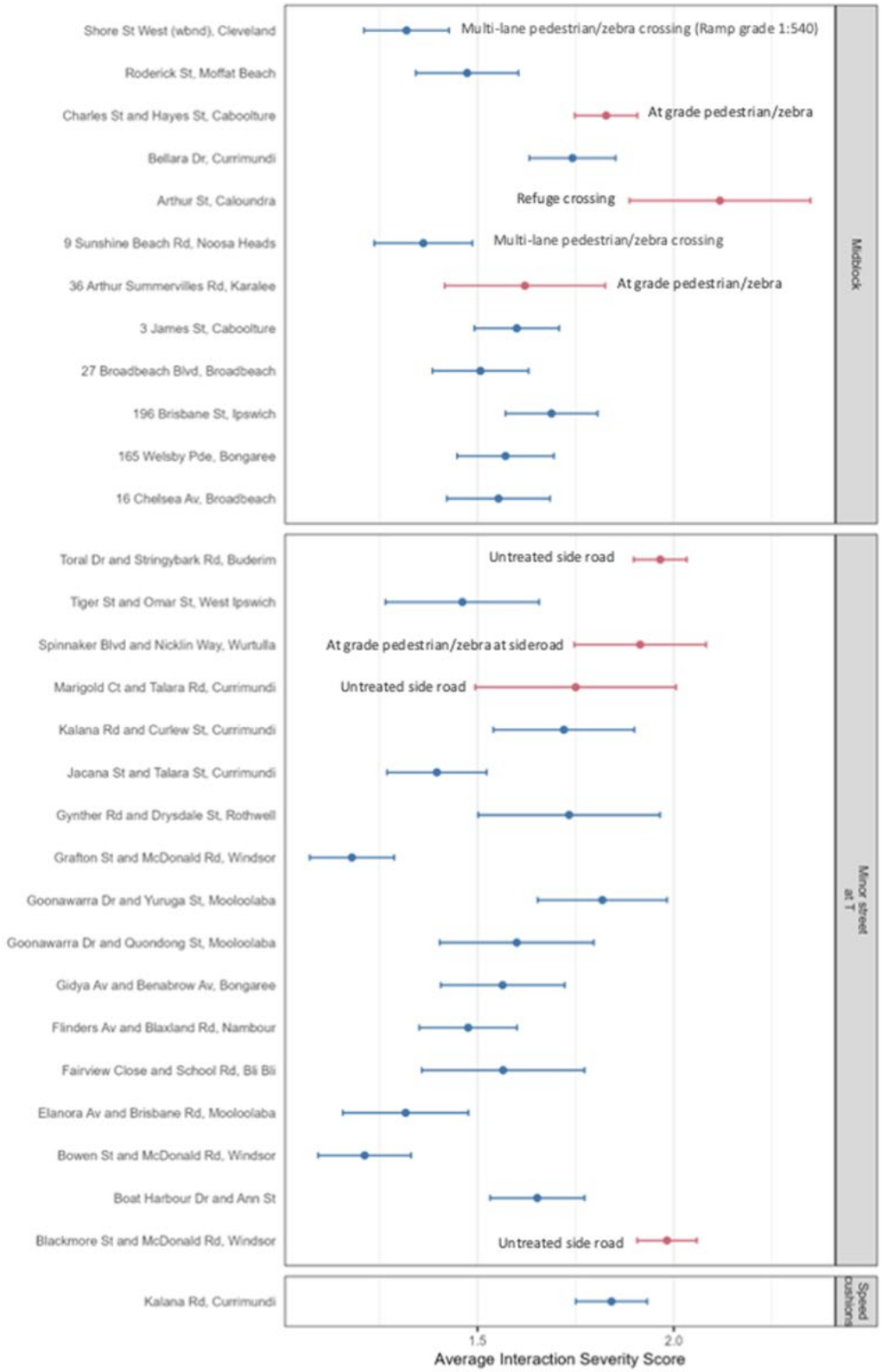


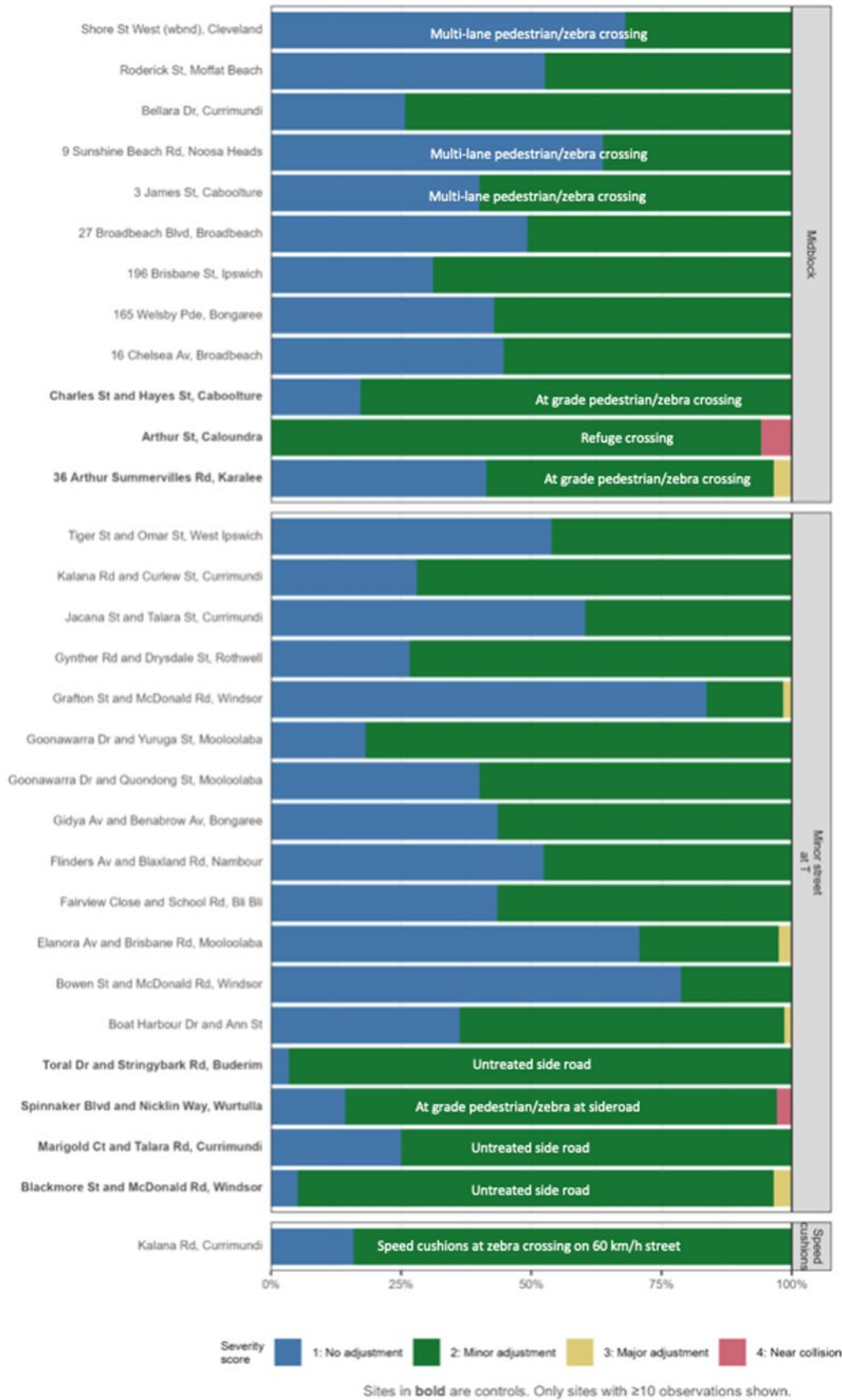
Figure 6.1(b) – Severity scores for raised priority crossing and control sites (includes at grade crossings and refuge crossing)



Note: All treated sites include raised priority crossings or raised pedestrian crossings. Control sites are described and include refuge, at grade pedestrian crossings, and untreated side road crossings.


Error bars are 95% confidence intervals
Only sites with ≥10 observations shown

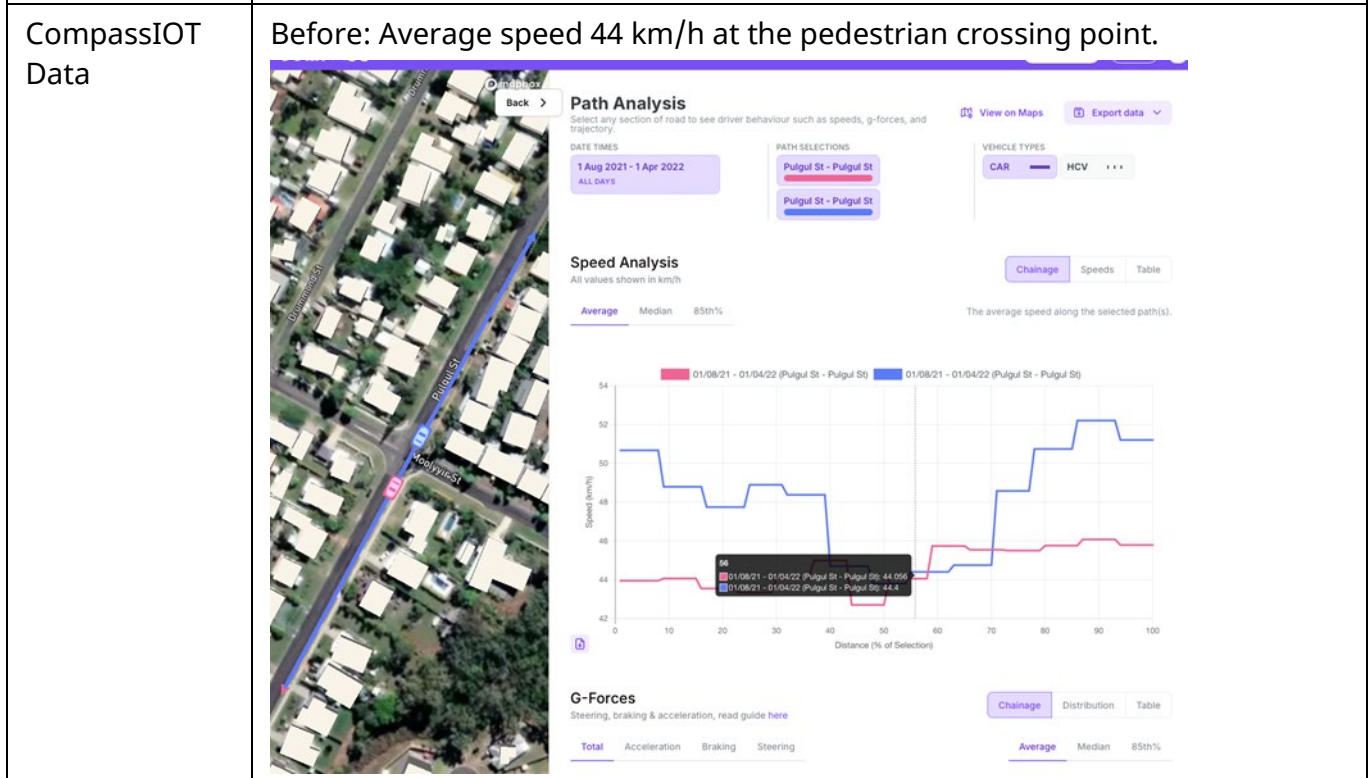
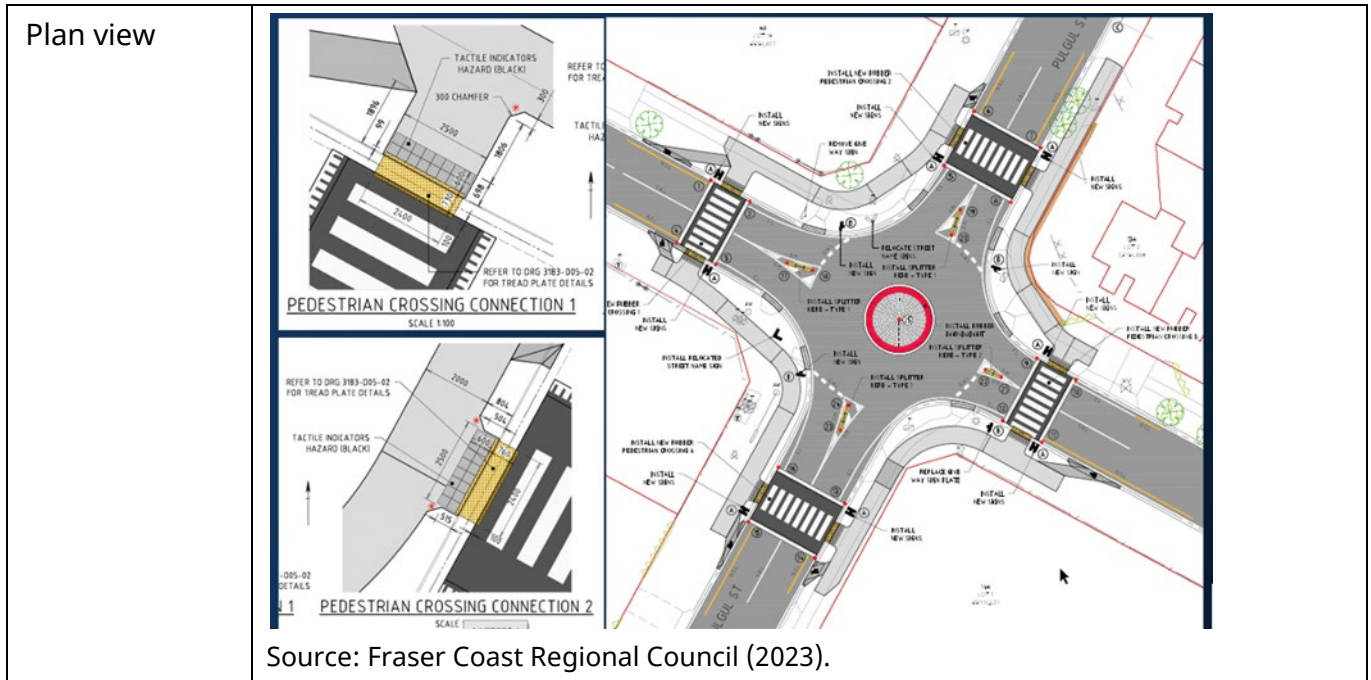
Figure 6.1(c) – Interaction severity scores for pedestrian crossing, raised priority crossing and control sites



