



Austroads

Research Report
AP-R756-26



Keeping People Safe When Walking
Stream 2: Strengthening Key Practitioner
Guidance and Methodologies

Keeping People Safe When Walking: Stream 2 – Strengthening Key Practitioner Guidance and Methodologies

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Abstract

This report identifies ways to strengthen a systems-based approach to pedestrian safety planning, intervention selection, design, evaluation, and monitoring of outcomes through guidance and methodologies. It is part of the Austroads project *SAG6371 Keeping People Safe When Walking* program, which aims to help chart a path to zero pedestrian serious trauma.

The report presents conclusions based on an extensive review of existing policies and guidelines, selected national and international research, as well as engagement with stakeholder groups.

This report identifies gaps in the current pedestrian safety literature and provides recommendations to address these areas.

The recommendations offer constructive steps towards a vision of seeing zero harm on our transport network and a more accessible, equitable space for our communities.

Keywords

Pedestrian safety, Safe System, safety measures, pedestrian safety interventions, guidance.

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Acknowledgements

This research report, *Keeping People Safe When Walking: Strengthening key practitioner guidance, methodologies and tools*, has been dutifully led by Austroads Project Manager Phil Harbutt and is a reflection of the current practices within Australia and New Zealand in relation to pedestrian safety planning, development, design and evaluation. We extend our sincere gratitude to the stakeholder groups for volunteering their time and sharing their practitioner experiences relating to this topic. Their inputs have been instrumental in articulating the current landscape and identifying the gaps in the existing literature.

Special thanks also to the dedicated Project Control Group, Expert Working Group and Austroads Task Forces for providing timely, pertinent feedback throughout the project's life.

This report has been prepared for Austroads as part of its work to promote improved Australian and New Zealand transport outcomes by providing expert technical input on road and road transport issues.

Individual road agencies will determine their response to this report following consideration of their legislative or administrative arrangements, available funding, as well as local circumstances and priorities.

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About Austroads

Austroads is the association of Australasian transport agencies.

Austroads' purpose is to support our member organisations to deliver an improved Australasian road transport network. To succeed in this task, we undertake leading-edge road and transport research which underpins our input to policy development and published guidance on the design, construction and management of the road network and its associated infrastructure.

Austroads provides a collective approach that delivers value for money, encourages shared knowledge and drives consistency for road users.

Austroads is governed by a Board consisting of senior executive representatives from each of its 11 member organisations:

- Transport for NSW
- Department of Transport and Planning (Transport Victoria)
- Queensland Department of Transport and Main Roads
- Main Roads Western Australia
- Department for Infrastructure and Transport South Australia
- Department of State Growth Tasmania
- Department of Logistics and Infrastructure Northern Territory
- City and Environment Directorate, Australian Capital Territory
- Department of Infrastructure, Transport, Regional Development, Communications, Sport and the Arts
- Australian Local Government Association
- NZ Transport Agency Waka Kotahi.

Summary

Austrroads project SAG6371 *Keeping People Safe When Walking* addresses the critical issue of pedestrian safety in Australia and New Zealand.

The focus of this report is to support Austrroads members' pedestrian safety practice, through better transport guidance, approaches and methodologies. This research report identifies ways to strengthen a systems-based approach to pedestrian safety planning and intervention selection, design, evaluation, and monitoring of outcomes.

The methodology for this project was designed to gain a clear understanding of the experiences of practitioners across Australasia in developing pedestrian safety treatments. A literature review was undertaken to compile existing national resources and compare them with jurisdiction-specific guidelines.

A key element of the project involved direct engagement with practitioners. A thorough stakeholder consultation process was carried out to assess the relevance of the resources currently in use and to identify gaps in existing guidance. Notably, during these consultations, practitioners also shared additional guidance documents, which were subsequently incorporated into the literature review.

The literature review and stakeholder engagement led to the development of recommendations to update, bolster or indeed remove existing transport guidance.

There are numerous recommendations provided within this report to improve pedestrian safety outcomes. These recommendations are to be considered by relevant guide-owners. A summary of some of the key recommendations has been provided below:

- **Raised pedestrian crossing points:** This project identified that practitioners find the existing guidance around raised pedestrian crossing points is lacking. These treatments offer a significant safety benefit for pedestrian safety and accessibility. In order to see the proliferation of these treatments, this project has recommended bolstering existing guidance and provided additional guidance.
- **Vulnerability of pedestrians:** While there are certainly some Austrroads guides that discuss the vulnerability of pedestrians, this project uncovered key guides where this information was either missing or ambiguous. Human vulnerability should be foundational during the planning and design of transport networks.
- **Demographics of pedestrians:** In discussions with practitioners, it was determined that designing with a *stereotypical* pedestrian in mind was common practice. However, of course our transport network serves the public which cannot readily be distilled into a single, *stereotypical* entity. There is existing guidance discussing the transport needs of different demographics and the authors have made recommendations to strengthen the link between this guidance and the planning/design process.
- **Minimum footpath widths:** The guidance from Austrroads *Guide to Road Design Part 3* stipulates a minimum footpath width of 1.2 m. Most jurisdictions have developed their own guidance that departs from this minimum width as they have recognised the 1.2 m width is too narrow to comfortably service the needs of pedestrians, including people using wheelchairs or mobility devices. To this end, recommendations have been provided to match industry standard and reflect contemporary practice.
- **Roundabouts:** It is well established that roundabouts offer a safety benefit for vehicular traffic. However, this safety benefit does not extend to pedestrians. This is particularly relevant for roundabouts that permit vehicle operating speeds at 30 km/h or above. Some Austrroads guides described the pedestrian safety disbenefit as a *perceived* crash risk as opposed to what it is, which is a *real* crash risk. The authors have recommended consistent phrasing around this intersection type and have also provided mitigating measures to improve pedestrian safety at roundabouts.

The recommendations proffered are a step towards our vision of seeing zero harm on our transport network and a more accessible, equitable space for our communities. This project emphasises the need to view our transport network through a human lens and not a vehicle lens. Fundamentally, improved pedestrian safety outcomes will eventuate through prioritising pedestrian movement and recognising the bio-mechanical limits of the human body.

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1. Introduction

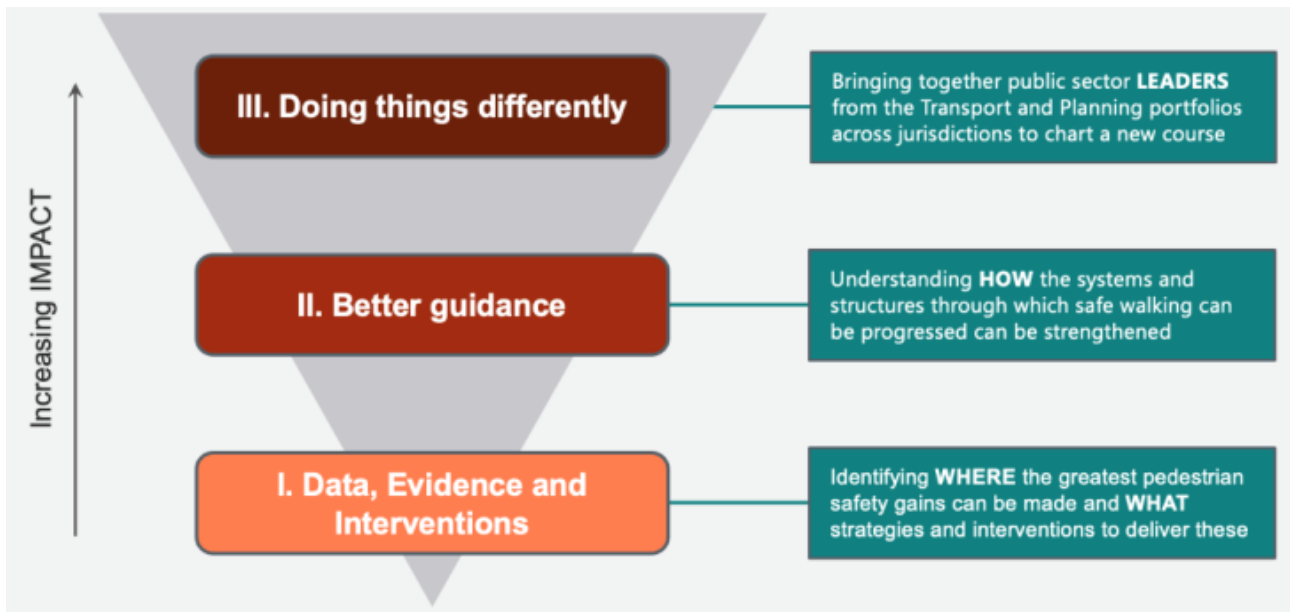
1.1 Background

The purpose of Austroads project SAG6371 *Keeping People Safe When Walking* is to help chart a path to zero pedestrian serious trauma by establishing a greater level of understanding and insights into pedestrian safety risk, trauma, and cost-effective countermeasures. The scope of the project includes:

- review travel and trauma data to better understand pedestrian safety risk priorities
- identify priorities to improve data needed to support investment in pedestrian safety
- assess strategies and interventions to progress pedestrian safety
- develop and strengthen practitioner guidance to support implementation of pedestrian safety measures
- support jurisdictions planning to eliminate pedestrian death and serious injury.

The project is being undertaken over 3 streams, as depicted below.

Figure 1.1: Project streams



Stream 1 *Data, Evidence and Interventions* has culminated in 4 reports:

1. AP-R727-25 Pedestrian Safety Problem and Project Methodology (Austroads 2025a)
2. AP-R728-25 Literature Review (Austroads 2025b)
3. AP-R729-25 Pedestrian Data Improvement Recommendations (Austroads 2025c)
4. AP-R730-25 Recommended Pedestrian Safety Interventions (Austroads 2025d).

Stream 2 builds on the work of Stream 1 to focus on areas of greatest value to Austroads members in delivering pedestrian safety outcomes. It will strengthen guidance and include an assessment of current practice by Austroads members, a gap analysis against best practice, and showcase examples of best practice from Australia and New Zealand.

1.2 Purpose

The purpose of this report is to support Austroads members' pedestrian safety practice, through better transport guidance, approaches and methodologies. This report identifies ways to strengthen a systems-based approach to pedestrian safety planning and intervention selection, design, evaluation, and monitoring of outcomes.

Recommendations to improve guidance for pedestrian safety outcomes are provided for consideration by the relevant guide-owners.

1.3 Scope

This project has focused on practitioners' experiences in planning, designing and evaluating the performance of pedestrian treatments. Specific literature was determined at the outset of this project as being required to be reviewed. Refer to Section 2 Literature Review for a list of these initial resources. This list expanded to cover jurisdictional supplements and local guidance, some of which was identified through the stakeholder engagement phase of this project.

During the project, several barriers for the development of safe pedestrian networks were identified but were judged as outside the scope of this project. One example is the need for Austroads *Guide to Traffic Management* (multiple parts) to align with the Movement and Place categories. While the authors recognise the value in this transformation in relation to pedestrian safety, proposing changes to these guides with exclusively a pedestrian focus would be a parochial approach. Instead, the authors have recommended a review of these guides with all transport modes in mind and updating this information in reference to Movement and Place.

Other examples of items outside of scope have been recorded in Section 5.

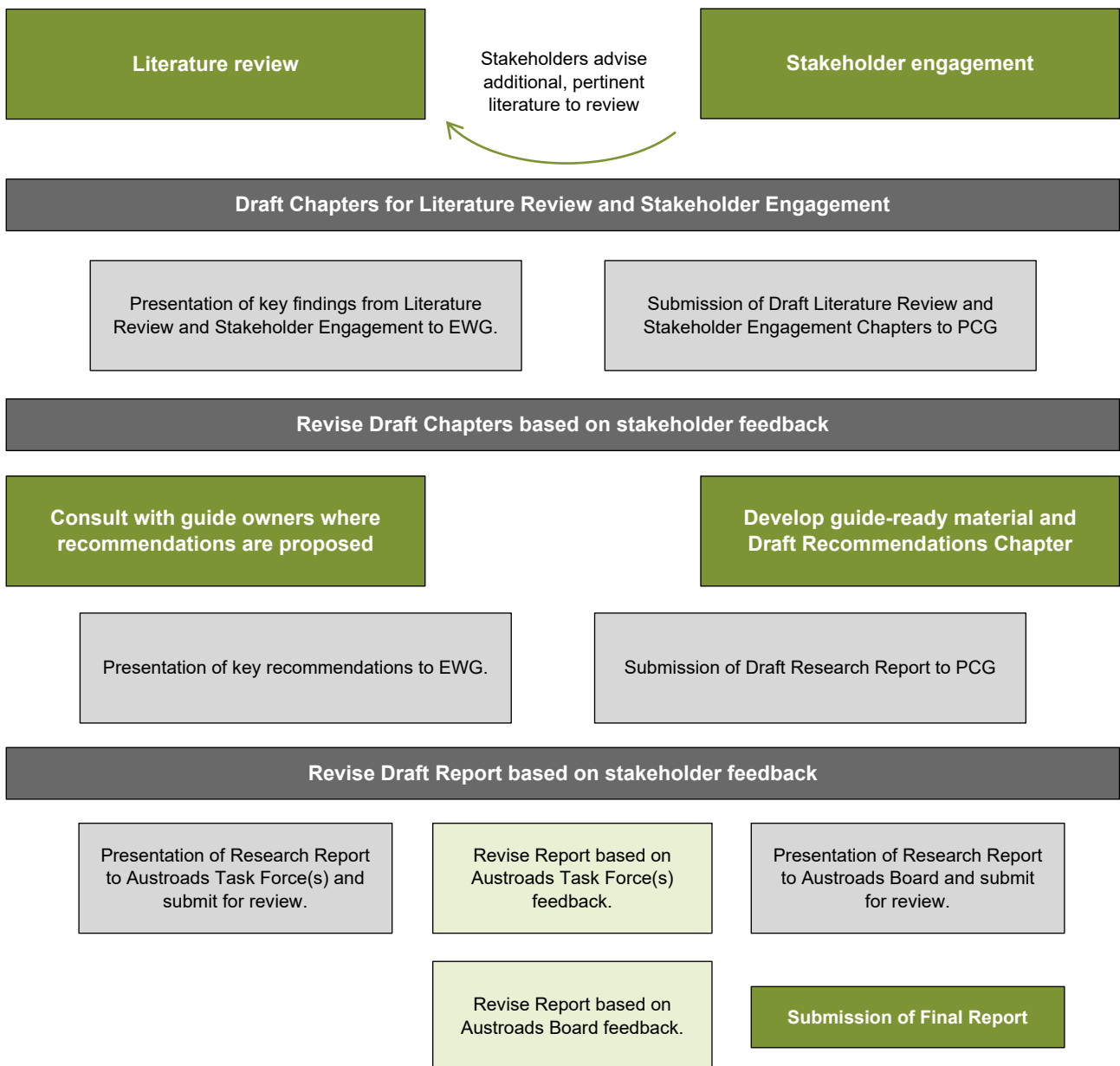
1.4 Methodology

The methodology for this project aims to best understand the experiences of practitioners across Australasia with regards to the development of pedestrian safety treatments. A literature review was completed that collated existing national resources and compared this information against jurisdictional supplements.

A large component of this project has involved speaking directly with practitioners. A comprehensive stakeholder engagement process was completed to validate the resources that practitioners are using and define the gaps in the guidance that they encounter.

At numerous stages of this project, the guidance from technical and subject matter experts was sought and their feedback has been incorporated into this report. The Project Control Group (PCG), Expert Working Group (EWG) and Austroads Task Force(s) have all contributed to the material developed and presented within this report. A high-level project methodology has been presented in Figure 1.2. This methodology is further detailed in Section 2 and Section 3.

Figure 1.2: High-level project methodology



1.5 Terminology

To avoid ambiguity, 3 key terms and their definitions used throughout this report are:

- Pedestrian crossing facility/facilities – areas of the transport network where pedestrians are encouraged to cross. Common treatments include the provision of kerb ramps, wombat crossings, pedestrian-actuated traffic signals etc.
- Pedestrian treatments – road infrastructure solutions that facilitate pedestrian activity and movement. The term is used synonymously with pedestrian interventions within this report.
- Unmarked pedestrian crossing – a pedestrian crossing where vehicles have priority (i.e. there are no zebra pavement markings, ‘give way to pedestrians’ signs or signals).

2. Literature Review

2.1 Purpose and scope

The purpose of the literature review is to analyse the national and international research, policies, guidelines, and practices of pedestrian safety treatments (or relevant keywords) to enhance the understanding of existing practices, measures, philosophy, and treatments across different jurisdictions in Australasia and internationally. The scope of this literature review has focussed on the documentation that Australasian practitioners readily access and reference in relation to pedestrian safety planning, development, design and evaluation. Thus, a more encompassing, academic literature review has not been the focus of this project.

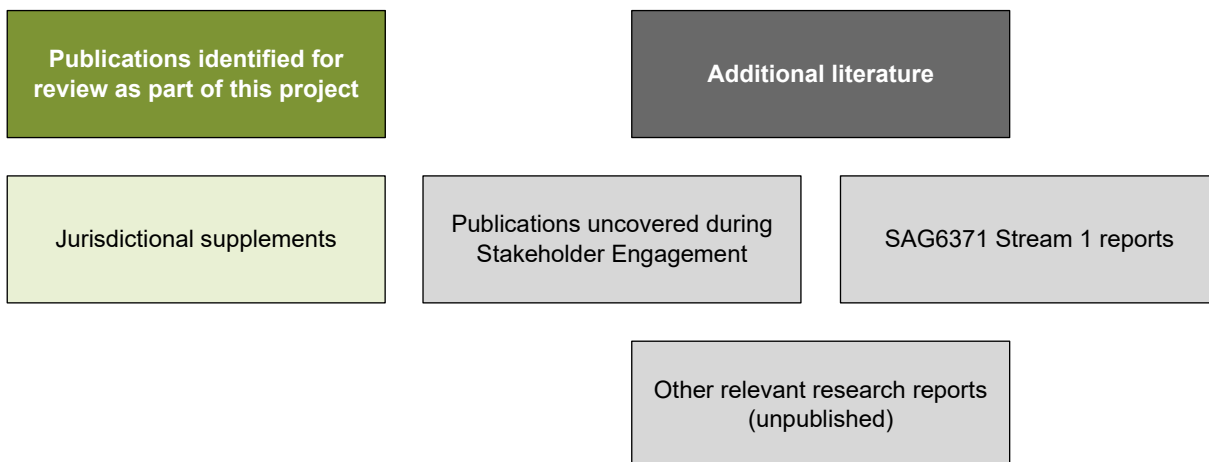
The literature review sets the context for this research report and summarises the current body of knowledge that practitioners reference within the pedestrian safety space. The review highlights jurisdictional practices and how these differ from the national (Austroads) publications. These jurisdictional inclusions and departures have been analysed, and where appropriate, have been included within Section 4 of this research report – indicating that the jurisdictional alteration offers an improved level of safety for pedestrians and Austroads should consider adopting this practice in their publications.

Moreover, the literature review identifies gaps within current Austroads guidance and methodologies and discusses the impact of these gaps. This gap analysis highlights key issues that practitioners face when referencing Austroads publications and establishes where research is lacking.

2.2 Literature review methodology

The literature review methodology has been developed with a practitioner-focussed approach. The sources of the literature reviewed have been broadly categorised into the headings shown in Figure 2.1. The focus of the literature review has been to reflect on Austroads current publications, investigate stakeholder practices and examine pertinent Austroads research reports. This approach has led to a comprehensive understanding of how practitioners currently reference guidelines when developing pedestrian safety solutions and embed insights from recent Austroads projects.

Figure 2.1: Literature review methodology



At the outset of this project, several publications were identified for review, including:

- *Austrroads Safe System Assessment Framework* (Austrroads 2016)
- *Austrroads Guide to Road Safety* (AGRS) Set
- *Austrroads Guide to Road Design* (AGRD) Set
- *Austrroads Guide to Traffic Management* (AGTM) Set
- *Austrroads Pedestrian Facility Selection Tool* (Austrroads n.d.)
- *Australian Transport Assessment and Planning Guidelines*. M4 Active travel and PV4 active travel parameter values (Commonwealth of Australia 2023a, 2023b)
- *NZ Pedestrian Network Guidance* (NZ Transport Agency Waka Kotahi n.d.)
- NZ Transport Agency Waka Kotahi (NZTA) *Monetised Benefits and Costs Manual* (MBCM) (NZ Transport Agency Waka Kotahi 2024)
- SAG6371 Stream 1 Reports, including:
 - *AP-R727-25 Keeping People Safe When Walking – Stream 1: Pedestrian Safety Problem and Project Methodology* (Austrroads 2025a)
 - *AP-R728-25 Keeping People Safe When Walking – Stream 1: Literature Review* (Austrroads 2025b)
 - *AP-R729-25 Keeping People Safe When Walking – Stream 1: Pedestrian Data-Improvement Recommendations* (Austrroads 2025c)
 - *AP-R730-25 Keeping People Safe When Walking – Stream 1: Recommended Pedestrian Safety Interventions* (Austrroads 2025d)

These documents have been reviewed and summarised. The keywords searched for within these documents include ‘pedestrian’, ‘active transport’, ‘walk’, ‘activity centre/area’, ‘vulnerable road user’ and ‘footpath’. The key information from each of these publications has been distilled in Section 2.3.

Additionally, jurisdictional supplements have been reviewed where applicable. Several jurisdictions across Australasia offer their own supplements to the reviewed Austrroads publications. These supplements provide additional context (for instance referring to specific jurisdictional strategies, policies and guidelines) and also articulate any changes (departures) from the Austrroads publications. Practitioners commonly refer to both the Austrroads publications and the jurisdictional supplement document – with the latter taking precedence where there are discrepancies in guidance. Reviewing jurisdictional supplements has provided greater insight into current practices across Australasia.

The authors noted during this review process that jurisdictional supplements commonly referenced superseded Austrroads publication. An example of this has been provided in Table 2.1.

Table 2.1: Austrroads publication vs jurisdictional supplement example

	Austrroads publication	Transport for NSW Supplement
Title	<i>Guide to Traffic Management Part 2: Traffic Theory Concepts</i>	Austrroads supplement for <i>Guide to Traffic Management Part 2 Traffic Theory</i> (2008)
Edition/Version	3.0	2.0
Published date	April 2020	July 2013

In this example, the Transport for NSW supplement references the Austrroads Edition 1.0 guideline, published in July 2008.

Insights and guidance from supplement documents that refer to current Austrroads guidance have been prioritised over those that refer to superseded guidance.

During the Stakeholder Engagement, described in Section 3, practitioners were directly asked what publications they refer to when planning, designing and evaluating the performance of pedestrian safety interventions. The most referred to publications included AGRD Part 6A and Part 3 and Australian Standard AS 1742.10. However, this engagement also uncovered additional literature that has also been reviewed.

It should be noted that the literature review is not merely just a review of Austroads documents against jurisdictional supplements. A myriad of pedestrian planning and design guidelines have been reviewed and informed the direction of this project. All literature reviewed as part of this project has been included in the References section of this research report.

Finally, this literature review has included a variety of relevant, unpublished Austroads research reports. Examining these documents has further articulated the current context and understanding of pedestrian issues. Information from unpublished Austroads publications has been used to develop thinking as part of this report, but it has not been referenced.

2.3 Literature review findings

Key findings from the literature review have been grouped in subcategories to improve readability and to align with recommendations (Section 4). Subcategories exist for each Austroads Guide Set pertinent to this project. Jurisdictional supplements relevant to each of the Austroads Guide Sets have been added in the relevant subcategory.

Key themes derived from the literature review have been **bolded** in the subcategories and include:

Vulnerability of pedestrians

This theme relates to the bio-mechanical tolerances of the human body in vehicle-to-pedestrian crashes. There is only so much impact a human body can withstand before serious or fatal crash outcomes occur. A key focus of this theme is articulating the Safe System speed thresholds for pedestrian crash types. Where vehicle-to-pedestrian exposure occurs or is possible within the transport network, the system should be designed to reduce vehicle speeds within the survivable tolerances.

The vulnerability of pedestrians (and people more broadly) is a key principle of the Safe System. This ideology is well mapped out within the AGRS Set, but there are sections of other Austroads publications where the guidance could be enhanced.

Critical role of active transport

At some stage, virtually everyone becomes a pedestrian. Active transport is foundational to providing a sustainable, accessible transport system and is critical in multi-modal journeys (e.g. getting to and from public transport). This theme focuses on the benefits of active transport, including its contribution to public health, accessibility, environmental sustainability, and equity in urban design. It explores the necessity of prioritising active transport in planning and designing infrastructure, creating pedestrian-friendly environments, and fostering walkability through thoughtful urban policies and interventions.

Jurisdictional supplements and other resources provide further examples, methodologies and evidence to unequivocally demonstrate the importance of walking. There is an opportunity to leverage from these resources to further enhance Austroads' current suite of knowledge.

Interventions

The core of this theme revolves around the technical application of pedestrian safety. The term interventions is synonymous with treatments. This theme is focused on the life cycle of pedestrian safety treatments, namely the selection process, the design and development as well as the evaluation. The construction methodologies have not been considered/analysed as part of this research report.

The Interventions theme is frequently referenced within this literature review. This aligns with the overarching project's objective to strengthen key practitioner guidance, methodologies and tools which is inextricably linked to the interventions.

The literature review surfaced changes in jurisdictional practices, namely in the design and implementation of interventions. These points of difference have been critically analysed to assess whether these departures offer an improved level of safety for pedestrians.

Pedestrian demographics

This theme acknowledges the diverse characteristics of pedestrians and the varying needs of different groups, including children, older adults, people with disability, and others with unique mobility requirements. It addresses how these demographics influence travel behaviours, speed, and facility use and emphasises designing inclusive environments that cater to all users equitably.

While Austroads publications acknowledge and articulate pedestrian demographics, there are instances of disconnect as to how practitioners should apply this knowledge. There is an opportunity to provide greater clarity around when the demographics of an area should directly impact on the pedestrian safety treatments being investigated and when a universal design approach is preferred to accommodate all pedestrians.

Pedestrian behaviours

This theme explores how pedestrians interact with the transport network, their environment, infrastructure, and other road users. It considers factors such as distractions (e.g. mobile phone use), pedestrians crossing in an unsafe manner, and compliance with designated facilities. The Safe System acknowledges that people are fallible – and this principle applies to pedestrians as well.

Understanding pedestrian behaviour is critical for designing interventions and infrastructure that account for real-world usage patterns and encourage safer practices.

Accessibility

This theme focuses on ensuring that pedestrian environments are easy to navigate and inclusive for all, including those with disabilities or limited mobility. It highlights the importance of designing infrastructure that complies with accessibility standards, such as the *Disability Discrimination Act* (1992) (DDA) and related guidelines, to ensure equitable access. Indeed there are several crossing facilities that do not align well with accessibility principles (e.g. vehicle-priority crossings where pedestrians have to pick a gap in traffic to cross, in this scenario this assumes that the pedestrian has adequate vision and/or assistance to safely cross).

Key considerations for accessibility include clear widths, tactile ground surface indicators, grades, colour contrast and unobstructed pathways to facilitate safe and comfortable movement for everyone.

The overarching concept of universal design which involves designing for a wide range of abilities, speeds and other needs is not well embedded in the design guidance. This could include aspects such as wider footpaths to cater for larger mobility scooters, minimising trip hazards, and considering a wider range of accessibility needs.

2.3.1 Austroads Guide to Road Safety and jurisdictional supplements

The authors note that jurisdictional supplements to the AGRS was not common, with Queensland's Department of Transport and Main Roads (TMR) being the only jurisdiction reviewed with published supplements.

AGRS Part 1 Introduction and the Safe System

Edition 1.0 published July 2021

This document is an introduction to the Guide and the Safe System. It provides an overview of the structure of the Guide, its remaining 7 parts and the interlinking and overlap between parts. It also describes Safe System, the guiding principles for road safety programs in Australia and New Zealand. The final section provides an overview of road agencies' responsibilities for road safety, and how performance in meeting these responsibilities is managed and measured.

The **vulnerability of pedestrians** is discussed in Section 2.2.2 of this Guide:

The chance of surviving a crash decreases markedly above certain speeds, depending on the crash type. The critical crash speeds for various crash types are (Australian Transport Council 2011):

- *pedestrian struck by vehicle → 30 km/h.*

Yet further along in this section:

Principles of 'integration' and 'separation', which are derived from the Swedish Vision Zero philosophy (Swedish Transport Administration 1997) can be applied. For example, in areas where there are large numbers of pedestrians, they should not be exposed to vehicle speeds any higher than 40 km/h and preferably less. This can be done through separating pedestrians from vehicles, or by lowering the travel speed of vehicles to a maximum of 40 km/h, thus 'integrating' the various road users.

There appears to be a contradiction between safe speed thresholds for vehicle-to-pedestrian crash types.

AGRS Part 2 Safe Roads

Edition 2.0 published July 2024

This Guide is designed to provide all levels of government in jurisdictions across Australia and New Zealand with information on the role infrastructure plays in the Safe System and guidance on the selection and implementation of infrastructure treatments to reduce road trauma and deliver a zero-harm future.

These guidelines cover network risk assessment techniques and present a suite of infrastructure interventions (proven and emerging) that can be implemented to address the key safety issues on our road networks: high-speed lane departures, intersections, and vulnerable road users. Interventions are categorised using a treatment hierarchy approach aligned with Safe System principles.

This Guide contains practical, hands-on advice to help practitioners identify, prioritise, and deliver infrastructure interventions that are aligned with Safe System principles and the contemporary Zero Planning approach to road safety.