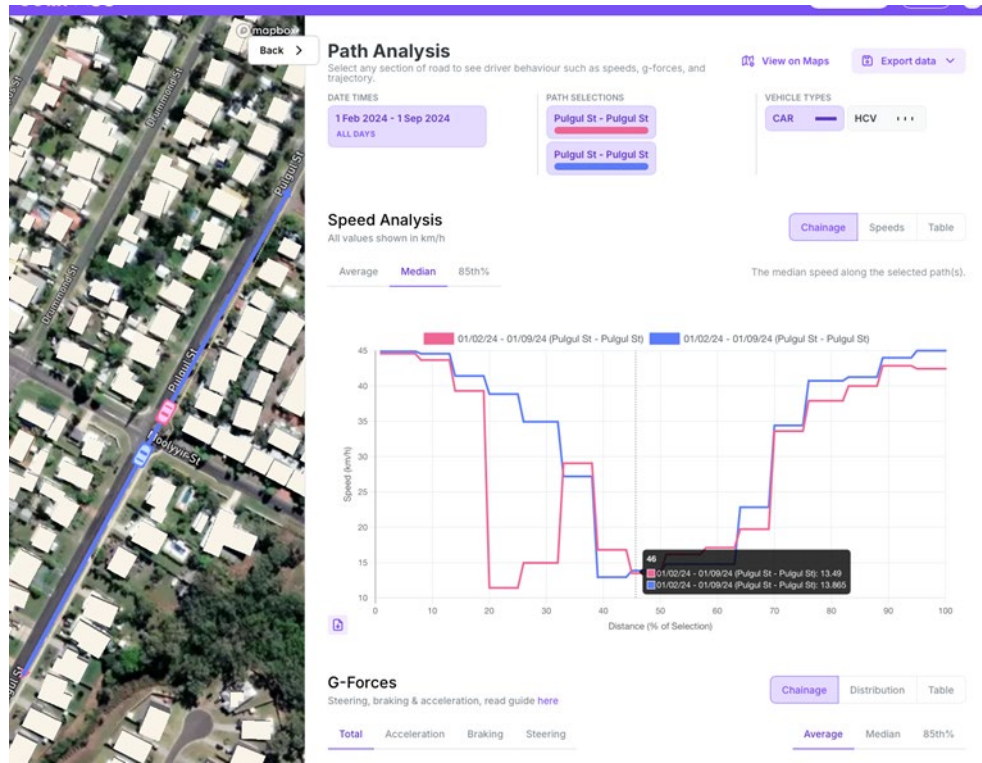
7 Case Studies

7.1 Recycled rubber pedestrian crossings at roundabout – Pulgul St, Hervey Bay

Description	75 mm rubber raised crossings, linemarking, lighting and signage installed May 2023 for under \$500,000.
Design attributes	<ul style="list-style-type: none"> • Rubber raised crossings with tread plates, splitter islands, roundabout, signage, lighting and linemarking installed on all legs of intersection. • Connecting footpaths.
Design challenges	<ul style="list-style-type: none"> • Streetlighting in a residential area. Design applied raised priority crossing lighting guidance, to avoid flood lighting in residential areas. • 14% heavy vehicles on Pulgul St (1148 vpd).
Performance evaluation	<ul style="list-style-type: none"> • Crash data indicates treatment is working well. Prior to installation, 5 crashes had occurred at this intersection in a 5-year period, including 2 hospitalisations and 2 medical treatment crashes. • 15 km/h pace has dropped from over 50 km/h to 26 km/h at roundabout.
Photo	<p>Raised pedestrian / zebra crossing - see link https://maps.app.goo.gl/N8iC92eaPNnyNQPHA.</p>  <p>Source: Nearmap (2024).</p>





After: Average speed 13 km/h at the pedestrian crossing point.

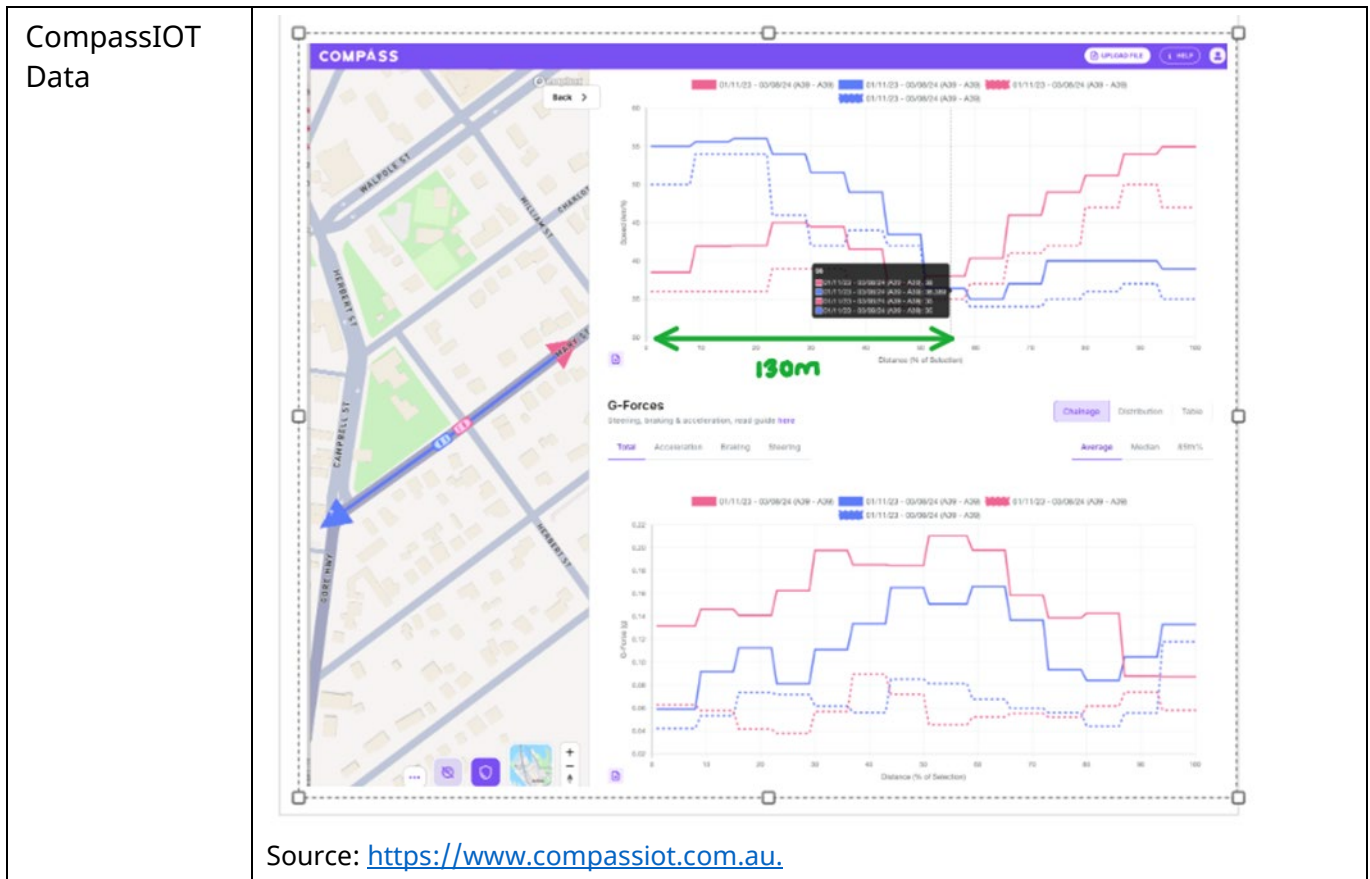


Source: <https://www.compassiot.com.au>.

7.2 Gore Hwy, Millmerran – 60 km/h street, 29% heavy vehicles and 36.5 m road trains

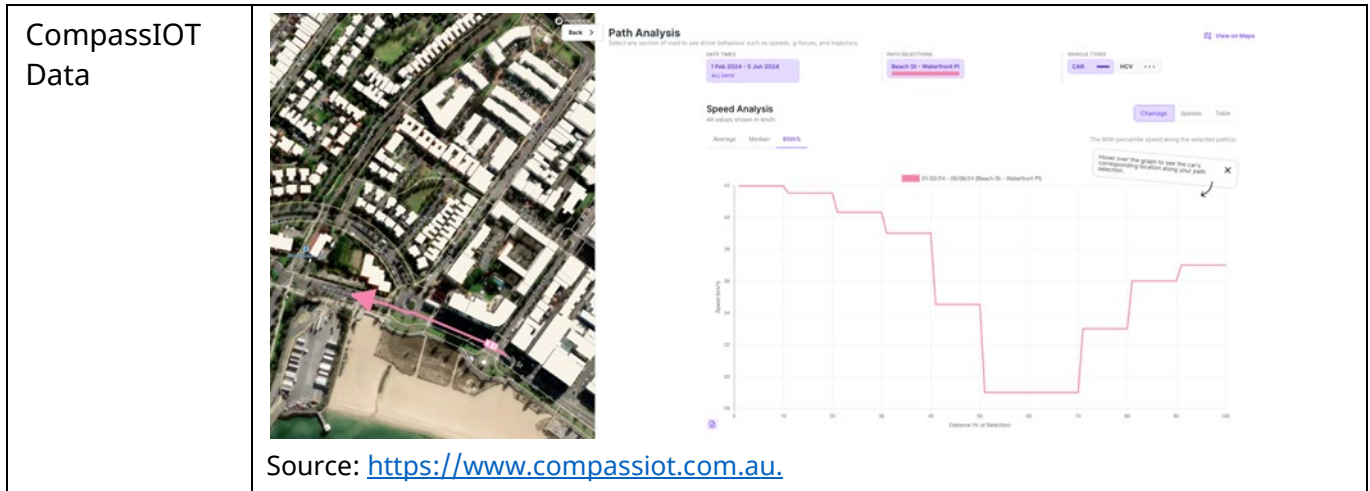
Description	Pedestrian crossing with 1.5-2 m build outs either side, installed May 2022
Design attributes	<ul style="list-style-type: none"> • Build outs on 12.5 m road carriageway, speed limit 60 km/h. • 1:27 as constructed ramp gradients, with red pavement and piano key markings. • Includes 70 mm single layer AC14 for platform.
Design challenges	<ul style="list-style-type: none"> • 29% heavy vehicles and 36.5 m road trains approved route. • Crossing provides for older and younger users accessing school, retirement village and community facilities. • Treatment selected in an options analysis that removing the existing at grade zebra crossing, signalised crossing, pedestrian refuge, and build outs. Criteria included safety, economic, environmental and social, strategic fit and cost. Fatal and serious injury risk was considered for various crossing options.