This Guide articulates the benefits of providing safe walking environments (**critical role of active transport**) and explores the raft of **interventions**, and how these treatments may influence the exposure, likelihood or severity of a crash.

In section 10.3 of the Guide, there is discussion of Safe System audits:

Safe System audits are an advancement on a traditional road safety audit. These audits bring together key elements of both Safe System assessments and road safety audits to provide a comprehensive transport project audit.

Currently, Safe System audits are only undertaken in New Zealand. All other jurisdictions would undertake a Road Safety Audit and/or a Safe System Assessment for transport projects. Furthermore, there is no Austroads 'Safe System audit' guideline/framework.

The TMR supplement includes guidance on the use of convex mirrors and states:

The purpose of the convex mirror is to indicate to the road user the presence or absence of a moving or stationary vehicle and/or pedestrian.

This treatment is not within the AGRS Part 2. After further review, the authors have not recommended this device for inclusion in AGRS Part 2 as the benefit to pedestrian safety is ambiguous.

The NZTA's *Pedestrian Network Guidance* articulates the benefits of walking and describes 7 main benefits. These benefits could be referenced/included in the Guide.

AGRS Part 3 Safe Speed

Edition 1.1 published July 2024

This Guide provides an overview of speed limits and their application as a speed management tool. The use of appropriate speed limits forms an integral part of a safe road system.

The general philosophy adopted when setting speed limits is that when they are being assessed they take into consideration a comprehensive range of factors. These factors include the safety record of the road, the road's operating performance, the road and roadside infrastructure, geometry and roadside development.

Within this publication, there are several cases made for Safer Speeds. In particular, there is discussion around:

- Evidence from speed limit reductions
- The case for addressing low-level speeding
- Travel time and productivity
- Speed dispersion.

Practitioners commonly receive complaints from the community about speed reductions. These sections of the Guide provide excellent collateral for practitioners to better engage with community members regarding appropriate speed limit setting.

There is further reference to the **vulnerability of pedestrians** with aspirational operating speeds of 30 km/h where there is the possibility of a collision between a vulnerable road user and a passenger vehicle. This argument is further strengthened with reference to the research conducted by Jurewicz et al. (2015) that includes serious injury crashes in addition to fatality risk.

It should be noted that research in this area is ongoing and while the specific definitions of tolerable risk and the shapes of curves may change, current indications are that impact speeds below 20 to 30 km/h are necessary to prevent severe injury from occurring.

Table 5.2 of this publication stipulates the *Design philosophies aimed towards specific road user and road user interaction types*. The 'Walking' criteria has been copied below in Figure 2.2.

Figure 2.2: AGRS Part 3 Table 5.2 excerpt

Walking	<ul style="list-style-type: none"> • Pedestrians should be prioritised in most street environments, with facilities such as footways of 1.5 m and wider, crossing facilities at appropriate locations and waiting times at signals not exceeding much beyond 60 seconds, climate protection, seating at frequent intervals, good levels of lighting, etc • Pedestrian needs should be considered for all street types • Streets should be designed on a 'human/pedestrian scale', responding to the needs of pedestrians • Streets should offer good connections of small grain • Streets should encourage staying activities and interaction for a diverse range of users • Street environments should be adaptable and flexible
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Interestingly, this table discusses the need for pedestrian 'footways' (more commonly referred to as 'footpaths') to be 1.5 m and wider. Yet, the AGRD Part 6A, and common practice, references minimum path widths of 1.2 m.

Most jurisdictions have developed their own speed limit setting guidelines/policy document that would be the primary point of reference for practitioners in proposing alterations to existing speed zones or setting new speed zones.

AGRS Part 4 Safe People

Edition 1.1 published July 2024

This Guide considers the human factors and behavioural considerations that impact safety outcomes on the road network. The Guide presents information on groups of individuals that are at increased risk of injury on the road network. Known categories of road user errors are also presented. Components of the information processing procedure are discussed.

The key insights have been noted below.

Older people are more vulnerable (fragility cited) and road users aged 75 and over have a greater proportional involvement of being involved in crashes as pedestrians than for other age groups. (**Pedestrian demographics**)

Mobile phones are cited as a distraction for pedestrians. There is also discussion around the incorrect use of facilities by pedestrians (e.g. jay walking). (**Pedestrian behaviour**)

The term 'jaywalking' is typically used neutrally in Australia referring to crossing a street outside of designated crosswalks or against traffic signals. However, in many urban areas, pedestrian infrastructure is unevenly distributed, and people may be forced to cross streets at non-designated points due to the absence of safe alternatives. The term 'jaywalking' can be viewed as implicitly blaming the individual rather than systemic issues associated with insufficient provision of safe crossing facilities.

Section 6 of this Guide has been copied below in Figure 2.3.

Figure 2.3: AGRS Part 4 Section 6 excerpt

6. Use of Facilities

It is accepted that the incorrect use of facilities provided leads to an increased risk of crashes. The incorrect use of facilities may include driving on the shoulder or across a median. Currently, there is limited information available regarding scenarios and their specific effects on crash risk. It is intended that this section will be expanded as new information becomes available on the subject.

Note that improper use of facilities is not limited to vehicles only and includes jay walking, pedestrians crossing on a red light when there are no vehicles present, and cyclists riding on footpaths.

Queensland’s supplement does not accept this discussion, as shown below in Figure 2.4.

Figure 2.4: TMR’s supplement to AGRS Part 4 Section 6 excerpt

6 Use of Facilities

Not accepted

This section is not accepted and does not apply in Queensland.

While the AGRS Part 4, Section 6 text, ‘*cyclists riding on footpaths*’ would not be considered improper use of facilities in Queensland (as this is a legal activity), it’s unknown why the other text within the AGRS Part 4, Section 6 has not been accepted.

The NZTA’s *Pedestrian Network Guidance - A Safe System for walking* (NZ Transport Agency Waka Kotahi (n.d.)) explores **pedestrian demographics** within crash statistics. Additionally, the ‘Pedestrian characteristics’ sub-section explores human factors such as human capabilities and human states. This information could be used or referenced within this publication to strengthen practitioner understanding.

AGRS Part 5 Safe Vehicles

Edition 1.1 published July 2024

This Guide considers the vehicle factors and features that impact safety outcomes on the road network.

This part of the Austroads *Guide to Road Safety* covers information relating to the Safer Vehicles element of the Safe System. This guide is intended for road safety practitioners and vehicle manufacturers, as well as organisations with vehicle fleets under their management. The information presented in this Guide may also prove useful to individual vehicle owners regarding different safety aspects of vehicles. This Guide is produced to cater to a wide audience by providing discussion on topics that may be implemented or incorporated to benefit a variety of activities.

There is not a significant amount of guidance regarding pedestrians within this publication.

There is mention of vehicle technologies (such as Autonomous Emergency Braking) mitigating the risk of pedestrian crashes. Further, there is discussion around Australasian New Car Assessment Program (ANCAP) incorporating pedestrian crash testing in the calculation of a vehicle’s overall crash rating.

AGRS Part 6 Road Safety Audit

Edition 6.0 published January 2022

This Guide provides practical guidance on the procurement, management and implementation of road safety audits. This Guide has been developed within the current operating environment for auditing, setting a series of key principles which establish good practice to shape a local road safety audit strategy/policy.

Where practical issues necessitate, reasonable exemptions are supported, but must be formally justified and signed-off to ensure responsibility and accountability.

Section 7.7.2 of this Guide discusses the provision of Thematic Road Safety Audits, where the risks of specific road users (i.e. pedestrians) are the focus of the Road Safety Audit. Prompt lists and fact sheets are provided as appendices within the Guide for thematic audits. There is an opportunity within this section to provide Case Studies of pedestrian-thematic Road Safety Audits to demonstrate their application.

Additionally, there is an opportunity to include reference to the expected **pedestrian behaviours** as part of the thematic audits.

Section 10.4 of the Guide discusses conducting a site inspection as part of a Road Safety Audit. There is no clear demarcation around when the site inspection should be conducted via a drive-through or should be on-foot (or both). There are significant benefits in conducting site inspections on-foot, particularly considering pedestrian safety risks. To this end, there is an opportunity to discuss the importance of on-foot site inspections and prioritising this methodology when pedestrians are expected to be within the audit area.

AGRS Part 7 Road Safety Strategy and Management

Edition 2.0 published July 2024

This Guide supports Australian and New Zealand jurisdictions to reach their national targets of zero road deaths and serious injuries by 2050 (and interim targets for 2030). The Guide outlines a realistic, cost-effective Path to Zero and aims to influence necessary leadership, enabling, professional, promotional, advocacy, training and change management activities to achieve this goal. The Guide covers various aspects of road safety strategy and management, including leadership, stakeholder engagement, and institutional strengthening.

There is not a significant amount of literature pertaining to pedestrians within this publication.

This Guide discusses the under-reporting of pedestrian crashes and that important information about pedestrian crashes is not always recorded.

2.3.2 Austroads Guide to Road Design and jurisdictional supplements

AGRD Part 1 Objectives of Road Design

Edition 5.1 published March 2021

This Guide provides practitioners with a detailed description of the critical aspects of road design.

This Guide includes the design objectives that apply to a road design project, design philosophy, context-sensitive design and the factors that influence the road design, including road design in the context of the Safe System approach, the design domain concept, design phases and processes, design considerations, design and legal liability, delivery considerations and emerging technology considerations. Links are provided to other Austroads Guides and resources that give further guidance on design inputs.

This Guide is largely introductory and there is not a significant amount of literature pertaining to pedestrians within this publication. The most pertinent section of this Guide is Section 2.3.3 Provision for Cyclists and Pedestrians. The majority of jurisdictional supplements expand on this Section by referencing relevant jurisdictional, supplementary documents.

AGRD Part 2 Network Wide Design

At the time of the literature review (February 2025) this Austroads Document was under development and has not been reviewed.

AGRD Part 3 Geometric Design

Edition 3.4 published February 2021

This Guide provides road designers and other practitioners with information about the geometric design of road alignments.

Design parameters include: road classification; design speeds; design vehicles; alignment controls; cross-section components, including travel lanes, shoulders and verges; and provisions for public transport and cyclists.

Speed parameters include: operating speed, desired speed and design speed; and their relationship with each other.

Horizontal and vertical alignments include development and application of: circular curves; superelevation; grades; vertical curves; procedures for the grading of a road alignment; and determination of sight distances across vertical curves.

The key insights from this Guide have been noted below.

There is reference to the *Disability Discrimination Act* (1992) and Australian Standards 1428.1 *Design for access and mobility* in Section 4.13 Bus Stops of the Guide. However, these pertinent documents are not referenced in Section 4.8 Footpaths. (**Accessibility**)

Appendix B Section B.1 discusses Pedestrian Refuges. Under the 'Implementation Issues' there is no discussion around the orientation of the stagger. Best practice would involve orientating the median so pedestrians face oncoming traffic (referred to as a Danish Offset or Z-Crossing). (**Interventions**)

Section 4.8 of this Guide discusses Footpaths (**Interventions**) and states:

The decision as to whether a footpath is included in the cross section on both sides of the road, only one side or not at all will depend on local guidance requirements and connectivity to the wider pedestrian network.

While this is an accurate assessment, there is an opportunity to provide an example of what local guidance requirements looks like, for instance, referencing NZTA's Footpath Design – principles table, as shown in Figure 2.5.

Figure 2.5: NZTA Footpath Design – principles table excerpt

Where footpaths should be provided [Back to top](#)

The table below is a guide to providing footpaths in urban and rural environments.

Table: When to provide footpaths

Land use	Footpath provision			
	New roads		Existing roads	
	Preferred	Minimum	Preferred	Minimum
Commercial and industrial	Both sides		Both sides	
Residential (on arterials)				
Residential (on collector roads)				
Residential (on local streets)			Both sides	One side
Three to 10 dwellings per hectare	Both sides	One side	One side	Shoulders on both sides
Fewer than three dwellings per hectare (rural)	One side	Shoulders on both sides		

AGRD Part 4 Intersections and Crossings: General

Edition 2.2 published May 2023

This Guide contains guidance that provides road designers and other practitioners with information that is common to the geometric design of all at-grade intersections. It contains information on the types of intersections, the road design considerations for intersections and the design process for the development of an intersection layout. The considerations include the selection of design vehicles, types of road users and provision of public transport facilities. Guidance is also provided for pedestrian, cyclist, and rail crossings.

The key insights from this Guide have been noted below.

Pelican crossings are not approved for use in Queensland. In Victoria, the provision of Puffin crossings is preferred to Pelican crossings. **(Interventions)**

There is repeated reference to *local jurisdictional guidelines regarding the provision and design layout of TGS/s* (Tactile Ground Surface Indicators). However, there is no general layout/requirements/definition specified within the Guide itself. To improve understanding, more information about TGSIs could be provided either as a reference or copied. An example has been shown in Figure 2.6. **(Accessibility)**

Figure 2.6: DTP’s Accessibility (DDA) Guidelines for Road Infrastructure TGSIs excerpt

3.4.2 Types of TGSIs

TGSIs may be in the form of raised dots or bars. The raised dots are known as warning tactile ground surface indicators (warning TGSIs) and the raised bars are known as directional tactile ground surface indicators (directional TGSIs).

Both warning and directional TGSIs are available in either integrated or discrete forms. Integrated TGSIs are in the form of a tactile tile, while discrete TGSIs are in the form of individual or discrete studs which may be either a single colour or two tone (two tone studs are also known as composite TGSIs).

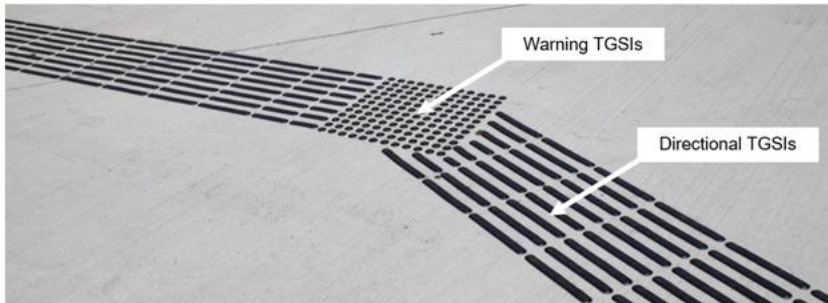


Figure 28: Warning and directional tactile ground surface indicators



Figure 29: Integrated TGSIs (tiles)



Figure 30: Discrete TGSIs (individual studs)



Figure 31: Discrete TGSIs (individual studs - composite / two tone)

Pedestrian crossings are discussed in Section 8 of this Guide. There is an opportunity to bolster what treatments are appropriate for single lane carriageways vs multi-lane carriageways. The Austroads *Pedestrian Facility Selection Tool* acknowledges that ‘for crossings in locations with more than two lanes in any direction, signals or grade separation are recommended.’ This could be further enhanced with the recommendation of raised intersections on multi-lane roads (in conjunction with signals). **(Interventions)**

The authors also noted a discrepancy in terminology in this Guide compared to AGRD Part 3. AGRD Part 3 specifies a minimum median width of 2.5 m to shelter pedestrians (highlighted in yellow in Figure 2.7). AGRD Part 4 uses the term ‘refuge depth’ to describe the ‘median width’ (refer to Figure 2.8). Different minimum dimensions are also provided.

Figure 2.7: AGRD Part 3 Section 4.7.2 excerpt

4.7.2 Median Width

Where a median is provided, its width should be sufficient to provide for the above functions. The minimum recommended widths, measured between lines of kerb and channels unless otherwise noted, are shown in Table 4.15. To restrict cross-median movements on major urban roads, the use of kerbed medians is recommended, as shown on Figure 4.31.

Table 4.15: Urban median widths

Median function	Minimum width (m)
Adjacent to a right turn bay to control turning path	0.5
Separate traffic flows with a rigid (concrete) safety barrier ⁽¹⁾ (no provision for shoulder or allowance for shy line effects) ⁽²⁾	0.8 ⁽³⁾ 1.6 ⁽⁴⁾
Shelter dual 200 mm and single 300 mm lantern display	1.5
Shelter dual 300 mm lantern display	1.8
Shelter a small sign	1.2
Shelter signal pedestals or lighting poles	2.0
Shelter pedestrians (provision for Tactile Ground Surface Indicators) and traffic signals	2.5
Shelter pedestrians, two stage signalled pedestrian mid-block	4.0
Shelter turning vehicles and traffic signals (i.e. includes a 3.5 m wide adjacent traffic lane)	6.0 ⁽⁵⁾
Shelter crossing vehicles (i.e. the length of a car plus clearance to median traffic lanes)	7.0
For planting and drainage	10.0
Recovery area	20.0

Figure 2.8: AGRD Part 4 Table 8.2 excerpt

Table 8.2: Pedestrian refuge design elements

Crossing element	Design requirement/principle	Additional information
Refuge width	At least 1.5 m or the width of the adjacent kerb ramps (whichever is greatest)	This width should be wider when large volumes of pedestrians are expected to use the refuge. If the crossing is also used by cyclists (shared path) the width should be increased.
Refuge depth	At least 1.8 m, preferably 2 m	Waiting pedestrians and/or their belongings should not protrude into adjacent traffic lanes. If the crossing is also used by cyclists (shared path) the depth should be increased.
Refuge island length	At least 8 m	Length will depend on the road type (larger islands on high-volume, high-speed and wide roads), the potential number of pedestrians waiting on the island and whether there are vehicles turning into adjacent accesses.

AGRD Part 4A Unsignalised and Signalised Intersections

Edition 3.2 published May 2023

This Guide provides road designers and other practitioners with guidance on the detailed geometric design of all at-grade intersections (excluding roundabouts). This Part contains information for the design of signalised and unsignalised intersections. Guidance is provided on intersection sight distances, including approach sight distance, safe intersection sight distance, and minimum gap sight distance. Left and right-turn treatments are outlined including the incorporation of auxiliary lanes at intersections and the use and size of traffic islands.

The key insights from this Guide have been noted below.

This Guide states:

free-flow left-turn lanes without a raised platform and/or any pedestrian priority can reduce perceived safety and level of service for pedestrians.

However, the Guide does not explicitly state what **intervention(s)** could be implemented to mitigate this risk. Conversely, AGRD Part 4 states:

The design of left-turn treatments should therefore limit the turning speed to 30 km/h if an unsignalised pedestrian crossing is to be used. Where the design provides for higher turning speeds (e.g. a free-flow slip lane) a signalised pedestrian crossing should be provided.

In addition to the above, Queensland in their supplement to AGTM Part 6 specifies the following hierarchy shown in Figure 2.9 for treatments at slip lanes.

Figure 2.9: TMR supplement to AGTM Part 6 Section 3.2.11 excerpt

^Crossing treatment type for slip lanes:

1. Raised pedestrian crossing (zebra controlled) – wombat crossing.
2. Raised priority crossing (give-way controlled) – numbat crossing.
3. Two-aspect traffic signals (as per [TRUM Volume 1](#) Part 9)
4. Pedestrian crossing (zebra).
5. Unmarked*.

* Potential for disability discrimination claims. Only appropriate where no pedestrian desire lines exist and would not be expected to exist in the future.

The Crossing Sight Distance (CSD) in this Guide stipulates the average walking speed is 1.2 m/s; however, there are pedestrians who may walk at different rates and designers need to consider the types of pedestrians and their likely walking speeds. The Queensland supplement acknowledges the variability in walking speeds as shown in Figure 2.10 and also references an average unimpeded free-flow walking speed of 1.35 m/s.

Figure 2.10: TMR supplement to AGRD Part 4A Section 3.3 excerpt

Pedestrian walking speeds can vary significantly and are affected by age, sex, motivation, presence of other pedestrians and other traffic impediments. The distribution of free flow walking speeds varies as follows:

- minimum walking speed 0.74 m/s
- maximum walking speed 2.39 m/s
- maximum speed of wheelchairs 10 km/h = 2.78 m/s (wheelchairs are classified as pedestrians in legislation), and
- average unimpeded free-flow 1.35 m/s walking speed.

Calculation of green time at traffic signals is based on an average design walking speed of 1.2 m/s, but this is still faster than some pedestrians can manage. Elderly pedestrians often adopt significantly lower speeds than the younger part of the population. Table 3.3 provides guidance on the walking speed to adopt for various circumstances.

Table 3.3 – Walking speeds for elderly pedestrians

Walking Pace	Mean Speed (m/s)	10th Percentile Speed (m/s)
Normal	1.13	0.8
Hurried	1.41	1.0
Rushing	1.71	1.0

Additionally, the Austroads Pedestrian Facility Selection Tool User Guide uses the terms ‘sensitive pedestrians’ and ‘non-sensitive pedestrians’ and specifies walking rates of 1.0 m/s and 1.2 m/s respectively. It is recommended to keep the terminology consistent with the Tool. **(Pedestrian demographics)**

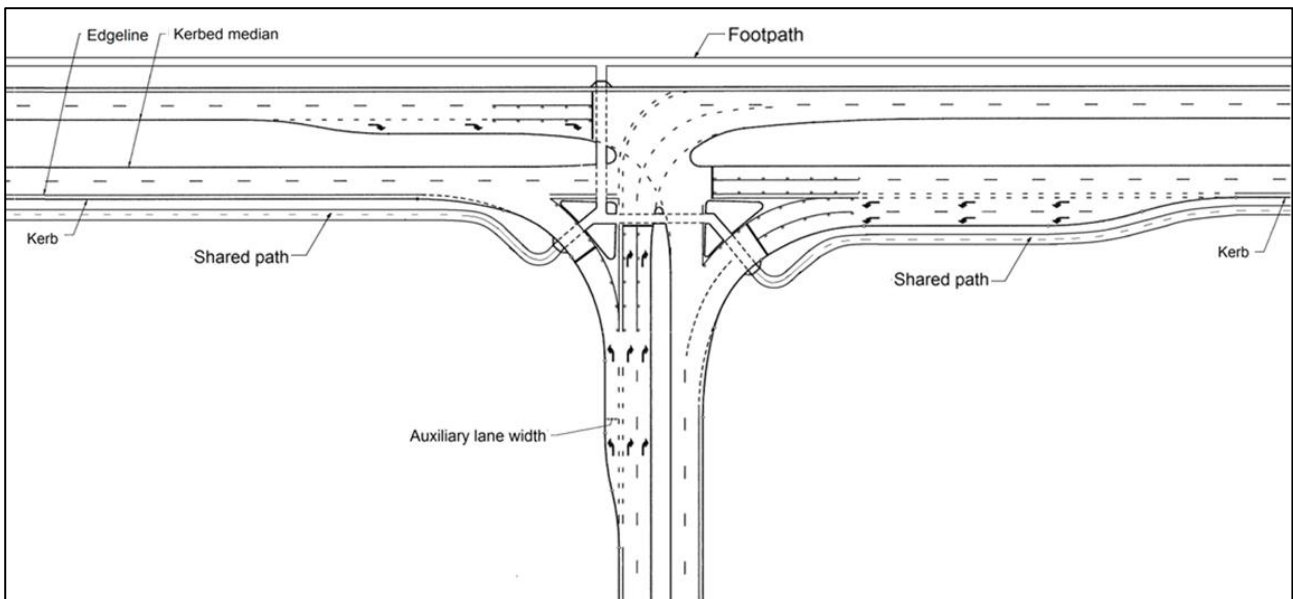
This Guide provides an example of a signalised T-intersection (refer to Figure 2.11). The pedestrian crosswalk is situated on the left side of the terminating leg. The authors, through discussions with practitioners, derive this is common practice.

The justification for providing the crosswalk at this location is that left turners would be performing a small radius turn and will be interacting with the crossing close to the stop line (if a slip lane is not provided as shown in Figure 2.11). These 2 factors typically mean low approach speeds. The right turn conversely is often 10-20 m from the stop line and has a generous approach radius. Right turners typically have developed speed by the time they interact with a pedestrian crossing. The right-turn risk is further exacerbated if dual right turn lanes are present.

However, the authors acknowledge that providing the crosswalk only on one side of the intersection may not meet pedestrian desire lines and may expose pedestrians to 2 crossings instead of one in order to get to their desired finishing point. This arrangement may also increase the risk of pedestrians crossing outside the designated crosswalk.

The authors have not come across definitive literature that states what the best pedestrian safety outcome would be with regards to this layout and have made a note for the need for further research in Section 5.

Figure 2.11: AGRD Part 4A Figure 10.2 excerpt (rotated)



AGRD Part 4B Roundabouts

Edition 3.2 published May 2023

This Guide provides road designers and other practitioners with guidance on the geometric design of roundabouts. It covers design principles and procedures, and guidelines for all the key elements, thus enabling practitioners to develop safe and efficient layouts. Part 4B also provides information on pedestrian and cyclist treatment at roundabouts and related topics such as pavement markings, signs and landscaping.

Section 5.2 of this Guide specifically discusses the safety analysis and design considerations for pedestrians. The items discussed below relate to the **Interventions** theme. On the former topic, the Guide states:

While there may be a perception in some sections of the community that roundabouts are problematic for pedestrians, there is no evidence to suggest that roundabouts are less safe for pedestrians than other forms of intersection control. However, there is anecdotal evidence to suggest that children and elderly pedestrians feel less safe at roundabouts, particularly at exits.

AGTM Part 6 cites a report by Tumber (1997) that suggests that roundabouts are at least as safe for pedestrians as other forms of intersection control because pedestrians are able to cross one direction of traffic at a time by staging their crossing on the splitter islands. It is also recognised that there are some pedestrians concerned with their safety as this method does not provide the pedestrian with priority in undertaking the crossing.

This text is also referenced in AGRS Part 2.

The authors note that the cited report by Tumber does not feature in AGTM Part 6 (2020). However, the authors derive that the assertion 'there is no evidence to suggest that roundabouts are less safe for pedestrians than other forms of intersection control' is supported by the Austroads Research Report *Improving the Performance of Safe System Infrastructure: Final Report* (2015a), which states:

Roundabouts also provided strong reductions in pedestrian crashes (up to 90% compared with priority control) based on limited studies.

In contrast, AGRS Part 7, Section 2.7.1 states:

In general, the use of roundabouts does not have such a positive effect on bicycle and pedestrian safety compared to the positive effect on motor vehicle safety. In fact, roundabouts may even increase the number of bicycle and pedestrian related crashes compared to traditional signalised intersections. The cause of the safety issues stems from the difficulty for motorists to sight cyclists entering the roundabout or pedestrians crossing.

Thus, there is an important distinction between pedestrian safety at roundabouts versus priority controlled intersections and pedestrian safety at roundabouts versus traditional signalised intersections.

Furthermore, the Queensland supplement to AGTM Part 6 contends:

Roundabouts are likely to present significant obstacles to safe movements of people walking and riding bikes where any of the following conditions are met:

- *vehicle speeds exceed 30 km/h on the roundabout or at crossing locations*
- *users find it difficult to predict a safe gap in traffic because of vehicle volumes, sight lines or geometry that requires them to consider vehicle movements from multiple directions (see Figure 4.1), and*
- *the roundabout has multiple circulating traffic lanes, and/or at least one multi-lane approach/departure.*

The authors acknowledge the supplement is for another Austroads publication, but the content is pertinent.

Section 5.2.2 of the Guide discusses design considerations for Pedestrians at roundabouts. Several features are listed to improve the level of service and safety for pedestrians. Absent from this list are interventions such as wombat crossings, compact roundabouts or radial roundabout configurations.

AGRD Part 4C Interchanges

Edition 2.1 published May 2023

This Guide provides guidance on the geometric design of interchanges on freeways/motorways and on major arterial roads. The Guide covers the design of interchanges between freeways and arterial roads; 2 freeways; and 2 major arterial roads. It covers the geometric design of all the elements of an interchange including the alignment and cross-section of the freeway in the vicinity of the interchange, the intersecting road and the ramps; merge and diverge ramp terminals at the freeway; and ramp terminals at the intersecting road.

Section 4.4 of this Guide discusses Pedestrian/Cyclist Grade Separations at interchanges. Section 13.1 of this Guide discusses general Pedestrian considerations.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGRD Part 5 Drainage – General and Hydrology Considerations

Edition 4.0 published January 2023

This Guide provides road designers and other practitioners with guidance on the design of drainage systems. This Guide needs to be used in conjunction with the other 2 Parts of the *Guide to Road Design* that relate to drainage design:

- Part 5A: Drainage – Road Surface, Network, Basins and Subsurface
- Part 5B: Drainage – Open Channels, Culverts and Floodway Crossings.

The key insights have been noted below.

Section 2.4 discusses the **Vulnerability of pedestrians**, specifically:

the chances of surviving a particular crash decrease markedly above certain speeds, depending on the type of crash, as follows:

- *pedestrian struck by vehicle 20 to 30 km/h.*

Pit lids should be designed so that they do not constitute a trip hazard for pedestrians. (**Interventions**)

Culverts may be sized for the provision of pedestrians and cyclists. It is noted that Western Australia's supplement departs from this provision. (**Interventions**)

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGRD Part 5A Road Surface, Networks, Basins and Subsurface

Edition 2.2 published December 2024

This Guide provides road designers and other practitioners with guidance on the design of the collection and discharge of water from road surfaces, pit and pipe systems, basins and subsurface drains.

This Guide contains information on major/minor drainage systems, and the collection and discharge of road surface flows to support the operation and management of the road network. Guidance is provided on aquaplaning, and the design of drainage inlets and pipe networks receiving the flows. The principles of retention and detention basins and their design are also outlined.