<p>Performance evaluation</p>	<ul style="list-style-type: none"> • 85th % speeds at crossing in both directions – 36-38 km/h. • 85th % speeds at crossing for heavy vehicles – 35 km/h. • No evidence of harsh braking occurring. • Heavy vehicle braking g-forces are significantly less than other vehicles. • Drivers slowing 70 to 100 m in advance of crossing. • No negative feedback 2 years after installation. Positive feedback from locals.
<p>Photo</p>	<p>Raised pedestrian / zebra crossing.</p> 
<p>Plan view</p>	 <p>Source: Qld Globe (accessed 2024).</p>





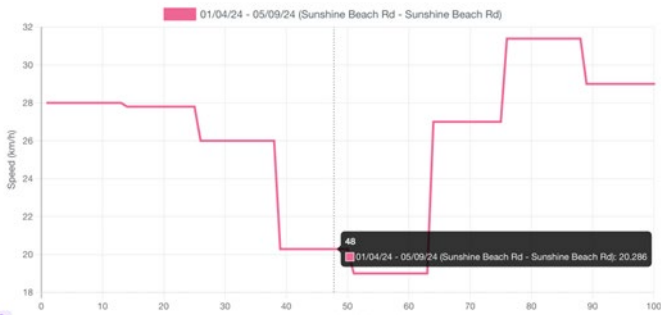
7.3 Multi-lane roundabout, with splitter island, Beach Street, Port Melbourne

Description	Beach St, Waterfront Place- Port Melbourne, Victoria.
Design attributes	<ul style="list-style-type: none"> • 2.4 m refuge between traffic lanes.
Design challenges	<ul style="list-style-type: none"> • Demonstrates use of splitter island/refuge to separate traffic lanes.
Performance evaluation	<ul style="list-style-type: none"> • 85th decreases from 42 at approach to 29 at crossing and 33 on roundabout. • Includes 2.4 m refuge between traffic lanes.
Plan view	<p>Source: Nearmap (accessed 2024).</p>



7.4 Multi-lane crossing on bus route with high path user volumes, Noosa Junction

Description	Four lane, 50 km/h road, with central median through busy shopping strip.
Design attributes	<ul style="list-style-type: none"> • High vehicle volumes (6,010 vpd). • High pedestrian volumes (1,277 per day). • Crossing distance 7.7 m, ramp gradients 1:11, platform width 8 m.
Design challenges	<ul style="list-style-type: none"> • Multi-lane road. • High pedestrian volumes. • A few small trees obstructing sight lines.
Performance evaluation	<ul style="list-style-type: none"> • 85th percentile vehicle speeds 23 km/h. • 58 interactions analysed. Path users had priority in 98% of interactions. • Interaction Severity Score = 1.36 (1 = no adjustment, 2 = minor adjustment, 3 = major adjustment, 4 = near collision, 5 = collision). • Highest severity score recorded = 2 – Minor adjustment.
Photo	 <p>One side of the multi-lane crossing on Sunshine Beach Rd, Noosa Junction.</p>

<p>Plan view</p>	 <p>Aerial view of crossing (2011). Piano keys have since been added to linemarking.</p>
<p>CompassIOT</p>	 <p>85th percentile speeds at crossing = 20 km/h. (Source https://app.compassiot.cloud).</p>



7.5 Side road raised crossing near schools, Flinders Ave and Blaxland Rd, Nambour

<p>Description</p>	<p>8.5 m long crossing, yellow crossing with dark ramps.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Side road crossing near high school and primary school. • 322 vpd and 116 path users per day. Significant proportion of crossings involved an interaction with a vehicle. This may reflect the high intensity of use for vehicles and path users in peak periods. • Crossing distance 8.5 m, ramp gradients 1:12, platform width 4 m.
<p>Design challenges</p>	<ul style="list-style-type: none"> • 63 interactions between motor vehicles and path users were mapped in a three-day period.
<p>Performance evaluation</p>	<ul style="list-style-type: none"> • 85th percentile vehicle speeds 23 km/h. • Drivers gave path users priority in 86% of interactions. • Interaction Severity Score = 1.5 (1 = no adjustment, 2 = minor adjustment, 3 = major adjustment, 4 = near collision, 5 = collision). • Highest severity score recorded = 2 – Minor adjustment.

<p>Photo</p>	 <p>People using the Flinders Ave Crossing (2024).</p>
<p>Plan view</p>	 <p>Aerial view of crossing. Source: Nearmap, 2024.</p>


7.6 Side road at grade pedestrian crossing, Spinnaker Blvd and Nicklin Way, Wurtulla

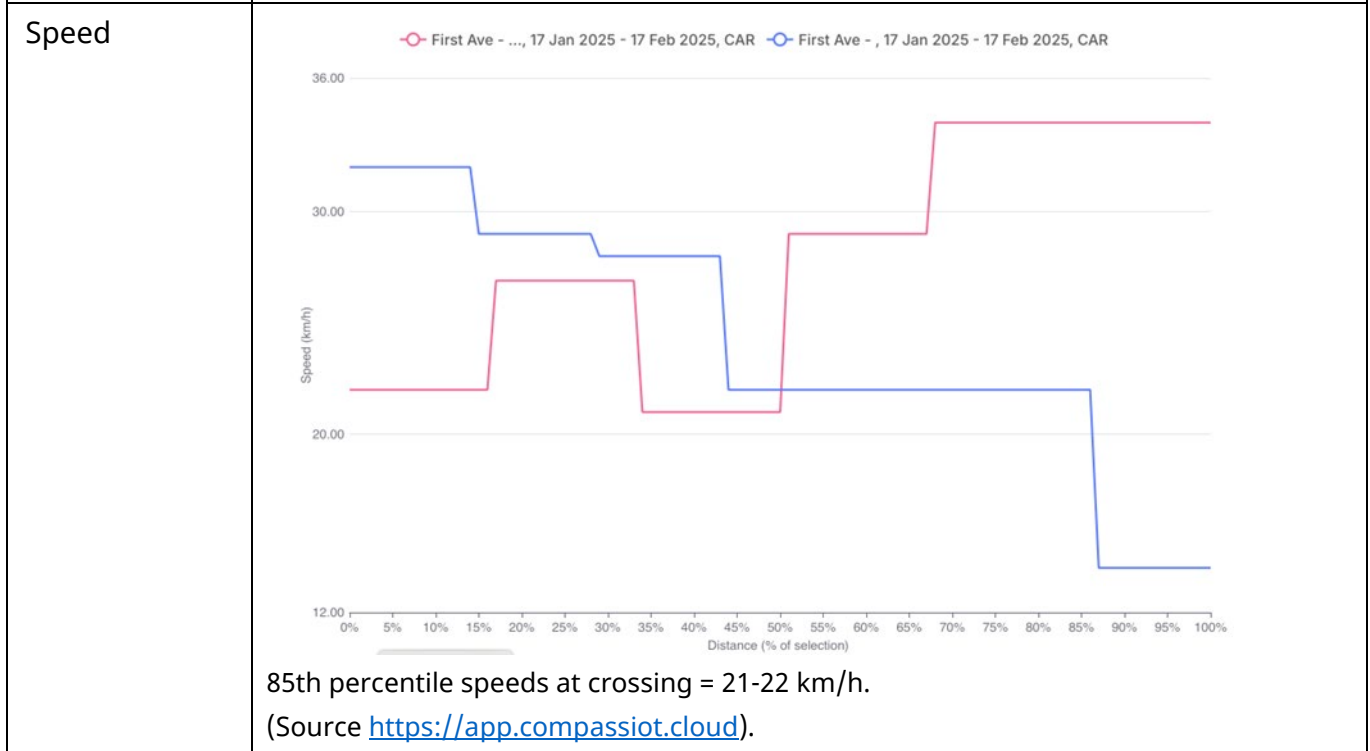
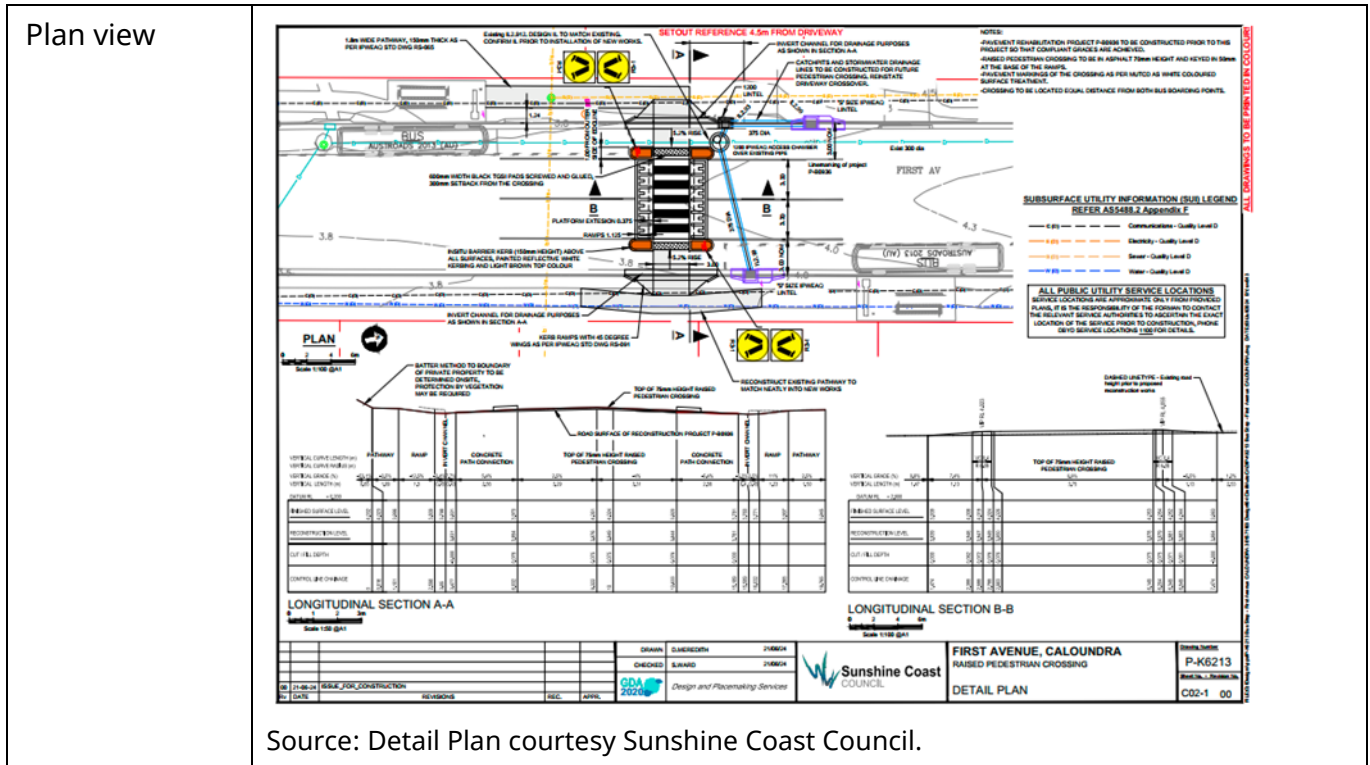
<p>Description</p>	<p>12 m wide at grade zebra crossing, with refuge at side road intersection with arterial road.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Major road is 4-lane arterial, posted at 70 km/h with uncontrolled right turn movements, no speed control at crossing. Not safe system aligned. • 1703 vehicles per day on side road. • 91 path users per day. • 13.5 m setback from crossing to through vehicle lane.
<p>Design challenges</p>	<ul style="list-style-type: none"> • High volume, high speed through road. • Crossing is not raised, and this may have contributed to a recorded near collision. • Uncontrolled right turns across multiple traffic lanes.