There are technical drainage requirements stipulated in Table 5.1 of this Guide for pedestrians.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGRD Part 5B Open Channels, Culverts and Floodway Crossings

Edition 1.2 published January 2023

This Guide contains guidance on the design of open channels, culverts and floodway crossings to support the operation and management of the road network. This Guide provides guidance on the fundamentals of open channel, culvert and floodway crossing flows, and includes methods to undertake the design of these drainage facilities.

There is no pertinent information relating to pedestrian safety from the Guide and Jurisdictional Supplements reviewed.

AGRD Part 6 Roadside Design, Safety and Barriers

Edition 4.1 published August 2024

This Guide provides guidance on roadside design and in particular guidance on evaluating the risk of a roadside and the selection and use of road safety barrier systems.

Roadsides have to accommodate many features that support the road and the safe and efficient operation of traffic, and have to be designed with regard to environmental requirements. Part 6 should therefore be read in conjunction with other Parts of the *Guide to Road Design*.

This Guide provides information to enable designers to understand the principles that lead to the design of safer roads, identify hazards, undertake a risk assessment process of roadside hazards, establish the need for treatment of hazards and determine the most appropriate treatment. Methods of evaluating the effectiveness of treatment options are summarised. A comprehensive design process, guidance and design considerations are provided for the selection of a suitable barrier and for the lateral and longitudinal placement of barrier systems.

The key insights from this Guide have been noted below.

Section 4.4.14 of this Guide discusses **Interventions** and states:

The separation between a heavily used cycleway or pedestrian path and a road should be as far as possible... If a barrier is considered an appropriate treatment, then the lateral positioning of the barrier and its working width will be important considerations.

Section 6.17.2 from this Guide states:

Situations, where a road safety barrier may be appropriate, are:

- *Roads that have an operating speed of 30 km/h or greater and where a pedestrian or bicycle path is close to the road...*

The authors contend this latter statement is overly broad and not a pragmatic solution. Western Australia's supplement states:

...protect shared or principal shared paths where they are within the clear zone adjacent to intermediate and high-speed roads (i.e. 70 km/h or greater).

There is an opportunity within this publication to bolster the requirements of providing roadside barrier systems to protect pedestrians.

AGRD Part 6A Paths for Walking and Cycling

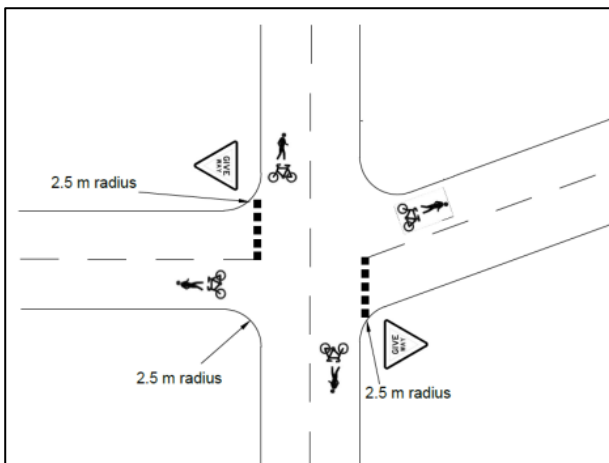
Edition 2.1 published February 2021

This Guide provides guidance for designers and other practitioners on the design of paths for safe and efficient walking and cycling, both within the road corridor and outside the road corridor. The Guide provides information on considerations that should be given in providing a path, describes the types of paths and covers the requirements of path users, e.g. operating spaces, factors that influence path locations, and geometric design criteria for a path and related facilities such as intersections between paths, and terminal treatments. Detailed guidance is provided on path location, alignment, width, clearances, crossfall, drainage and sight distance requirements.

The key insights from this Guide have been noted below.

Section 6.4 of the Guide discusses the **interventions** for intersections of paths with paths, Figure 6.1 from this Section has been copied below as Figure 2.12. Western Australia's supplement does not permit 4-way intersections on their Principal Shared Paths. The authors derive this is to minimise the risk of bicycle riders failing to yield and colliding with path users on the thoroughfare.

Figure 2.12: AGRD Part 6A Figure 6.1 excerpt



Section 7.3 of the Guide discusses the **interventions** for intersections of paths with roads and states:

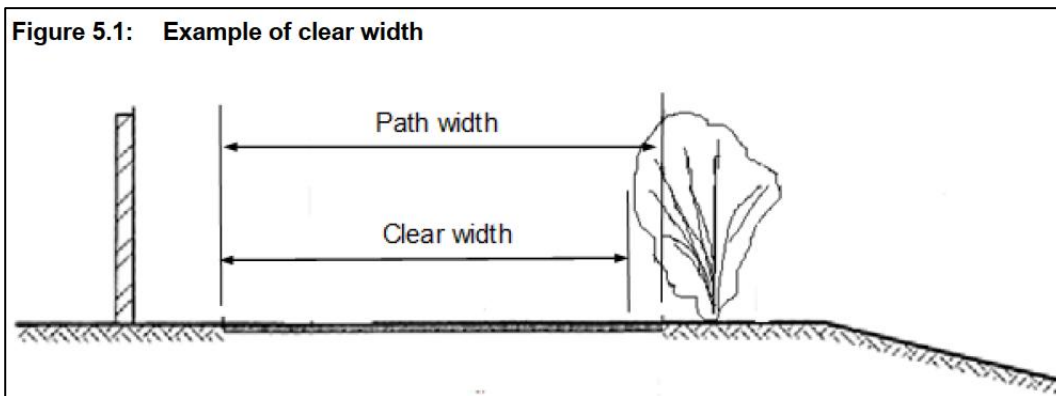
Where a path connects to a path on a road, the preferred treatment is just a connection without the use of other devices.

This preferred treatment is recommending priority to vehicular traffic. There is an opportunity in this section to prioritise the installation of Raised Priority Crossings as per Victorian and Queensland Supplements.

Section 5.1.1 of this Guide discusses **interventions**, specifically the premise of clear widths, defined below:

The widths provided in this Part are for a clear width on a path (Figure 5.1 [Figure 2.13]). Intrusions in or over a path, such as vegetation, signs, poles, fences or seats may become obstacles or hazards to path users, reducing the width of the clear path and should be removed wherever practicable. In locations where the intrusion is unable to be removed, path users need to be alerted to the presence of the intrusion with sufficient time to enable the obstacle or hazard to be avoided.

Figure 2.13: AGRD Part 6A Figure 5.1 excerpt



In the NZTA’s Footpath Design – principles, the ‘clear width’ is described as the ‘through zone’ and a 0.15 m ‘shy distance’ is applied to any object next to the footpath through zone. This ‘shy distance’ acknowledges that pedestrians are unlikely to utilise the area directly adjacent objects/street furniture.

Table 5.1 of this Guide discussed **interventions** and provides width requirements for pedestrian paths as shown in Figure 2.14. As noted in the Comments, a 1.2 m wide footpath is very commonly adopted for roads and streets.

Figure 2.14: AGRD Part 6A Table 5.1 excerpt

Situation	Suggested minimum width (m)	Comments
General low volume	1.2 ⁽¹⁾	<ul style="list-style-type: none"> General minimum is 1.2 m for most roads and streets. Clear width required for one wheelchair. Not adequate for commercial or shopping environments.
High pedestrian volumes	2.4 (or higher based on volume)	<ul style="list-style-type: none"> Generally commercial and shopping areas.
For wheelchairs to pass	1.8	<ul style="list-style-type: none"> Refer also to AS 1428.1:2009.
For people with other disabilities	1.0	

¹ *In constrained locations an absolute minimum of 1.0 m should be provided. In these situations, path users should be able to detect other path users with sufficient time to respond and take appropriate actions.*

In the NZTA's Footpath width, an absolute minimum width of 1.5 m is only acceptable in existing constrained conditions where it is not possible to widen the footpath. This is supported by research from Nunns and Dodge (2020).

The Queensland supplement provides advice on the most common means of separating cyclists from pedestrians – **interventions** guidance that is currently not provided in the Guide.

The Victorian supplement describes walkway Level of Service (LoS) and ties this into the Movement and Place walking indicator categories. The **critical role of active transport** and specifically the term 'Movement and Place' is lacking in this Guide.

The Victorian supplement provides characteristics of various **pedestrian demographics** (including older pedestrians, child pedestrians, mobility-impaired pedestrians, sensory-impaired pedestrians, wheeled pedestrians). These characteristics are lacking in the Guide.

AGRD Part 6B Roadside Environment

Edition 2.1 published February 2021

This Guide contains information on the components of roadside areas that may need to be accommodated within a road reserve. These components include environmental aspects such as fauna management and noise control, and landscaping, road furniture including signs, poles, fencing and lighting. There is also information about off-street car parking and the placement and allocation of space for utility services.

Key topics discussed within this publication pertaining to pedestrian safety include Design of Service Centres and Rest Areas, Lighting Pole configurations (situating slip-based poles in areas where pedestrian activity is low) and Fencing. On the latter topic, most jurisdictions have developed their own Guidance and Standard Drawings for fence types.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

The authors note Section 4.3 of this Guide discusses Emergency/Help Telephones. This information may be redundant with most jurisdictions moving away from providing/maintaining roadside telephones.

AGRD Part 7 New and Emerging Treatments

Edition 1.0 published March 2021

This Guide contains design-related knowledge, findings from research and practical experiences about new and emerging treatments. Treatments are broken down into the following sub-sections: intersections, midblock, motorway, pedestrian/cyclist and other. The process for piloting and trialling new and emerging treatments is also outlined.

Section 5 of this Guide discusses Pedestrian and Cyclist Treatments, however the one and only treatment listed is relating to Cyclists (not pedestrians) as shown in Figure 2.15. Section 2.7 of this Guide discusses Cycle and Pedestrian Friendly Roundabouts, yet this is absent from the treatments listed in Section 5.

Figure 2.15: AGRD Part 7 Section 5 Excerpt

5. Pedestrian and Cyclist Treatments

The treatment listed in Table 5.1 is considered new or emerging but are already covered in other parts of the *Guide to Road Design*.

Table 5.1: Additional pedestrian/cyclist treatment already covered in the Guide to Road Design

Treatment	Reference
Cyclist advanced stop line (head start)	Guide to Road Design Part 4

New treatments will be added to this section as the information on new and emerging treatments grows.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

2.3.3 Austroads Guide to Traffic Management and jurisdictional supplements

AGTM Part 1 Introduction to the Guide to Traffic Management

Edition 4.0 published April 2020

This Guide provides comprehensive coverage of traffic management guidance for practitioners involved in traffic engineering, road design and road safety.

This Guide introduces the discipline of traffic management and an overview of the structure and content of the Guide. It outlines the breadth of the subject, the distribution of content among the various Parts of the Guide, and the relationship with other Guides such as those for Road Design and Road Safety.

Part 1 introduces traffic management in a practical context, and presents fundamental definitions, principles and objectives. It introduces functional road hierarchy as an essential concept, and outlines the basic elements of traffic management and their application. It provides an overview of how the various parts of the Guide would typically be used by a wide range of practitioners.

This Guide is primarily introductory and there is no significant literature pertaining to pedestrian safety. Instead, this Guide points towards Part 6, Part 7 and Part 12 of the AGTM Set as key references for pedestrian safety.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGTM Part 2 Traffic Theory Concepts

Edition 3.0 published April 2020

This Guide provides practitioners with the theoretical background necessary to appreciate the nature of traffic behaviour and to undertake analyses required in the development and assessment of both traffic management plans and road design proposals.

While there are references to ‘pedestrian’, overall the focus of this Guide is passenger vehicles and freight. There is an opportunity to include additional pedestrian-focused literature within this publication.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGTM Part 3 Transport Study and Analysis Methods

Edition 4.0 published April 2020

This Guide provides comprehensive coverage of traffic management guidance for practitioners involved in traffic engineering, road design, town planning and road safety. This Guide is concerned with the collection and analysis of traffic data for the purpose of traffic management and traffic control within a network. It serves to ensure some degree of consistency in conducting traffic studies and surveys. It provides guidance on the different types of traffic studies and surveys that can be undertaken, their use and application, and methods for traffic data collection and analysis.

Part 3 covers applications of the theory presented in Part 2 of the Guide, and provides guidance on traffic analysis for uninterrupted and interrupted flow facilities and for various types of intersections. It outlines sound methods of analysis for effective traffic management, design and control.

Pedestrian Surveys are discussed in Section 3.5.5 and Appendix E. Pedestrian characteristics are discussed in Section 4.3.5 – relating to factors affecting Capacity, Level of Service (LOS), and Degree of Saturation. In this latter Section, the following statement is provided:

Pedestrians may be considered as being similar to vehicles, operating on a transport network consisting of footways, stairs, travelators etc.

This statement may be overly simplistic and fail to fully recognise the varying **pedestrian demographics** and **pedestrian behaviours**, and in particular the need pedestrians have to interact with the road network.

Section 4.5 of this Guide discusses the Pedestrian Level of Service and notes:

Assessing the level of service for pedestrians (or walkability) is less developed than other transport modes and is an area of ongoing research... Various tools have been designed to measure walkability both qualitatively and quantitatively including:

- *Pedestrian Environment Review System (TRL undated)*
- *Predicting walkability (Abley and Turner 2011)*
- *Guide to the Healthy Streets Indicators (TfL 2017).*

It is noted that Jurisdictional Supplements tend to reference their own Guidelines/Tools to measure Pedestrian Level of Service.

The NZTA's *Pedestrian Network Guidance Measuring pedestrian activity* (NZ Transport Agency Waka Kotahi (n.d.)) describes the importance of measuring pedestrian activity and offers methodologies to employ when conducting pedestrian surveys. This information could be referenced in the Guide.

AGTM Part 4 Network Management Strategies

Edition 5.0 published April 2020

This Guide provides guidance on traffic management at a network level. It addresses network needs of the various categories of user, the characteristics of various types of network and, importantly, describes a planning process for balancing or prioritising the competing needs of different users based on a movement and place framework view of the road network. It describes the Network Operation Plan, which provides a framework for defining the intent of operation of the network, the priorities accorded to the various road user groups, network strategies, and the action plan that defines how the network is to be managed, operated and developed.

The Movement and Place Framework is introduced within this publication, with numerous references to pedestrian safety and amenity. Appendix D of the Guide discusses LOS measures for pedestrians. The Victorian supplement to AGRD Part 6A, similarly, provides measures (performance indicators) for pedestrians.

Pedestrian networks, in particular **pedestrian demographics** are discussed in Section 4.7 as well as common hazards encountered by pedestrians. Pedestrian facilities are similarly introduced in this section (within and outside the road reserve).

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGTM Part 5 Link Management

Edition 4.0 published April 2020

This Guide is concerned with traffic management on sections of road between major intersections. It focuses on traffic management issues and treatments related to various situations but does not provide dimensions or other details for the design of treatments as these are provided in the *Guide to Road Design*. Guidance on traffic management at intersections is provided in the *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*.

This Guide presents detailed information and guidelines relating to the factors that need to be considered in applying traffic management techniques and treatments to road types that include motorways and expressways, urban arterial roads, urban local roads, rural highways and rural local roads. It considers the needs of all road users including pedestrians, cyclists, motorcyclists, heavy vehicles and public transport. It provides the guidance under the 4 key areas of access management, road space requirements for general traffic use, allocation of road space between road users, lane management and speed limits.

This Guide also introduces and references the Austroads Pedestrian Selection Facility Tool. The tool is designed to help in the selection of the type and characteristics of the facility based on the walkability, pedestrian safety and economic viability

The key insights have been noted below.

Section 5.5.2 of this Guide lists **interventions** that can be provided at mid-block locations. One of the treatments listed is:

- pedestrian (zebra) crossings:
 - the use of zebra crossings or children’s crossings on arterial roads, particularly four-lane roads, is not desirable
 - requirements for the installation of zebra crossings or children’s crossings, as outlined in AS 1742.10-2009, should be met.

Additionally, Table A 17 (wombat crossings [raised pedestrian crossings]) states the application for this treatment is:

- Generally, not applied on multilane roads as the higher crossing distance might present a crash risk for pedestrians and cause vehicle delay.

The language ‘not desirable’ and ‘generally, not applied’ is evasive. Conversely, AS 1742.10 uses more unequivocal language in relation to traffic lanes as shown in Figure 2.16. Several Jurisdictional Supplements similarly state that zebra crossings are not to be installed on multi-lane roads. The primary reason not to implement zebra crossings on roads with multiple lanes in one direction is to reduce the risk of dynamic visual obstruction. Also, the referenced AS 1742.10-2009 is outdated, the 2024 version is the latest.

Figure 2.16: AS 1742.10 Section 5.3 excerpt

5.3 Requirements for installation	
Requirements and options for the installation of pedestrian crossings (zebra crossings) are as follows:	
(a)	<i>Mid-block crossing</i> — The following shall apply:
(i)	No more than one lane of moving motor vehicle traffic in any one direction shall be encountered by a pedestrian using a crossing.

Section 7.1 discusses the Safe System and Safe Speeds (**Vulnerability of pedestrians**). The Wrangborg curves are presented, yet the Safe System speed thresholds for different crash types are not included. Including reference to the Safe System speed threshold for vehicle-to-pedestrian crash types will help to contextualise and ascertain the effectiveness of different interventions listed. The AGRS Part 2 provides this context well and in Table 7.2 articulates the various interventions as impacting the exposure, likelihood and/or severity of a crash.

AGTM Part 6 Intersections, Interchanges and Crossings Management

Edition 4.0 published April 2020

This Guide provides a comprehensive coverage of traffic management guidance for practitioners involved in traffic engineering, road design and road safety.

This Guide is concerned with traffic management at all types of intersections where road users must join or cross another stream of traffic. It focuses on traffic management issues and treatments related to intersections, interchanges and crossings. It does not provide information on the geometric design of the treatment as this is provided in the *Austrroads Guide to Road Design* Parts 4, 4A, 4B and 4C. Guidance on the management of road sections which are not part of the intersection or interchange is provided in the *Austrroads Guide to Traffic Management Part 5: Link Management*.

This Guide describes the appropriate use and design of the various intersection types and the techniques that need to be applied if efficient and safe intersections are to be provided to the road user. All categories of road use – including cars, trucks, public transport, motorcycles, cyclists and pedestrians are addressed in the Guide.

The key insights from this Guide have been noted below.

Table 3.13 of this Guide stipulates issues for pedestrians, specifically discussing the vulnerability to crashes as shown in Figure 2.17 (**Vulnerability of pedestrians**). The treatments listed as examples are by no means exhaustive. Indeed, one of the most effective treatments to mitigate this issue would be the physical separation of vehicular traffic from pedestrian areas (e.g. grade separation, pedestrian malls, restricted mode access) as discussed in AGRS Part 2.

Figure 2.17: AGTM Part 6 Table 3.13 excerpt

Table 3.13: Issues for pedestrians		
Issue	Characteristics	Treatments
<ul style="list-style-type: none"> Vulnerability to crashes 	<ul style="list-style-type: none"> High speed traffic results in high severity crash potential 	<ul style="list-style-type: none"> Wombat crossings Speed limit reductions

Additionally, the **interventions** listed within Table 3.13 are essentially displayed with even weighting. Practitioners reading this information may not infer which treatment(s) offer greater safety pedestrian benefits. To this end, there is an opportunity to redevelop this table referencing the Treatment Hierarchy and Selection information presented in the *Austrroads Safe System Assessment Framework* (2016).

Table 5.2 of this Guide discusses the factors affecting signalised intersection capacity and safety. Under the factor of *differential speeds*, **pedestrian demographics** information is referenced as shown:

Provide additional time where a significant number of aged, disabled or mobility impaired pedestrians use signalised crossings.

The authors contend the factor of *differential speeds* may be misinterpreted by practitioners as relating to vehicular traffic. Thus this information pertaining to pedestrians could be missed by practitioners.

Section 5.3.2 of this Guide discusses ‘Urban Arterial Road Signalised Intersection Approaches’ and Table 5.3 lists pedestrian requirements at these locations. Raised signalised intersections (either in green-field or brown-field sites) can be implemented to significantly improve pedestrian safety outcomes – yet this **intervention** has not been discussed.

The authors also noted typographical errors in this Guide, namely in Section 9.2.1. The cross-referenced Table 8.1, Table 8.2, Table 8.3, Table 8.4 and Table 8.5 should be listed as Table 9.1, Table 9.2, Table 9.3, Table 9.4 and Table 9.5 respectively.

AGTM Part 7 Activity Centre Transport Management

Edition 3.0 published April 2020

This Guide is concerned with the planning and management of centres typified by high levels of internal activity and interaction, especially pedestrians. It addresses the need to obtain a balance between providing for vehicular access and providing for pedestrian, cyclist and public transport needs without compromising the functionality of a site. It provides guidance for planners and engineers associated with the design, development and management of a variety of activity centres.

This Guide presents the guiding principles for traffic management in activity centres, including the policy and planning context, and major considerations and processes involved. It outlines operational and physical measures to provide for movement to and within such centres, either as part of their planning or in their day-to-day management. It presents traffic management techniques and procedures that may be applied in activity centres and details their application in different kinds of centre, based on examples in practice.

The key insights from this Guide have been noted below.

The Safe System is introduced in Section 3.2.1 and there is discussion around the Safe System speed thresholds (**Vulnerability of pedestrians**):

... the Safe System approach aims to ensure that potential collisions are avoided and, if they occur, that the potential crash impact forces do not exceed human tolerance.

There is an opportunity to unequivocally state what the Safe System speed thresholds are (rather than cross-reference to AGRS Part 1).

Text from Section 4.8.2 *Designing for pedestrians* has been copied below:

The acceptable length of a crossing will be determined by the overall carriageway width to be crossed and the nature of traffic control, e.g. the amount of time allotted at a traffic signal. In general, the distance to be travelled by pedestrians in negotiating a crossing should be minimised by ensuring that where practicable, the crossing is approximately at right angles to the carriageway. Some pedestrians, e.g. the elderly or infirm, cross slowly and may cause long delays to vehicles. Others may be deterred from using a crossing because of a perception of excessive exposure to traffic. Minimising the distance is therefore desirable both in terms of pedestrian safety and convenience and in terms of reduced vehicle delays.

This paragraph is overtly vehicular traffic-focussed and fails to capture the need to provide safe pedestrian crossings (**critical role of active transport**). Within Activity Centres, the pedestrian movement should be prioritised. Additionally, the term *infirm* is not appropriate language to refer to people who live with a range of challenges or illnesses that affect mobility.

There is frequent reference to NSW's *Pedestrian Access and Mobility Plan* (Roads and Traffic Authority NSW 2002). While the information in here is still pertinent, there is an opportunity to replace this reference with more contemporary resources such as Austroads Research Report *Integrating Safe System with Movement and Place for Vulnerable Road Users* (2020).

In Section 5 of this Guide there are examples of different activity centres. It is not clear how these terms relate to the Movement and Place classifications. There is an opportunity to re-write this section explicitly referencing the terminology listed in the Austroads Research Report *Integrating Safe System with Movement and Place for Vulnerable Road Users* (2020). This is outside the scope of this project.

The authors also noted an error from broken references in Section 3.1.1, Section 3.3.2 and the first sentence of Section 5:

Error! Reference source not found.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGTM Part 8 Local Street Management

Edition 3.0 published April 2020

This Guide focuses on the planning and management of road space usage within a local area, to reduce traffic volumes and speeds in local streets, to increase amenity and improve safety and access for residents, especially pedestrians and cyclists. It provides guidance for planners and engineers associated with the design, development and management of residential precincts.

This Guide presents a systematic approach to traffic management in local areas, outlining the principles and practice of influencing driver behaviour in local streets – both directly by physical changes to the environment, and indirectly by influencing driver perceptions of what is appropriate behaviour. It provides guidance on the selection, design, application and effectiveness of traffic control measures on an area-wide or at least whole-of-street basis, including effects such schemes may have on local and arterial road networks.

The Safe System is introduced in Section 2.3 of this Guide, explicitly stating the **vulnerability of pedestrians** and Safe System speed thresholds. Section 8 of this Guide discusses in detail a variety of **Interventions** several of which relate to pedestrian safety, however, there is no mention of the Austroads *Pedestrian Facility Selection Tool*.

The key insights from this Guide have been noted below:

Figure 8.1 of this Guide displays the LATM devices (**interventions**) commonly used by local governments. The preceding text states:

It should be highlighted that the frequency of use of particular devices should not be a major determinant in the selection of an LATM device for a specific location. Instead, each treatment should be assessed for its effectiveness and appropriateness for the situation in which it is being used, as part of a whole of street or whole of area wide implementation.

Thus, rather than ordering LATM devices by frequency, there is a logic to instead display the treatments in order of effectiveness, referencing the Austroads *Safe System Assessment Framework*. This would instead challenge practitioners to consider the most-effective treatments first, rather than focus on what the most commonly utilised treatments are.

Table 8.1 of this Guide shows different LATM devices (**interventions**) and whether they influence pedestrian safety. An excerpt of this Table has been provided below in Figure 2.18. The authors suggest that any LATM device that ‘Reduce speeds’ and/or ‘Reduce traffic volume’ will also ‘Increase pedestrian safety’.

Figure 2.18: AGTM Part 8 Table 8.1 Excerpt

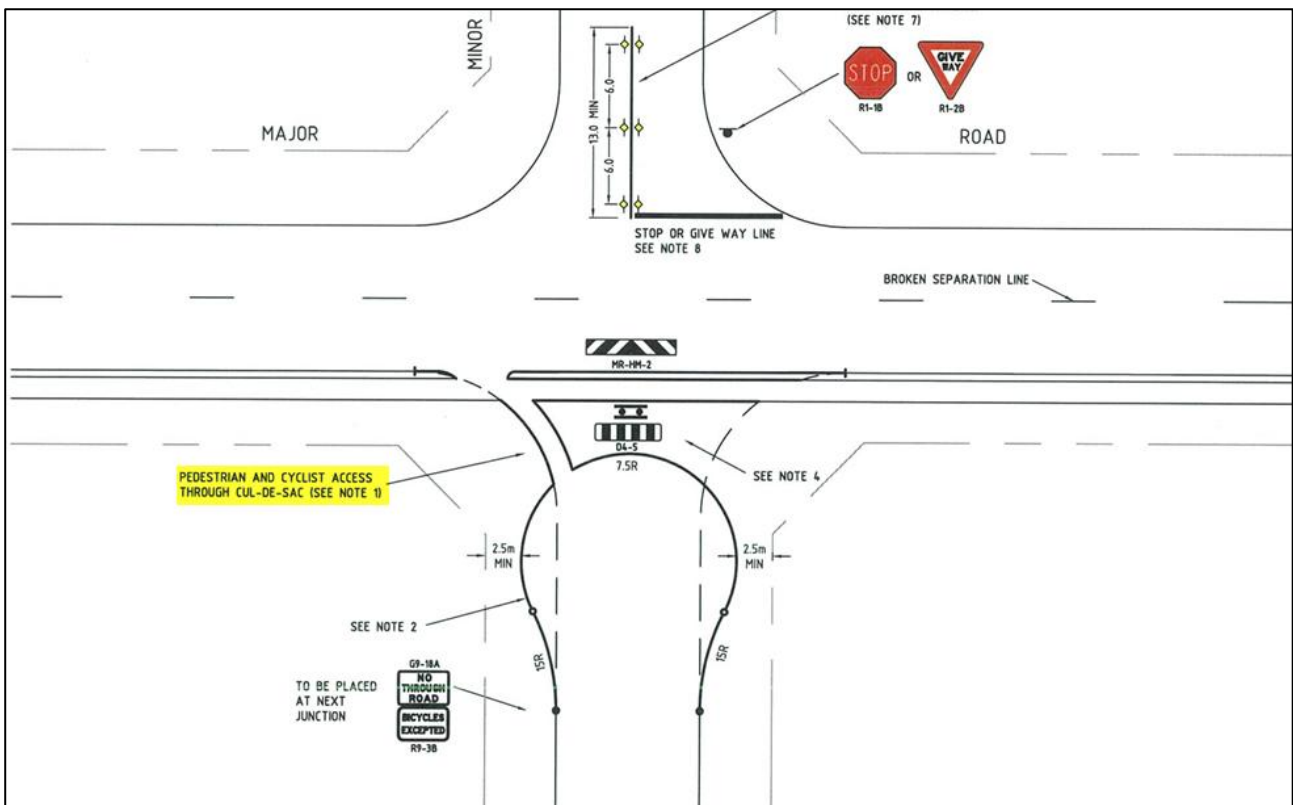
Measure		Reduce speeds	Reduce traffic volume	Reduce crash risk	Increase pedestrian safety	Increase bicycle safety
Vertical deflection devices (Section 8.2)	Road humps	✓	✓	✓	–	–
	Road cushions	✓	✓	✓	–	✓
	Flat-top road humps	✓	✓	✓	–	✓
	Wombat crossings	✓	✓	✓	✓	✓
	Raised pavements	✓	✓	✓	–	✓

WA’s supplement mentions the importance of continuing pedestrian facilities at full road closures where possible. This is illustrated in WA’s Guideline Drawing 200331-0138 as shown in Figure 2.19. While Section 8.4.1 of this Guide does state:

When designing a full closure... cycle and pedestrian access should be provided.

This could be misinterpreted as pedestrian facilities at the perimeter of the cul-de-sac and excluding pedestrian facilities at the head of the cul-de-sac.

Figure 2.19: WA’s Guideline Drawing 200331-0138 Excerpt



It was noted in the NSW’s supplement that numerical warrants for pedestrian (zebra) crossings were featured. However, this supplement references a superseded version of the AGTM Part 8 (2008).