<p>Performance evaluation</p>	<ul style="list-style-type: none"> • 85th percentile vehicle speeds 39.4 km/h. • 35 interactions analysed. • Drivers gave path users priority in 74% of interactions. • Interaction Severity Score = 1.91 (1 = no adjustment, 2 = minor adjustment, 3 = major adjustment, 4 = near collision, 5 = collision). • Highest severity score recorded = 4 – near collision.
<p>Photo</p>	<div style="display: flex; flex-direction: column; align-items: center;">  <p>(a) Rider approaches crossing</p> <p>(b) Rider veers right and motorist brakes abruptly</p> <p>(c) Rider jumps kerb onto verge while motorist has come to complete stop</p> </div> <p>Near-collision event between right entering motorist and bicycle rider at Spinnaker Blvd.</p>
<p>Plan view</p>	 <p>Aerial view of crossing. Source: Nearmap, 2024.</p>



7.7 Drainage capacity through low profile ramps, First Avenue, Caloundra

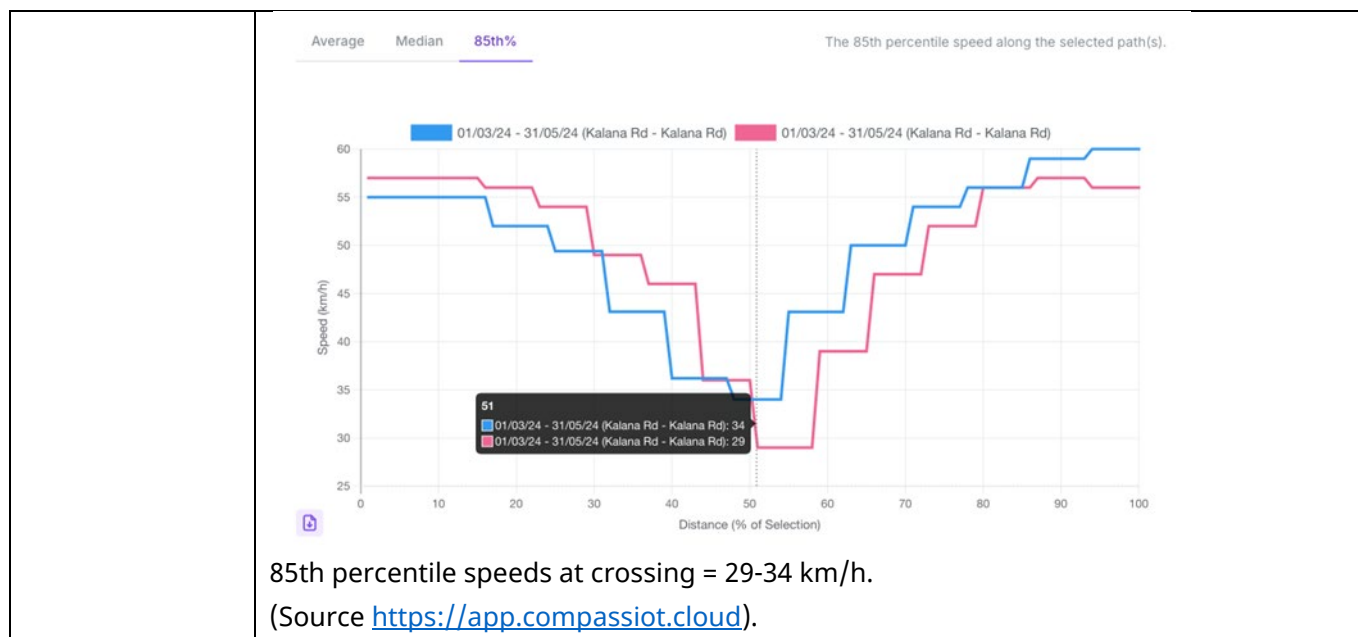
<p>Description</p>	<p>Drainage provided through low profile ramps.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Two-lane, 50 km/h street. • Shopping centre and bus stops adjacent.

<p>Design challenges</p>	<ul style="list-style-type: none"> • Challenging site with large catchment. Significant overland flow in major design storm event. • Providing sufficient capacity to accommodate major storm events without impacting properties. • Managing constraints for bicycle riders where they may be riding in vehicle lane or shoulder parking lane. • Afflux after construction should be less than 10 mm.
<p>Design Features</p>	<ul style="list-style-type: none"> • Works were undertaken in combination with a road rehabilitation project. This made it easier to accommodate drainage works and allowed the profile of the road and the hump to be lowered to accommodate flows. • A drainage investigation was undertaken. • Low profile (5.2%) ramps between precast islands and kerb ramp, improves comfort for users whilst maintaining an open kerb for drainage. This avoids situation where wheelchair users are experiencing maximum down and up ramps sequentially. • Kerb ramps set back to allow extra capacity in major storm event.
<p>Photo</p>	 <p>The top photograph shows a wide asphalt road with a raised pedestrian crossing in the center. The crossing is marked with white zebra stripes and has a red and white curb. A yellow circular sign with a black arrow pointing up is visible on the left side of the road. The bottom photograph shows a bus stop shelter on the left side of the road. A green bus is stopped at the bus stop, and several cars are parked on the right side of the road. The road has yellow dashed lines in the center.</p>



7.8 Road cushions at pedestrian crossing, Kalana Rd Currimundi

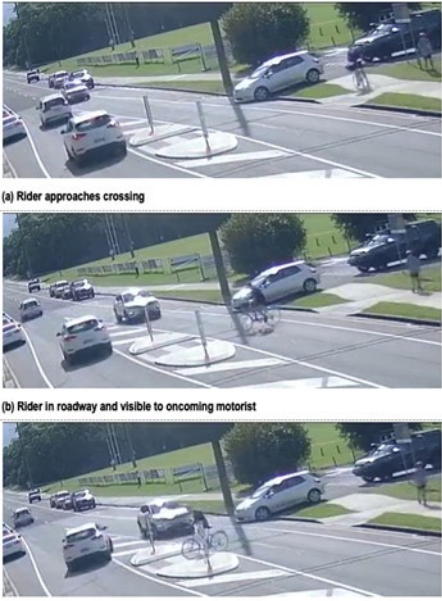
Description	At grade zebra crossing with road cushions.
Design attributes	<ul style="list-style-type: none"> • Two-lane, 60 km/h road, with central median through busy shopping strip and high vehicle volumes (4,730 vpd). • 109 pedestrians per day. • Crossing distance 8.3 m. • Road cushions both sides of crossings (design speed for cushions 40 km/h).
Design challenges	<ul style="list-style-type: none"> • 60 km/h posted speed limit. • Retrofit site. • Minimise drainage impacts and works.
Performance evaluation	<ul style="list-style-type: none"> • 85th percentile vehicle speeds 29 km/h. • 63 interactions analysed. • Drivers gave path users priority in 97% of interactions. • Interaction Severity Score = 1.8 (1 = no adjustment, 2 = minor adjustment, 3 = major adjustment, 4 = near collision, 5 = collision). • Highest severity score recorded = 2 – Minor adjustment.
Photo	 <p>A street-level photograph showing a zebra crossing on a two-lane road. The crossing is marked with white stripes and has raised road cushions on both sides. In the background, there are residential houses with red roofs, trees, and a clear blue sky. A street lamp is visible on the left side of the road.</p>
Plan view	 <p>An aerial photograph showing the zebra crossing from above. The crossing is clearly visible as a white-striped area on the road. The surrounding area includes a central median, sidewalks, and some greenery. A white car is visible on the road near the crossing.</p> <p>Aerial view of crossing. Source: Nearmap, 2024.</p>



7.9 Refuge crossing, Arthur St Caloundra

Description	12 m wide crossing with central refuge (2.6 m wide with 2 x 4.7 m crossings).
Design attributes	<ul style="list-style-type: none"> • Two-lane, 60 km/h road. • 27 pedestrians per day. • Crossing distance 4.7 m, refuge width 2.6 m.
Design challenges	<ul style="list-style-type: none"> • Posted speed limit 60 km/h. • 27 pedestrians per day. However, many pedestrians were observed not using the crossing, and crossing are short distance away closer to the desire line.
Performance evaluation	<ul style="list-style-type: none"> • 85th percentile vehicle speeds 61 km/h, 2500 vpd. • 17 interactions analysed. • Drivers gave path users priority in 6% of interactions. • Interaction Severity Score = 2.11 (1 = no adjustment, 2 = minor adjustment, 3 = major adjustment, 4 = near collision, 5 = collision). • Highest severity score recorded = 4 – Near collision.

Photo



(a) Rider approaches crossing

(b) Rider in roadway and visible to oncoming motorist

(c) Rider accelerates towards refuge and motorist brakes

Bicycle rider accelerating and motorist braking to avoid conflict at Arthur St, Caloundra (CDM Research, 2024).

Plan view



Aerial view of crossing. Source: Nearmap, 2024.



Average Median 85th%

The 85th percentile speed along the selected path(s).

01/03/24 - 31/05/24 (Arthur St - Arthur St) 01/03/24 - 31/05/24 (Arthur St - Arthur St)

51

01/03/24 - 31/05/24 (Arthur St - Arthur St); 55.558


01/03/24 - 31/05/24 (Arthur St - Arthur St); 52

Speed (km/h)

Distance (% of Selection)

85th percentile speeds at crossing = 52-55 km/h.
 (Source <https://app.compassiot.cloud>).