AGTM Part 9 Transport Control Systems – Strategies and Operations

Edition 4.0 published April 2020

This Guide is concerned with the day-to-day operations that support the provision of road services to road network users. It introduces the concept of traffic operations as underpinning road user services, covers the major types of services provided and outlines the role of intelligent transport systems (ITS) in delivering these services.

This Guide provides guidance on the configuration and operation of systems, both ITS and manual, supporting traffic operations including network monitoring systems, incident management, traffic signal systems, congestion management, freeway/motorway management systems and traveller information systems.

Various signal timing and phasing treatments that support pedestrian priority are listed in Table 6.6 of this Guide.

The key insights from this Guide have been noted below.

Section 6.5.2 of this Guide discusses Phase Intervals. A walking speed of 1.2 m/s is referenced in this Section; however the needs and abilities of different pedestrians is not acknowledged. Refer to discussion in *AGRD Part 4A Unsignalised and Signalised Intersections* for further information. **(Pedestrian Demographics)**

Section 6.5.3 of this Guide discusses the **vulnerability of pedestrians** and the basic elements of signal phasing and states:

Crashes involving pedestrians are also a significant source of FSI crashes at urban signalised intersections (Austroads 2017a). As far as is reasonably practicable, pedestrian movements should be protected by the signal phasing. This applies particularly to conflicts between right turning vehicles and pedestrians. Options for pedestrian movements include:

- *A special phase for pedestrians during which all other phases are stopped and pedestrians can walk in any direction through the intersection ('Barnes dance' or 'scramble crossing').*
- *Full control of vehicle movements to remove conflict with pedestrians – this is the preferred control for right turn movements.*
- *Partial control of vehicles movements (through a delay to the start of their movement) or allow vehicles to filter through pedestrians – subject to assessment of the risks to pedestrians through road safety audit or Safe System assessment.*

Queensland's supplement states that:

- *pedestrians should be protected for the walk period as a minimum and*
- *full protection should be provided in the situations listed:*
 - *where indicated in Austroads Guide to Traffic Management (restricted sightlines, high speed and two turning lanes)*
 - *in activity-based places in the movement and place framework (some movement and significant place aspects)*
 - *at Smart Crossings where carriageway pedestrian detectors have been provided (these ensure pedestrian protection is provided only while pedestrians are on the crossing), and/or*
 - *in accordance with the requirements of Austroads Guide to Traffic Management Part 9 Section 6.5.3.*

There is an opportunity to re-word this section to improve pedestrian protection and safety.

Commentary 13 of this Guide further discusses the **vulnerability of pedestrians** within the context of Pedestrian Protection and states:

Full protection must be provided when:

- *sighting to the pedestrian crossing is restricted*
- *the speed of the turning traffic is high*
- *there are 2 lanes of vehicles turning left or right through the pedestrian movement, where those turning vehicles are opposed*
- *there are 3 or more lanes of vehicles turning left or right through the pedestrian movement.*

This commentary should be amalgamated with the information in Section 6.5.3. Moreover, the Safe System speed threshold should be referenced as opposed to stating “the speed of the turning traffic is high.”

Appendix H of this Guide discusses Pedestrian Push-buttons. A general arrangement is provided in Figure H1, copied below as Figure 2.20. There is no pedestrian median nosing shown in this Figure, demonstrating/advocating poor pedestrian safety. Instead this Figure could be replaced with a Figure showing a staggered median with pedestrians facing oncoming traffic as shown in Figure 2.21.

Figure 2.20: AGTM Part 9 Figure H 1

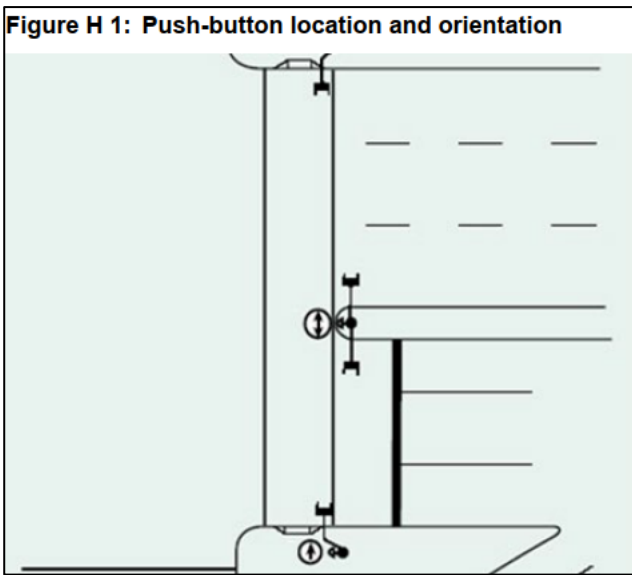
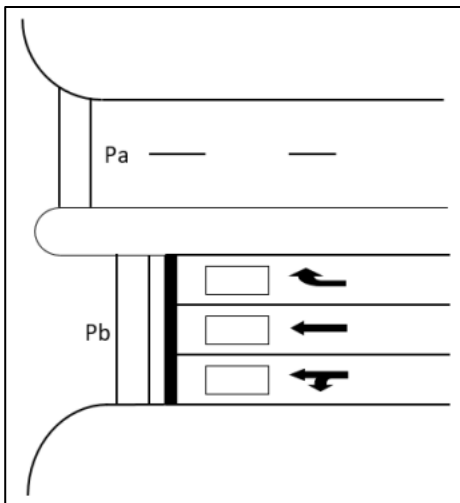


Figure 2.21: DTP supplement to AGTM Part 9 excerpt (need to include push-button location and orientation details)



AGTM Part 10 Transport Control – Types of Devices

Edition 3.0 published April 2020

This Guide is concerned with the tools that are required for traffic management and traffic control within a network. It covers the various control devices used to regulate and guide traffic, including signs, traffic signals, pavement markings, delineators, and traffic islands. Other devices and technologies that convey information and guidance to road users while they are active in traffic are also included.

This Guide provides guidance on the design and use of particular traffic control devices that are applied to achieve or implement traffic management and control measures. It provides advice on the functions, suitability and correct use of devices to create a more efficient and safer road traffic environment for all users in permanent or temporary situations

The key insights from this Guide have been noted below.

Pedestrian demographics are discussed in Section 4.3.2 Consideration for Older Road Users and People with Disabilities. Additional characteristics could be included in this Section, refer to the discussion in *AGRD Part 6A Paths for Walking and Cycling* for additional information.

Section 5.7 of this Guide discusses wayfinding (**interventions**). The purpose and principles behind wayfinding is described, however, it does not cover design and implementation of a wayfinding scheme. Queensland has developed *Wayfinding and signage for people walking (2020)* which could be referenced/reproduced in this section.

Section 8.6 of this Guide discusses the use of coloured pavements (**interventions**) and states:

Yellow pavement material may be used where it is desirable to reinforce pedestrian priority and encourage drivers to give way to pedestrians by highlighting pedestrian areas such as marked foot crossings at pedestrian operated signals. If the road surface is coloured yellow there would be poor colour contrast with any pedestrian (zebra) markings, so yellow pavement colouring should not be used in such cases.

AS 1742.10 Pedestrian control and protection has recently been updated (September 2024), Figure 2.22 has been provided below specifying the application of coloured surface treatment. This Guide should be updated (or reference) the AS 1742.10 literature.

Figure 2.22: AS1742.10 Coloured surface treatment excerpt

(d)	<i>Coloured surface treatment</i>
A coloured surface treatment may be applied to a priority path crossing to enhance its visibility by providing a contrasting colour between the crossing and the surrounding road pavement.	
Where used, the following colours shall be used for the relevant situation:	
(i)	For a pedestrian only footpath: Yellow
(ii)	For a shared pedestrian and bicycle path: Yellow
(iii)	For a bicycle only path: Green
(iv)	For a separated footpath and bicycle path: Yellow for the footpath portion and, green for the bicycle path portion. An additional longitudinal line may be marked along the priority path crossing to separate users.

An **intervention**, Left-turn on Red (LTOR) is discussed in Section 10.5.13 of this Guide and states:

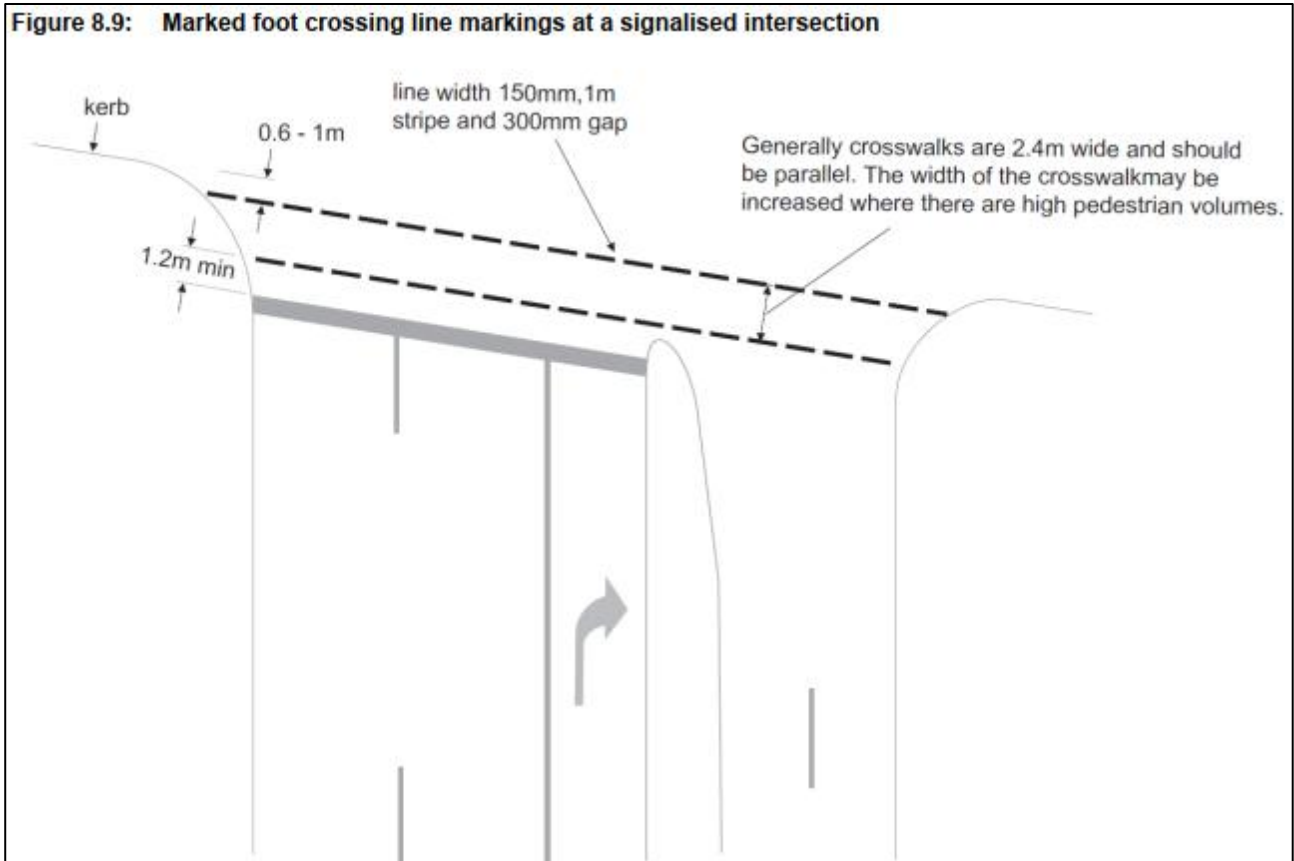
LTOR may be used as a delay reduction measure, subject to any jurisdictional regulations and the criteria described in AS 1742.14 to ensure the safety of pedestrians, bicyclists and motorists. Due to concerns related to drivers not stopping before turning and to issues regarding the safety of pedestrians, some jurisdictions do not permit the use of LTOR while others may impose additional conditions and restrictions to those outlined in Section 7.5.1 of AS 1742.14.

There are numerous studies that demonstrate LTOR (or right-turn on red treatments in right-hand driving environments) significantly increase the crash risk of turning vehicles and pedestrians. This section could be re-worded to discourage this practice. The Victorian supplement states:

The use of left turn on red (LTOR) is not permitted in Victoria. This is due to safety concerns about the conflict between left turning vehicles and pedestrians crossing the approach that the vehicle is turning from. Although the guidelines for use of LTOR minimise the chances of such conflicts by only allowing LTOR where there are few pedestrians and simple geometry, these conflicts can occur nevertheless.

Section 8.4.4 of this Guide discusses Pedestrian Crossing Markings Push-buttons. A general arrangement is provided in Figure 8.9, copied below as Figure 2.23. There is no pedestrian median nosing shown in this figure, which could result in poor pedestrian safety. The 1.2 m minimum distance from the hold line should also be reviewed. Instead this figure could be replaced showing a staggered pedestrian median as discussed in AGTM *Part 9 Transport Control Systems – Strategies and Operations*.

Figure 2.23: AGTM Part 10 Figure 8.9



AGTM Part 11 Parking Management Techniques

Edition 3.0 published April 2020

This Guide is concerned with the parking management process. It provides guidance for planners and engineers to ensure that parking is provided in a safe and efficient manner and with due regard to considerations of access to and the impact on the wider road and transport system.

This Guide presents guidelines for determining the demand for and supply of parking and it provides a parking policy framework – how the demand should be addressed. The implementation of on-street and off-street parking for all road users including parking controls in urban centres is addressed as is parking on rural roads and at park-and-ride facilities. Electronic parking guidance systems and signs are also described.

The key insights from this Guide have been noted below.

Section 8.5.2 of this Guide discusses pedestrian **interventions** in parking areas and states:

Raised pedestrian footpaths can be used in large car parks to separate rows of cars and to provide favourable walking conditions where high pedestrian flows are expected.

Additional wording could be added to clarify what treatments are appropriate when pedestrians cross the roadway. Additionally, Figure 8.2 of this section could be updated to include wombat crossings.

In parking areas, it would be reasonable to assume an increase in the number of pedestrians – particularly where adjacent shops, businesses and other pedestrian generators. There is no reference in this Guide of adopting low speeds in parking environments to cater for the **vulnerability of pedestrians**. Including reference to the Safe System speed threshold for vehicle-to-pedestrian crash types would help contextualise and strengthen the need for low operating speeds in environments with high-pedestrian activity.

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGTM Part 12 Integrated Transport Assessments for Developments

Edition 3.0 published April 2020

This Guide guides planners and engineers who design, develop and manage a variety of land use developments in identifying and managing the impacts on the road system arising from these developments. It aims to ensure consistency in the assessment and treatment of traffic impacts, while addressing the needs of all road users and the effect on the broader community.