7.10 Conventional side road crossing, Carl Street at intersection with O'Keefe Street, Woolloongabba

Description	14 m wide crossing with kerb ramps either side.
Design attributes	<ul style="list-style-type: none"> • Kerb ramps. • Priority to motor vehicles.
Design challenges	<ul style="list-style-type: none"> • Set-back 0 m. • Excellent sight lines from major road, limited between vehicles approaching from Carl St and cyclists.
Performance evaluation	<ul style="list-style-type: none"> • 259 interactions between riders and motorists at this location. • 25% of interactions between riders and motorists required some form of adjustment, a small proportion of which were major, and one near collision. • This crossing was considered the least safe, largely because of the level of confusion that sometimes arose between road users, motorist speeds and riders being masked from entering motorists by other motorists queuing to exit Carl St. • Bicycle riders gave way to motorists in 72% of interactions.
Photo	 <p data-bbox="379 1417 1453 1480">Conventional crossing, Carl Street at intersection with O'Keefe Street, Woolloongabba (photo).</p>

<p>Plan view</p>	 <p>Conventional crossing, Carl Street at intersection with O'Keefe Street, Woolloongabba (plan view).</p>
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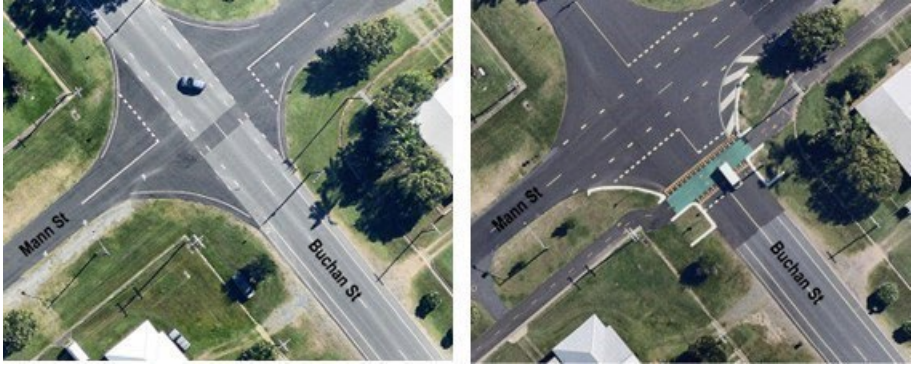
7.11 Separated bicycle and pedestrian path crossing on principal cycle route

<p>Description</p>	<p>Separated bicycle and pedestrian path – Somerset St.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Raised, coloured platform, platform markings for raised pedestrian crossing, green bike path extending 30 m south and 10 m north, pedestrian path is continuous plain concrete. • Steep ramp gradients (approximately 20%), effective at reducing vehicle speeds. • Intersection built out and aprons installed to provide short 7.5 m crossing distance. • Set-back 10 m from traffic lane with good sight lines. • High cyclist volumes and low vehicle volumes. • One street light over crossing.
<p>Design challenges</p>	<ul style="list-style-type: none"> • Located on a bus route. • Insufficient space to store a bus between crossing and major road. • Four-way intersection with all movements allowed.

<p>Performance evaluation</p>	<ul style="list-style-type: none"> • 80 interactions observed between motorists and path users (65 were cyclists). • In 87% of interactions the vehicle driver gave way to the pedestrian or cyclist. • In the 6 cases where a motorist did not give way to a pedestrian, the vehicle was stopped or going slowly, and the pedestrian signalled for the motorist to go ahead. • In three of the 7 cases where a motorist did not give way to a rider, the rider stopped or signalled to the motorist to proceed ahead of the cyclist. • The intersection appears to operate satisfactorily, the frequency of confusion, hesitation or near collision conflict was low. • The motor vehicle traffic volumes and speeds are generally low, such that the likelihood of interaction is low, the risk of conflict when an interaction does occur is low and speeds are sufficiently low that a collision is unlikely to result in serious injury (CDM Research, 2016).
<p>Photos</p>	 <p>Somerset Street path priority crossing (photos).</p>
<p>Plan view</p>	 <p>Somerset Street path priority crossing (plan view).</p>

7.12 Priority crossing - Mann Street and Buchan Street, Cairns

<p>Description</p>	<p>One of 9 raised priority crossings constructed on the 2.6 km Mann Street cycleway in Cairns, the crossing is located on one leg of a four-way intersection that was reprioritised as part of the project.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Raised platform, yellow piano key markings, green coloured surface on path. • Crossing length between buildouts is 11 m. • Set-back 10.5 m from traffic lane, sight lines very good. • This does not represent preferred pavement marking for shared path treatment.

<p>Design challenges</p>	<ul style="list-style-type: none"> • Located on a four-way intersection that was reprioritised as part of the project. • Intersection allows for all turn movements.
<p>Performance evaluation</p>	<ul style="list-style-type: none"> • Crossing performs satisfactorily; risks presented to path users considered similar or better to what would be present if the crossing were not priority controlled. • 169 interactions observed between path users and motorists: 56% involved bicycle riders and vehicles, vehicles gave way to bicycle riders in 85% of interactions. • In 85% of interactions between bicycle riders and vehicles, a minor adjustment was made by one or both parties to avoid a collision: in 14% of interactions, a major adjustment was made, and one incident was classified as a near collision – no collisions were observed. • Elevated risk to cyclists, from drivers coming from the north; a raised platform for the entire intersection, or a retrofit incorporating road cushions on the northern leg of the intersection at Buchan Street, would improve this issue.
<p>Photo</p>	 <p>Priority crossing on Mann Street and Buchan Street, Cairns (photo).</p>
<p>Plan view before and after</p>	 <p>Priority crossing on Mann Street and Buchan Street, Cairns (plan view). Note: Refer to Section for preferred pavement markings for raised priority crossings.</p>

7.13 Separated crossing - Brisbane Road, Mooloolaba

Description	The first priority crossing on the Sunshine Coast, located on the corner of Brisbane Road and Elanora Avenue in Mooloolaba – the route is used by recreational riders of varying levels of confidence, as well as utility and commuter cyclists.
Design attributes	<ul style="list-style-type: none"> • Crossing set back 7 m from vehicle lanes. • Green treatments used on cycle track, extend 17 m and 13 m past edge of road. • Coloured pavement on pedestrian section. • Raised platforms designed to 1:15. • GIVE WAY signs and line marking installed at approaches. • Side street access limited to left in and left out by centre median.
Design challenges	<ul style="list-style-type: none"> • Low probability of cyclist and vehicle interacting (low vehicle and cyclist numbers). • Cultural context suggests that at least some path users are reluctant to 'claim' priority over motorists, side street on an arterial road. • Ramp gradients are relatively flat (1:15).
Performance evaluation	<ul style="list-style-type: none"> • 143 interactions between riders and motorists at this location. • No collisions or near collisions were observed. • In 75% of interactions, motorists gave way to path users consistent with design intent; drivers generally gave way to pedestrians unless pedestrians waved them through. • Vehicle drivers did not give way to approximately 27% of bicycle riders. • Minor adjustment by cyclists in 51% of interactions and major in 3% of interactions. • The intersection appeared to perform satisfactorily from a safety standpoint because: <ul style="list-style-type: none"> – most road and path users are travelling slowly through the intersection, thereby allowing them to slow or stop as necessary and, should a collision occur, the consequence of a collision is unlikely to be severe. – Elanora Avenue is a minor local street with low traffic volume, such that the likelihood of a path user encountering a motorist is 1 in 28.

<p>Photos</p>	 <p>Priority crossing, Brisbane Road, Mooloolaba (photo).</p>
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7.14 Waterways Drive, Main Beach, Gold Coast

<p>Description</p>	<p>Car park entry adjacent to 4 lane undivided road (Waterways Drive), shared path is not set back from road, crossing is at footpath grade with red coloured treatment on either side and ochre pavement, constructed in 2015.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Adjacent to 4 lane road. • Excellent sight lines. • Set-back 2 m from traffic lane. • Unknown cyclist and vehicle numbers. • Painted splitter island.
<p>Design challenges</p>	<ul style="list-style-type: none"> • Providing for long vehicles. • Constrained setting restricted set back to < 2 m.
<p>Performance evaluation</p>	<ul style="list-style-type: none"> • Research captured 33 interactions between riders and motorists at this location. • No collisions or near collisions were observed. • In 79% of interactions, no adjustment was made by the rider or driver. • Where adjustments were made, they usually involved the rider veering around long vehicles. • Motorists gave way to bicycles in over 97% of interactions. • All interactions appeared safe.

<p>Photo</p>	 <p>Waterways Drive, Main Beach, Gold Coast (photo).</p>
<p>Plan view</p>	 <p>Source: Nearmap. Waterways Drive, Main Beach, Gold Coast (plan view).</p>


7.15 Priority crossing on Amess Street, Carlton North, Melbourne.

<p>Description</p>	<p>Shared path with priority for path users over Amess St, installed adjacent to the four-way intersection of Park Street and Amess St (Carlton North, Melbourne), located in a suburb with high cycling numbers and good awareness of local facilities, constructed in 2012.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Raised platform, piano key markings, contrasting coloured surface extending approximately 5 m past edge of crossing, crossing length is 14 m. • Excellent sight lines. • Set-back 8.5 m from traffic lane. • Approximately 2000 cyclists per day and 4000–5000 vpd. • Splitter island on Amess St, 7 m corner radius.
<p>Design challenges</p>	<ul style="list-style-type: none"> • Located on a bus route. • Insufficient space to store a bus between crossing and major road. • Four-way intersection with all movements allowed.

<p>Performance evaluation</p>	<ul style="list-style-type: none"> • 381 interactions observed between riders and motorists. • Vehicles gave way to bicycles in over 99% of interactions; where an interaction did occur, it involved only a minor adjustment to the course of travel by one party. • Performed well, no indication that road users failed to understand priority. • All interactions appeared safe.
<p>Photo</p>	 <p>Priority crossing on Amess Street, Carlton North, Melbourne (photo).</p>
<p>Plan view</p>	 <p>Source: Nearmap. Priority crossing on Amess Street, Carlton North, Melbourne (plan view).</p>

7.16 Devonshire Street, at Bourke Street, Sydney

<p>Description</p>	<p>STOP sign-controlled cyclist crossing on a raised platform with an adjacent pedestrian crossing, crossing is 7.2 m wide on a 75 mm raised table.</p>
<p>Design attributes</p>	<ul style="list-style-type: none"> • Adjacent to 2 lane road. • Excellent sight lines. • Set-back 6 m from traffic lane. • Approximately 2000 cyclists per day and 4000 vpd. • Corner radius 9 m.
<p>Design challenges</p>	<ul style="list-style-type: none"> • Constrained location, limited set back to 6 m. • Restricted sight lines.

<p>Performance evaluation</p>	<ul style="list-style-type: none"> • Observational research captured 336 interactions between riders and motorists at this location and found that this intersection operates satisfactorily. • Observations point to importance of having slow road user speeds to encourage safer negotiated crossings by motorists, bicycle riders and pedestrians. • Significant decrease in cyclist crashes after the construction of the priority crossing. • No collisions or near collisions were observed. • In 90% of interactions, no adjustment was made by the rider or driver. • Motorists treated STOP signs as GIVE WAY controls. • Motorists gave way to bicycles in over 94% of interactions. • Tendency for motorists to encroach onto the zebra crossing. • Critical safety case appears to be riders travelling against the adjacent traffic on Bourke St, emerging from behind a propped vehicle.
<p>Photo</p>	 <p>Source: CDM Research. Devonshire Street, at Bourke Street, Sydney (photo).</p>

8 Information to support rollout

Community engagement can be an important component of planning and delivery of raised crossings. Community engagement may involve the community in the process for identifying sites where crossings are needed and informing them of why sites were identified and how they operate. This process of engagement is described in Figure 8(a).

Figure 8(b) provides an example of how agencies can communicate to communities why raised crossings are being installed. This information should be provided in plain language, with a phone number and contact details for further information.

Figure 8(a) – Example of community engagement around raised crossings

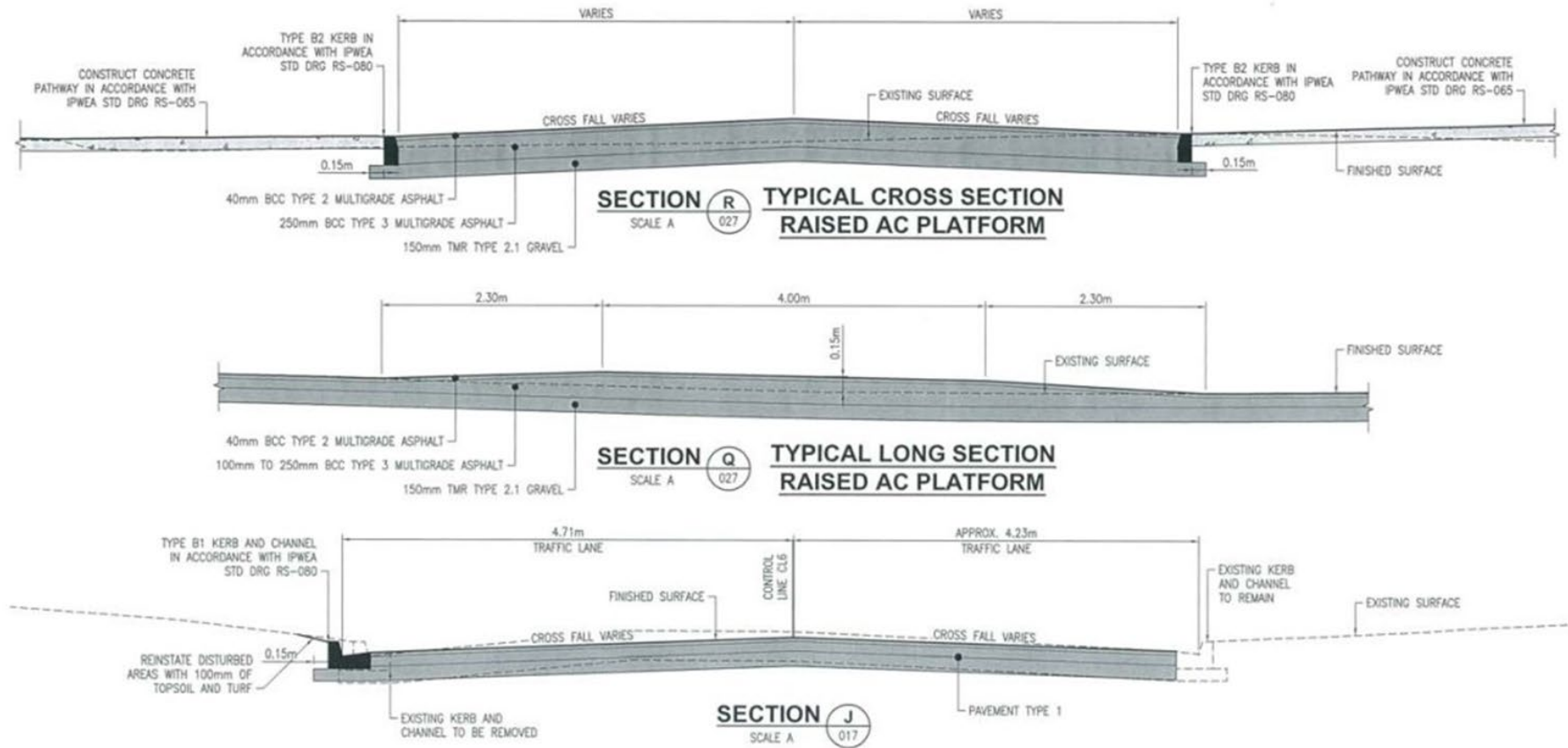


Figure 8(b) – Example information flyer describing why agencies install raised crossings



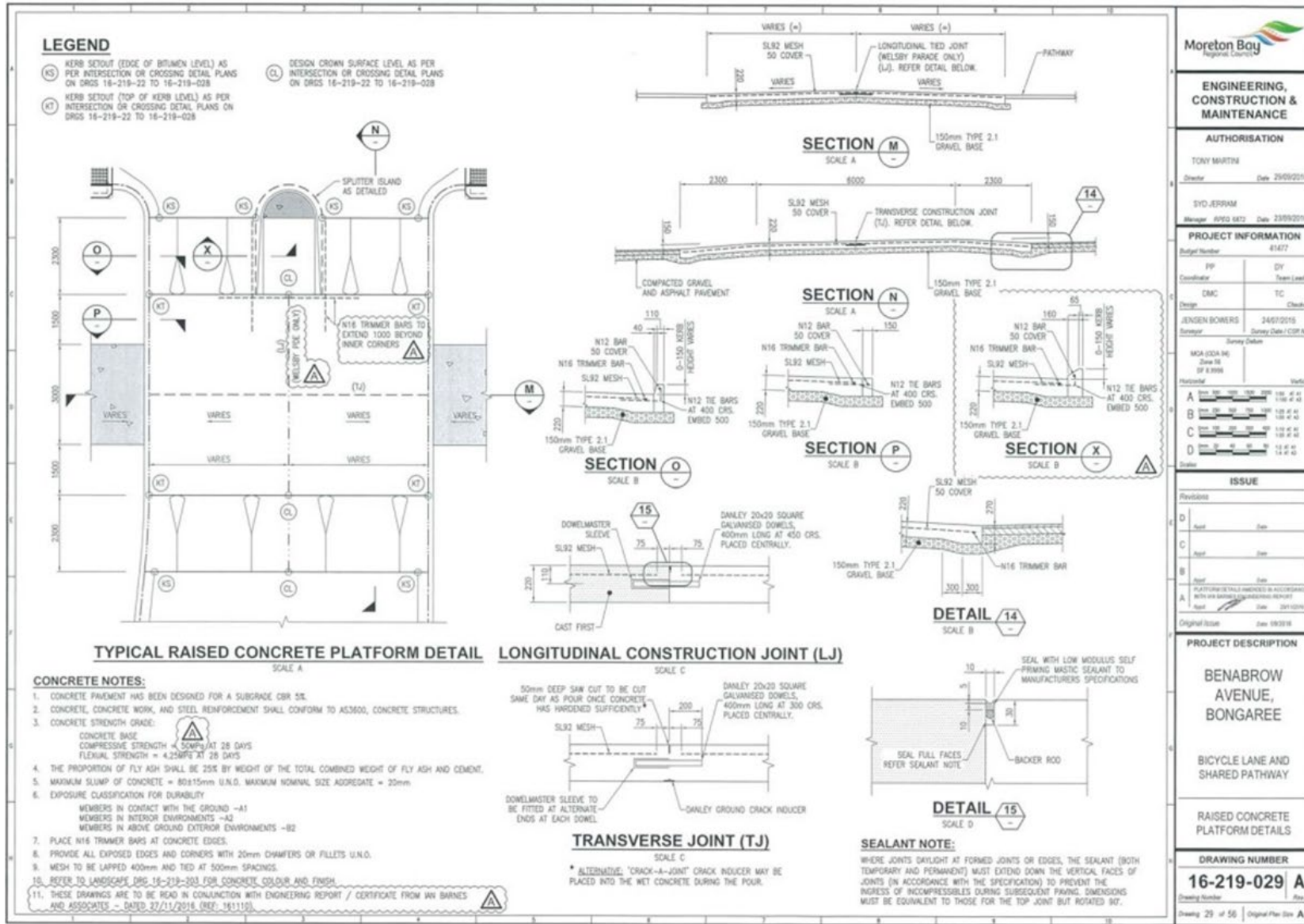
Appendix 1 – Examples of detailed drawings

Asphalt platform cross section example

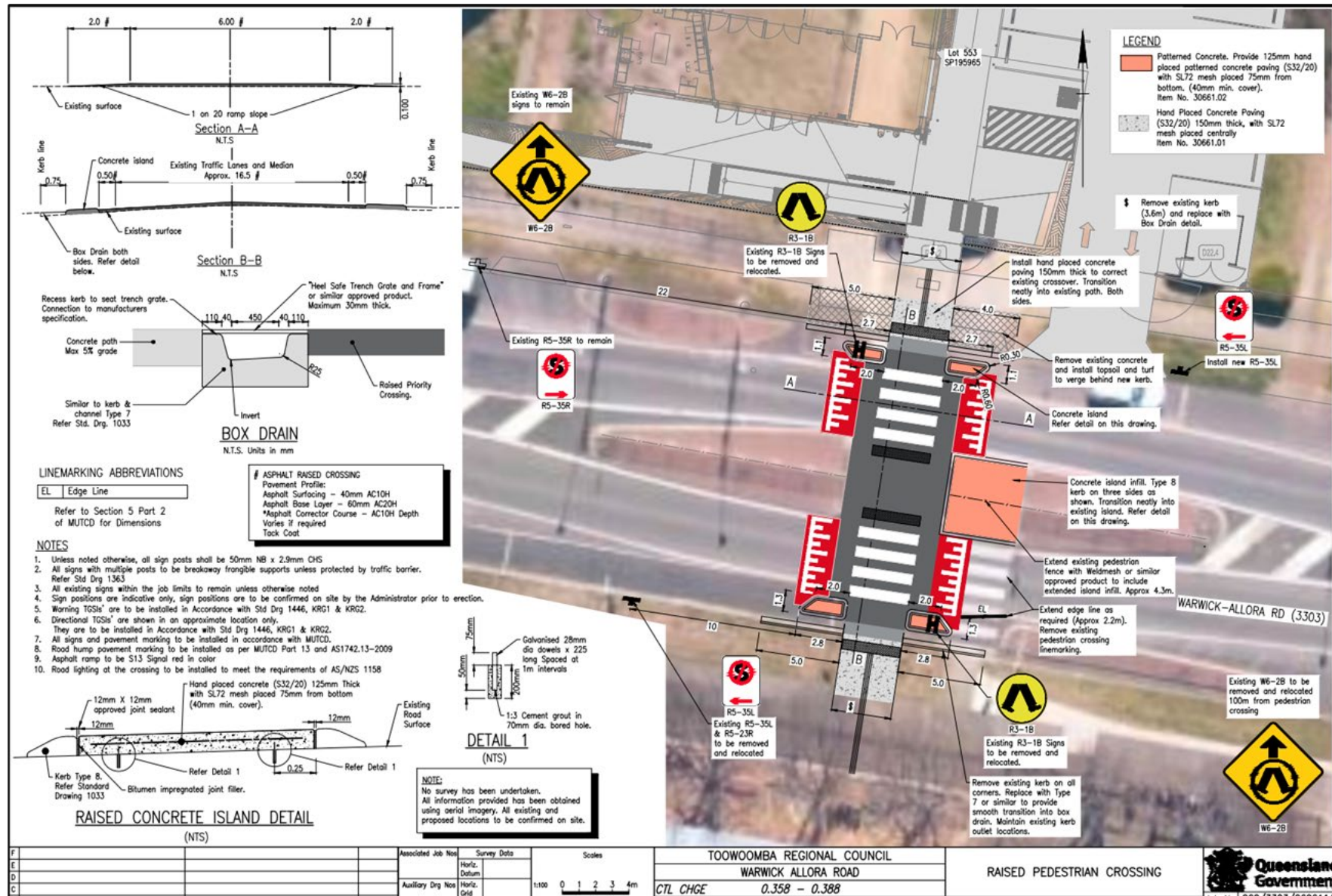


Source: Moreton Bay Regional Council.

Concrete platform construction example



Combined refuge and raised pedestrian crossing adjacent to school



Appendix 2 – Extracts of Safe System Assessment for multi-lane crossing

2.5. Safe System Assessment Context

Table 2.5 provides a concise overview of the context and existing conditions for this project.

Table 2.5: SSA Project Context

Key Considerations	Comments
Reason for project?	<ul style="list-style-type: none"> - People have complained about dangerous crossings at the roundabout. High traffic volumes, vehicle speeds and young path users increase risk of crashes. The road was increased to 4- lanes in 2023/24. This has exacerbated crossing issues. - Cyclist hospitalisation crash recorded on Bellvista Blvd in 2022. The crash occurred mid-block where 85th percentile speeds are 60-70 km/h. A cyclist crash resulting in medical treatment was recorded at the roundabout in 2020 (See Appendix C). - Raised crossings align very well with Safe System principles, have a strong safety record, reduce likelihood and severity of crashes and are used widely in environments where speeds are already 50 km/h. Existing sites are achieving significant speeds control, enabling high numbers of movements, causing minimal delay to traffic and are not generating crashes. See Section 5, Appendix E for Case Studies and Appendix G for Qld Roundabout Guidance.
Function of the road	<ul style="list-style-type: none"> - The road is a distributor. It has a 60 km/h speed limit. - CompassIOT indicates 85th percentile vehicle speeds range from 32 km/h at entries, to 30 km/h on the crossings and up to 43 km/h at exits. - Annual Average Daily Traffic (AADT) volume was 7997 in 2019, 95 m south of Dumbarton Dr (north of project site). Considerable growth since then. AADT estimated as >10,000vpd. Estimated traffic volumes on the road for 2016 were 17,000 vpd (Sunshine Coast Transport Analysis 2022). - There is a school with over 1,400 students 100m west of the site - There is a significant residential catchment east of the site. The trunk north-south cycle network is on the western side of the site. - There are local shops, parks and recreation facilities west of the site. - Bellvista Blvd is a bus route with bus stops north and south of the site
Function of the crossing in the pedestrian/cycle network	<ul style="list-style-type: none"> - There are no controlled crossings on Bellvista Blvd for 2.5 km between Edwards Terrace and Caloundra Rd. - On the south-west side of the creek near Edwards Terrace there is a grade separated crossing. However, there is only one pedestrian/cycle bridge over the creek and it is on the south-east side. This means, all active transport users south of Edwards Tce are on the south-east side of Bellvista and require a crossing to access attractors on the west/north. - There are significant attractors south and west of Edwards Tce including a shopping precinct, community centre and public schools.
Speed Environment	<ul style="list-style-type: none"> - 85th percentile vehicle speeds range from 32 km/h at entries, to 30 km/h on the roundabout and up to 47 km/h at exits. Midblock speeds on Bellvista Boulevard are up to 70 km/h at the further points from intersections. - Mid-block 85th percentile speeds exceed 60 km/h, 200 m north of the roundabout. See Appendix B for Speed Data - Speeds on the roundabout are consistent with Safe System threshold speeds. However, speeds at crossing points currently exceed Safe System threshold speeds for crashes involving pedestrians and cyclists (particularly at exits). Speeds at crossings are significantly lower than mid-block.
Road users	<ul style="list-style-type: none"> - There are significant numbers of pedestrians and cyclists at the roundabout. 50 pedestrians were counted (25 during each peak period) and 32 cyclists. - Approximately 75% of path users observed in peak hours were children. - Older people, people using mobility scooters and pushing prams observed
Vehicle composition	<ul style="list-style-type: none"> - Vehicles includes a mix of passenger vehicles, buses (including school buses), some trucks and motorcycles.

Source: Sunshine Coast Council/Sidelines Traffic.

4.2. Safe System Assessment Matrices

Table 4.2(a)1: SSA Matrix – Existing Conditions

	Run-off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	ADT was 797 in 2019, 95m south of Dumbarton Drive (ie. North of project site). There has been considerable growth since this time, and the ADT is estimated to be >10,000/CompassIoT indicates 85th percentile vehicle speeds range from 32km/h at entries, to 30km/h on the crossings and up to 43km/h at exits. For run-off road crash types, the ADT is > 10000 vehicles per day.	For head-on crash types, the ADT is > 10000 vehicles per day	For intersection crash types, the ADT is > 10000 vehicles per day. Turning traffic volumes are low.	For 'other' crash types, the ADT is > 10000 vehicles per day	Pedestrians crossing Belvidera Blvd at roundabout Mon 3 June: 7:40-8:40 AM - 25 pedestrians 2:30-3:30 PM - 25 pedestrians Total peak hr volume = 350. Assume >100 users per day.	Bike riders and e-scooters crossing Belvidera Blvd at roundabout Mon 3 June: 7:40-8:40 AM - 14 pedestrians 2:30-3:30 PM - 17 pedestrians Total peak hr volume = 31. Assume >50 users per day. All cyclists using paths. No riders on road.	Motorcycle volumes are unknown. For the purposes of the assessment, motorcyclist volumes are assumed to be in the order 1% of ADT (> 100 units per day). Short length of road segment.
Likelihood	4 Factors that increase likelihood include: • Dual lane road • Fencing on site had been hit by vehicle, indicating a recent run-off road type crash	4 Factors that increase likelihood include: • Nil	4 Factors that increase likelihood include: • Multiple traffic lanes	4 Factors that increase likelihood include: • Multiple traffic lanes • Drivers approaching crossing stopping for pedestrians	4 Factors that increase the likelihood include: • Dynamic obstruction-path users obscured by vehicles • Vehicles overtaking at crossing • Difficult to predict gaps at entries and exits • Drivers accelerating exiting RBT at crossings • Vegetation on RBT obstructs sight lines from crossing • Drivers turning left, looking right for vehicles • Users need check multiple directions for CSO. • 75% of users are children in peak. • Inner lane stopped whilst outer flowing at crossings • Multiple users storing for long periods on refuge • Multiple users reported danger on site • Users waiting over 60 seconds for gap in traffic	3 Factors that increase the likelihood include: • As per pedestrians • Failure start for bike rider/equipment failure • Multiple riders and bikes trying to access and store on crossing at one time.	4 Factors that increase the likelihood include: • Multiple traffic lanes
Severity	1.5 Factors that increase the severity include: • Trees and entry statements likely to be non-fragrable and are situated on or around roundabout	1 Factors that increase the severity include: • Nil	2 Factors that increase the severity include: • Nil	2 Factors that increase the severity include: • Nil	4 Factors that increase the severity include: • Speeds up to 47km/h at crossings on exit lanes (significantly higher than on road/roundabout) • Drivers unlikely to brake because not looking for path users, or looking in other direction • Drivers accelerating out of roundabout	4 Factors that increase the severity include: • As per pedestrians	2 Factors that increase the severity include: • Trees and entry statements likely to be non-fragrable
Product	12	4	8	8	48	36	20
Total	136	448					

Source: Sunshine Coast Council/Sidelines Traffic.

Table 4: SSA Matrix – Raised Crossing Southern Leg

	Run-off road	Head-on	Intersection	Other	Pedestrian	Cyclist	Motorcyclist
Exposure	ADT was 797 in 2019, 95m south of Dumbarton Drive (ie. North of project site). There has been considerable growth since this time, and the ADT is estimated to be >10,000/CompassIoT indicates 85th percentile vehicle speeds range from 32km/h at entries, to 30km/h on the crossings and up to 43km/h at exits. For run-off road crash types, the ADT is > 10000 vehicles per day.	For head-on crash types, the ADT is > 10000 vehicles per day	For intersection crash types, the ADT is > 10000 vehicles per day. Turning traffic volumes are low.	For 'other' crash types, the ADT is > 10000 vehicles per day	Pedestrians crossing Belvidera Blvd at roundabout Mon 3 June: 7:40-8:40 AM - 25 pedestrians 2:30-3:30 PM - 25 pedestrians Total peak hr volume = 350. Assume >100 users per day.	Bike riders and e-scooters crossing Belvidera Blvd at roundabout Mon 3 June: 7:40-8:40 AM - 14 pedestrians 2:30-3:30 PM - 17 pedestrians Total peak hr volume = 31. Assume >50 users per day. All cyclists were observed using path network. No riders on road.	Motorcycle volumes are unknown. For the purposes of the assessment, motorcyclist volumes are assumed to be in the order 1% of ADT (> 100 units per day). Short length of road segment.
Likelihood	4 Factors that increase likelihood include: • Dual lane road • Fencing on site had been hit by vehicle, indicating a recent run-off road type crash	4 Factors that increase likelihood include: • Nil	4 Factors that increase likelihood include: • Multiple traffic lanes	4 Factors that increase likelihood include: • Multiple traffic lanes • Drivers approaching crossing stopping for pedestrians	4 Factors that increase the likelihood include: • Dynamic obstruction-path users obscured by vehicles • Vehicles likely likely to overtake at crossing and not allowed by (then on roundabout) • Drivers accelerating exiting RBT at crossings accelerating exiting RBT at crossings • Vegetation on RBT obstructs sight lines from crossing • Drivers turning left, looking right for vehicles • Users need check multiple directions for CSO. • 75% of users are children in peak. • Inner lane stopped whilst outer flowing at crossings • Multiple users storing for long periods on refuge • Multiple users reported danger on site • Users waiting over 60 seconds for gap in traffic	3 Factors that increase the likelihood include: • As per pedestrians • Failure start for bike rider/equipment failure • Multiple riders and bikes trying to access and store on crossing at one time.	4 Factors that increase the likelihood include: • Multiple traffic lanes • Riders approaching at high speeds, from north not anticipating raised crossing
Severity	1.5 Factors that increase the severity include: • Trees and entry statements likely to be non-fragrable and are situated on or around roundabout	1 Factors that increase the severity include: • Nil	2 Factors that increase the severity include: • Nil	2 Factors that increase the severity include: • Nil	4 Factors that increase the severity include: • Speeds up to 47km/h at crossings on exit lanes (significantly higher than on roundabout) • Drivers unlikely to brake because not looking for path users, or looking in other direction • Drivers accelerating out of roundabout	4 Factors that increase the severity include: • As per pedestrians	2 Factors that increase the severity include: • Trees and entry statements likely to be non-fragrable
Product	12	4	8	8	48	36	20
Total	136	448					

Source: Sunshine Coast Council/Sidelines Traffic.

4.1. Assessment Summary

The Safe System Assessment matrix scores for the existing conditions and the proposed design option are shown in Table 4.1. The scores for each crash type are shown in Figure 4.1. The detailed assessments are presented in Section 4.2.

Table 4.1(a): SSA Matrix Scores for the Project

Option	Score
Existing conditions	136 / 448
Design Option 1 – Raised Crossing Southern Leg	59.5 / 448

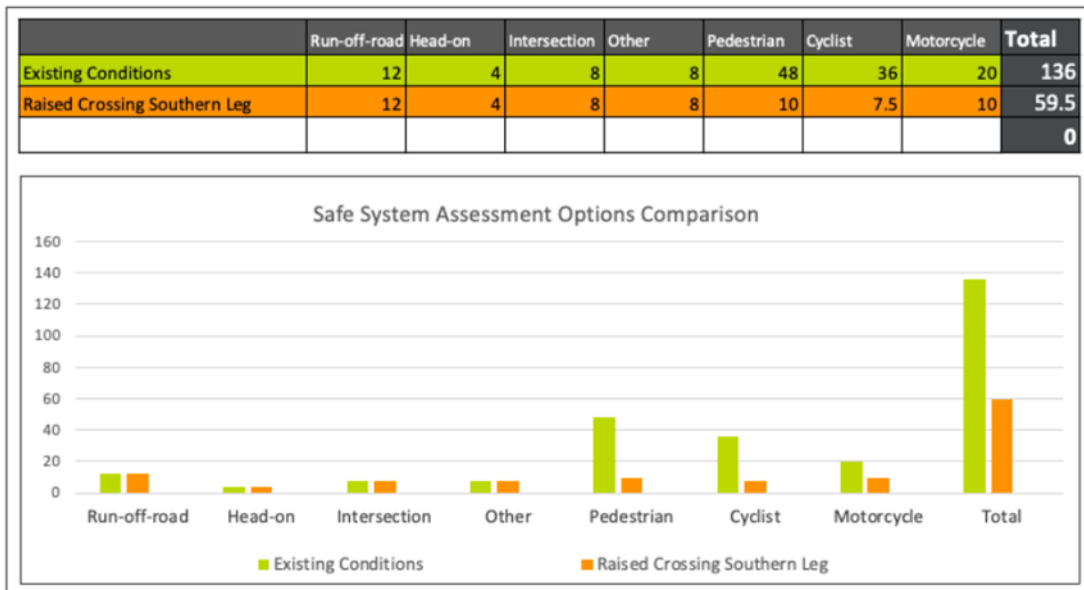


Figure 4.1: SSA Scores for Crash Types

Source: Sunshine Coast Council/Sidelines Traffic.

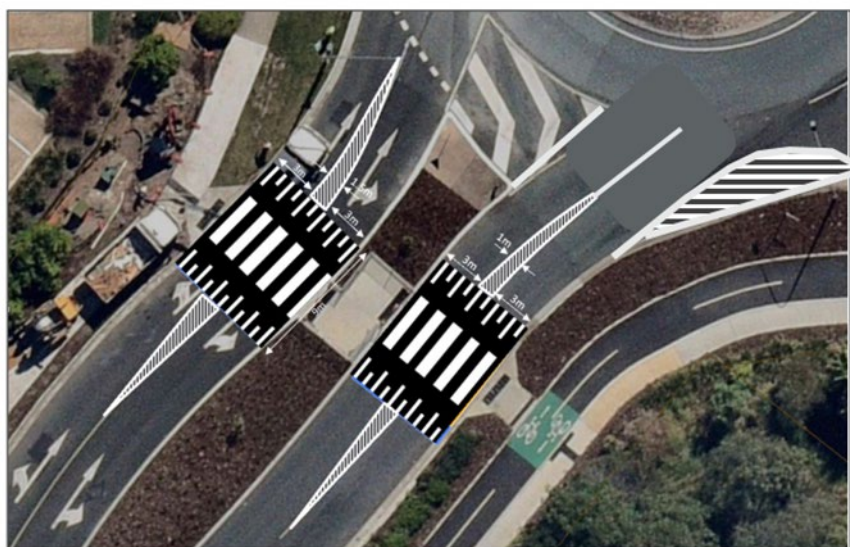
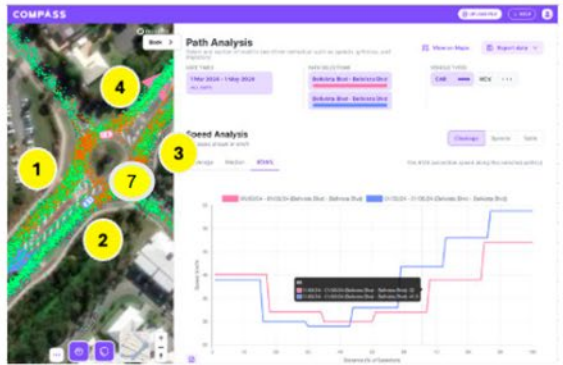


Figure 3.1(b): Concept layout of raised crossing sites on southern leg of roundabout

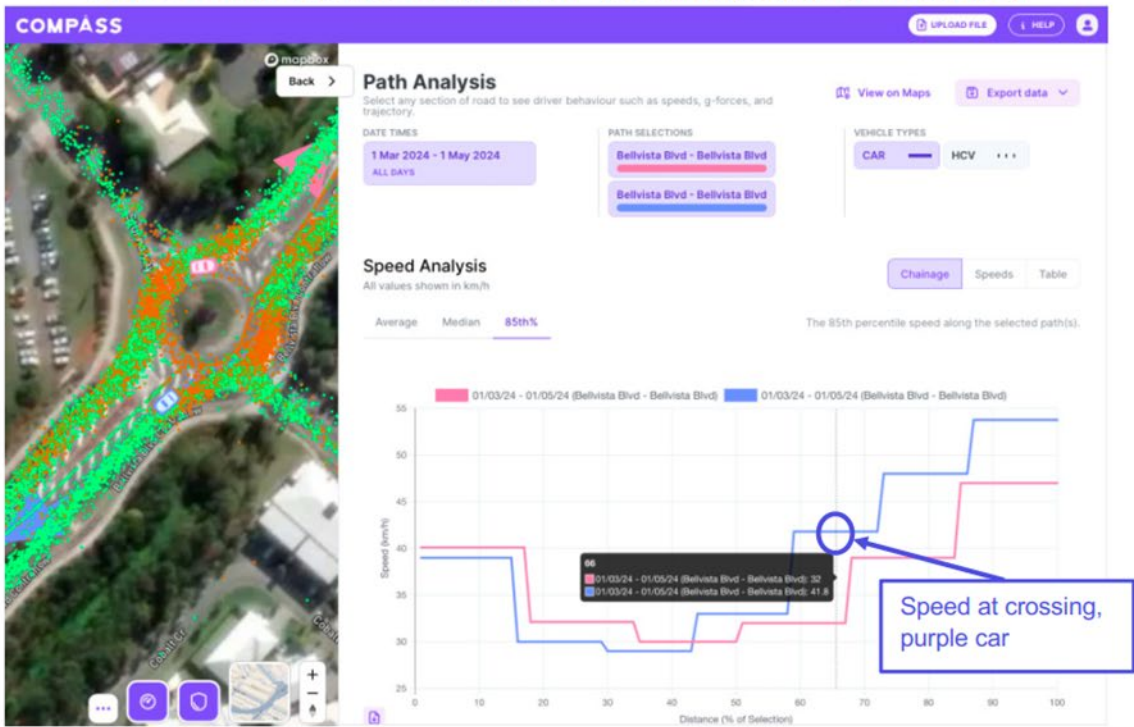
Source: Sunshine Coast Council/Sidelines Traffic.

Site	Type	Site	85th% (km/h)	Average (km/h)
1	Roundabout Entry	Adjacent SW Pedestrian Crossing	32	20
2	Roundabout Exit	Adjacent SE Pedestrian Crossing	42	33
3	Roundabout Entry	Adjacent NE Pedestrian Crossing	30	22
4	Roundabout Exit	Adjacent NW Pedestrian Crossing	43	37
5	Northbound - Midblock	Approx 200m north of roundabout	72	63
6	Southbound - Midblock	Approx 200m north of roundabout	66	61
7	Roundabout - Southbound	On Bellvista – southbound rbt centre	30	25

Locations at roundabout for point speed data [\(CompassIOT\)](#)



CompassIOT Speed Analysis Data (Pink Line – Northbound, Purple Line Southbound)

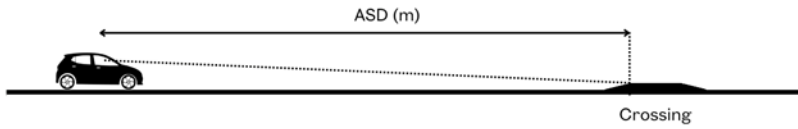


Source: Sunshine Coast Council/Sidelines Traffic.

Appendix 3 – Approach site distance measurement for proposed raised crossing facility

How would the Approach Site Distance change at this crossing located on a crest if the crossing was raised?

For raised crossings, measure ASD from driver eye height (1.1 m) to top of the raised crossing leading edge ramp (100mm)



Top of black tape is 100mm (same height as top of platform)

Crossing	ASD	ASD
Existing at grade crossing	Measure to road surface	44
Proposed raised crossing	Measure to 100mm above surface	62
Difference		18m

Appendix 4 – Queensland MUTCD Part 10 85th percentile speed requirements for raised priority crossings and raised pedestrian crossings

This section provides examples of how the guidance from Queensland MUTCD Part 10 is applied when considering where the following types of mid-block crossings can be used:



- at grade pedestrian crossings (zebras)
- Raised Priority Crossings (RPC), and
- Raised Pedestrian Crossings (Wombat).

The examples refer to vehicle speed requirements from Queensland MUTCD Part 10, including:

- **Speed limit:** posted speed limit where the proposed crossing is situated
- **85th % speed without platform:** 85th percentile vehicles speeds in the vicinity of the crossing, before a platform (or other speed reduction device is installed)
- **85th % speed with platform:** 85th percentile vehicle speeds at the crossing after the platform (or speed reduction device is installed).

Where a raised platform (or an alternative speed control device such as road cushions) is to be installed at a mid-block site, it is generally assumed that vehicle speeds will reduce by approximately 20 km/h as per Table 4.3.2. The speed reduction is expected to be less at side road sites, or where ramps and platforms are designed to be longer with shallower ramps. Practitioners should generally not rely on achieving this full 20 km/h reduction in speed, when meeting requirements of Queensland MUTCD Part 10. A more conservative assumption of 10-15 km/h should generally be used during planning and design. The charts and model provided in Figure 4.3.3 may also be referred to when estimating speeds at the crossing.

Examples of application of Queensland MUTCD Part 10 speed requirements for raised priority crossings

Example 1	Collector - urban	Arterial - regional town
Street		
Speed Limit	<ul style="list-style-type: none"> • 60 km/h 	<ul style="list-style-type: none"> • 50 km/h
85th % speed (without platform)	<ul style="list-style-type: none"> • 57 km/h 	<ul style="list-style-type: none"> • 53 km/h
Estimated 85th % speed at crossing with platform	<ul style="list-style-type: none"> • 37 km/h 	<ul style="list-style-type: none"> • 33 km/h
<p>Site suitability for crossing types applying vehicle speed criteria from Queensland MUTCD Part 10?</p>		
At-grade Zebra	<ul style="list-style-type: none"> • No. • Only supported where 85th % speed on crossing (57) ≤ 50 km/h. • At-grade crossing does not reduce operating speed. 	<ul style="list-style-type: none"> • No. • Only supported where 85th % speed on crossing (53) ≤ 50 km/h. • At-grade crossing does not reduce operating speed.
Raised Priority Crossing (RPC)	<ul style="list-style-type: none"> • No. • RPC only supported where Post Speed Limit (PSL) (57) ≤ 50 and 85% speed (37) ≤ 50. 	<ul style="list-style-type: none"> • Potentially. • No requirements for PSL for wombats. • Supported where estimated speed on crossing after construction is ≤ 50 km/h. Estimated speed is 33 km/h. This is well below threshold.
Pedestrian/ Wombat Crossing	<ul style="list-style-type: none"> • Most likely. • No requirements for PSL for wombats. • Supported where estimated speed on crossing after construction is ≤ 50 km/h. Estimated speed is 37 km/h. This is well below threshold. 	<ul style="list-style-type: none"> • Route has high volume of heavy vehicles that may require longer platform and less steep ramp. Consider additional treatments such as reducing speed limit to reduce vehicle speeds to closer to Safe System thresholds.

Summary of risk assessment requirements of application of Queensland MUTCD Part 10 for pedestrian / wombat crossings

Crossing type	No. Lanes	Treatment type	Posted speed (km/h)	Risk assessment required	85th percentile speed
Mid-block zebra crossings	Single lane	at-grade	50 or less	No	must be 50 km/h or less regardless of the posted speed
			higher than 50	Yes	
		raised or cushions	50 or less	No	at the crossing once constructed – is not expected to exceed 50 km/h regardless of posted speed
			higher than 50	No	
	Multi-lane	at-grade	All speeds Not permitted	Not applicable	Not applicable
		raised or cushions	50 or less	Yes	at the crossing once constructed – is not expected to exceed 50 km/h regardless of posted speed
higher than 50	Yes				
Slip lane zebra crossing	Single lane	at-grade	50 or less	No	must be 50 km/h or less regardless of the posted speed
			higher than 50	Yes	
		raised or cushions	50 or less	No	at the crossing once constructed – is not expected to exceed 50 km/h regardless of posted speed
			higher than 50	No	
	Multi-lane	at-grade	All speeds Not permitted	Not applicable	Not applicable
		raised or cushions	50 or less	Yes	at the crossing once constructed – is not expected to exceed 50 km/h regardless of posted speed
higher than 50	Yes				

Crossing type	No. Lanes	Treatment type	Posted speed (km/h)	Risk assessment required	85th percentile speed
Roundabout or side-street zebra crossing	Single lane	at-grade	50 or less	No	must be 50 km/h or less regardless of the posted speed
			higher than 50	Yes	
		raised or cushions	50 or less	No	at the crossing once constructed – is not expected to exceed 50 km/h regardless of posted speed
			higher than 50	No	
	Multi-lane	at-grade	All speeds Not permitted	Not applicable	Not applicable
		raised or cushions	50 or less	Yes	at the crossing once constructed – is not expected to exceed 50 km/h regardless of posted speed
higher than 50	Yes				
Mid-block Refuge crossing	Single lane	at-grade	50 or less	No	Not a consideration for the installation of refuge crossings
			higher than 50	Yes	
	Multi-lane	raised or cushions	All speeds	Yes	Not a consideration for the installation of refuge crossings