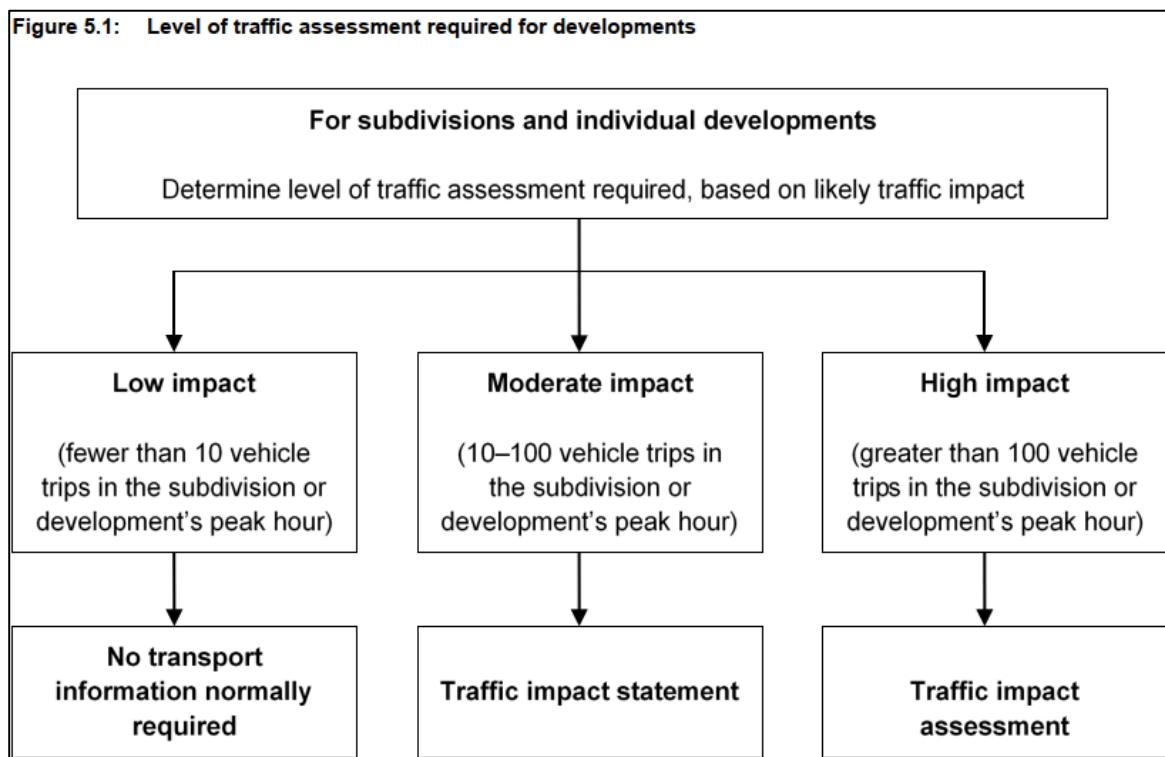
This Guide presents the land use and transport planning context for traffic impact assessment, including travel demand, safety, parking and access management issues. It provides guidance on the need and criteria for impact assessments, and a detailed procedure for identifying, assessing and mitigating traffic impacts. It also covers assessment of safety, infrastructure and environmental effects, and gives examples of checklists, report structures, traffic generation rates and projects.

The authors note Queensland departs from this Guide entirely, and instead references ‘Guide to Traffic Impact Assessment’ (2018).

There is an opportunity to re-write this Guide with the Movement and Place framework and Safe System principles embedded. Pedestrian safety is discussed throughout the Guide, however, could be more encompassing and articulate **pedestrian behaviours, demographics** and the **vulnerability of pedestrians**. This would be outside the scope of this project.

Figure 5.1 of this Guide, copied below as Figure 2.24, provides an example of how a jurisdiction may determine when to conduct a Traffic Impact Assessment for new developments. This example only considers vehicle trips. While this may be a proxy for pedestrian traffic, there could be scenarios where new developments see low vehicle trips and high pedestrian traffic. To this end, there is an opportunity to revisit the metrics/criteria around when to conduct Traffic Impact Assessments.

Figure 2.24: AGTM Part 12 Figure 5.1



There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

AGTM Part 13 Safe System Approach to Transport Management

Edition 4.0 published April 2020

This Guide is concerned with traffic management practice under the Safe System philosophy. The Guide emphasises the need for the road system to provide an environment which assists road users to behave effectively and safely. It considers the role of traffic management in influencing road user behaviour, and provides guidance for practitioners specifically on road safety aspects of traffic management.

This Guide defines a safe road environment and the broad approaches for achieving it. It outlines basic human factors as related to users of the road and traffic environment, and how these can be influenced by road design and traffic management practice. It also describes the basic components of road safety engineering and its application in terms of risk engineering concepts, primary strategies and safety management systems, and outlines the principles and practice of managing safety in the road environment, as related to road infrastructure features and the basic tools of traffic engineering and management.

This Guide introduces several key road safety topics including the Safe System Assessment framework and Human Factors (**Pedestrian behaviours**).

There are no significant amendments/departures pertaining to pedestrian safety from the Jurisdictional Supplements reviewed.

2.3.4 Additional literature

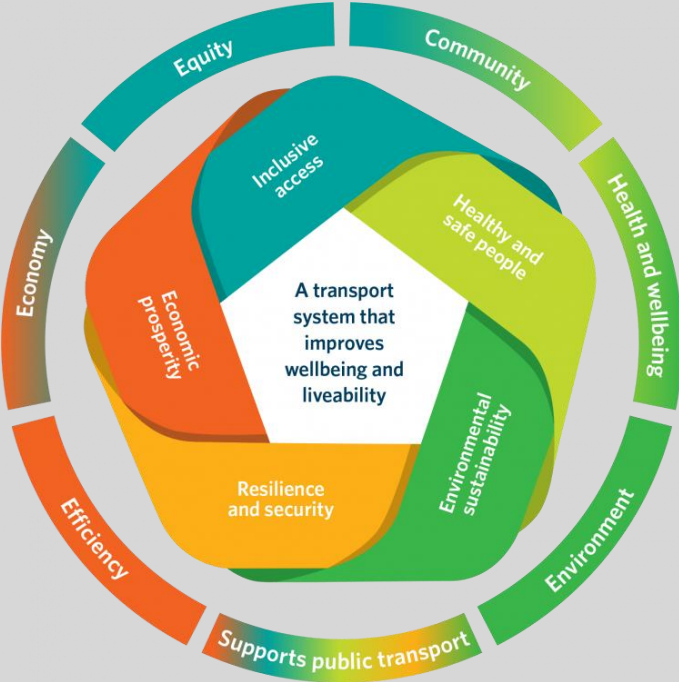
Several other literature resources have been reviewed as part of this project. The key findings/notes from these resources have been collated within this section.

The authors have not copied any information from unpublished Austroads publications within this section. While information from these documents has been used to develop thinking as part of this research report, the authors acknowledge the sensitivities in referencing unpublished material.

The NZTA *Pedestrian Network Guidance* was being updated during the literature review phase of this project. The information provided in Table 2.2 represents the data that was publicly available at the time of the literature review. The recommendations provided in Section 4 represent the proposed *revised* PNG content. The authors have noted, where applicable: **This resource has not been published at the time of writing.**

Table 2.2: Additional literature findings/notes

Publications	Publication date	Findings/notes
Australian Transport Assessment and Planning Guidelines – M4 Active Travel – Background Report	July 2023	<ul style="list-style-type: none"> Table 20 of this report stipulates the effectiveness of various interventions, primarily referencing Federal Highway Administration (FHWA) 2008 <i>Toolbox of Countermeasures and their potential effectiveness for pedestrian crashes</i>. The Crash Reduction Factors (CRFs) referenced in this table are conservative and at times erroneous. As an example, the CRF for a raised pedestrian crossing is 36% for all crashes. In contrast, the Australasian Pedestrian Facility Selection Tool [V2.2.2] User Guide provides a CRF of 63% for a Zebra with platform. This conservative CRF may disparage the use/application of raised pedestrian priority crossings. Table 20 also presents the installation of refuge islands with a CRF of 56% for pedestrian crashes. This mathematically denotes refuge islands are more effective in reducing pedestrian trauma than raised pedestrian crossings which is inaccurate.

Publications	Publication date	Findings/notes
Australasian Pedestrian Facility Selection Tool [V2.2.2] – User Guide	January 2023	This resource states: <i>“the tool cannot be used to assess crossings in locations with more than two lanes in any direction, signals or grade separation are recommended for wider corridors.”</i>
Australasian Pedestrian Facility Selection Tool [V2.2.2] – User Guide	January 2023	<ul style="list-style-type: none"> • This resource uses an average walk speed for non-sensitive pedestrians as 1.2 m/s and an average walk speed for sensitive pedestrians as 1.0 m/s. • These default values can be changed within the tool.
Austroads Safe System Assessment Framework	February 2016	Table 4.9 of this publication details pedestrian treatments and proposes a hierarchy for these interventions (Primary and Supporting).
NZTA – Monetised benefits and costs manual	November 2024	This resource references the NZTA ‘Crash Estimation Compendium’ (2018) for information on crash rates, crash prediction models and crash reduction factors.
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Benefits of walking There are seven main benefits to walking, many of which overlap:</p> 
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: A Safe System for walking This text explores where pedestrian crashes are occurring, crash statistics and the demographics of pedestrians in crashes.</p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Pedestrian characteristics Human factors are detailed within this sub-section. Human states (comfort, calmness, happiness, energy and wellness) and human capabilities (body, mind, ears, eyes and hands) are described.</p>

Publications	Publication date	Findings/notes
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Principles of Safe, Obvious and Step-free (SOS) Designing for universal access means accounting for humans, in all of their varied capabilities and states. The following principles of Safe, Obvious and Step-free (SOS) incorporate human variation, so that planners and designers can incorporate universal access into their projects. It is important that safe, obvious, step-free routes are provided as a priority on the most important pedestrian routes in towns and cities.</p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Measuring pedestrian activity Discussion around what metrics should be measured in pedestrian networks and the reason for collecting this data. The when, where and how of pedestrian surveys are also articulated in this sub-section.</p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Footpath design – principles Footpath zones are defined within this sub-section. A ‘shy-distance’ of 0.15m is mentioned – acknowledging that pedestrians are unlikely to use the path that is closely located near street furniture/hazards.</p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Footpath width The minimum footpath dimensions differ from what is referenced in AGRD Part 6A. These departures are supported by research by Nunns and Dodge (2020).</p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Pedestrian platforms Pedestrian platforms, also known as raised tables, are crossing aids for pedestrians raised above the carriageway level, however, priority is not awarded to pedestrians. These interventions are not called out in Austroads Sets – there is a risk that pedestrians assume they have priority and cross without yielding to traffic. The authors tend to agree that these devices should not be included as pedestrian safety treatments.</p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Crossing selection process At the time of this literature review (January 2025) the <i>Pedestrian crossing selection guidance note is currently in draft and under review.</i></p>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Left turn slip lanes <i>Slip lanes are not recommended in urban areas and other intersection layouts should be considered. When planning and designing improvements to existing slip lanes after exhaustively assessing opportunities to change the layout of the intersection, the following should be considered to assist pedestrian movements:</i></p> <ul style="list-style-type: none"> • <i>Slip lanes should have a high entry angle to reduce vehicle speeds and thereby reduce the risk to pedestrians.</i> • <i>A free flow slip lane which allows drivers to make turns without needing to significantly reduce their speed is not recommended and should be avoided.</i> • <i>Signalisation of the slip lane or providing a zebra crossing to give pedestrians priority over vehicles is recommended.</i> • <i>Any crossing treatment should incorporate a raised platform to reduce vehicle speeds.</i>
NZTA – Pedestrian Network Guidance	Various dates	<p>Sub-section: Case studies Various case studies, projects and studies are presented in this sub-section to support pedestrian planning and guidance.</p>

3. Stakeholder Engagement

3.1 Scope and objectives

The overarching objective for stakeholder engagement was to identify successful and effective strategies, practices, or approaches within the field of pedestrian safety. Key to achieving this goal is engaging with practitioners and subject matter experts.

The focus of the stakeholder engagement process was to understand any risks, challenges, barriers, and lessons learned that road managers or government agencies have encountered, as well as the measures taken to overcome these challenges. These may include institutional (including policy) barriers, as well as political and community opposition to implementing the desired changes. Addressing these was key to creating a research report focused on meeting the day-to-day needs of road managers and practitioners.

It was also essential to understand what existing guidance, methodologies and tools stakeholders currently reference when developing pedestrian safety interventions. This discussion then pivoted towards whether stakeholders have identified gaps or inconsistencies in guidance documents and allow them the opportunity to recommend improvements.

The stakeholder engagement objectives have been outlined below:

1. Identify the guidance, approaches and methodologies referenced.
2. Understand and document stakeholder practices.
3. Investigate the challenges faced during pedestrian safety planning and intervention selection, design, evaluation, and monitoring of outcomes.
4. Explore the gaps or inconsistencies within existing literature sources.
5. Discuss opportunities for improvements to existing literature sources.
6. Gather successful examples or lessons learned within their jurisdiction as well as supplementary guidance developed by jurisdictions.

A stakeholder engagement plan was developed to identify appropriate stakeholders. This document outlines the communication methodologies for different stakeholders and is available upon request.

3.2 Methodology

Engagement with relevant, experienced stakeholders was critical in achieving the project objectives. The goal was to have representatives from both Local Government and State/Territory Government levels of each State/Territory. The stakeholder groups were shared with the Project Control Group (PCG) and Austroads Project Manager (APM) to verify the appropriateness of the listed stakeholders and offer additional contacts. 37 participants joined workshops and 12 stakeholders were interviewed. A full list of stakeholders engaged is available upon request.

Engaging with stakeholders took on multiple forms. Each avenue for engagement has been described below. Stakeholder engagement raw data has been stored electronically. The raw data has been analysed, distilled into findings and presented in this research report.

3.2.1 Workshops

Stakeholders were asked to join online workshops. Online workshops allow effective consultation with a wider group and let attendees discuss ideas, best practices, and solutions with each other. The workshop agendas were developed in reference to the project objectives and stakeholder engagement objectives. Online engagement tools were utilised to maximise participation.

The workshop dates were:

- Friday 31 January 2025 10:00AM – 12:00PM (AEDT)
- Monday 10 February 2025 12:00 – 2:00PM (AEDT).

The agenda of each workshop was consistent; thus participants only needed to attend one of the sessions. The agenda, presentation and minutes from these workshops are available upon request.

3.2.2 Online survey

For stakeholders unable to make either of the workshops, an online survey was developed. This enabled stakeholders to share their insights and capture their experiences. The survey form was distributed to stakeholders with a note that the survey is only required if they are unable to attend.

Stakeholders shared both the survey link and calendar invite to the workshop with other contacts/colleagues that had experience within this space.

The online survey raw data is available upon request.

3.2.3 Interviews

One-on-one interviews were also organised to better understand current practices and methodologies. 12 stakeholders were interviewed in total. These discussions were arranged for stakeholders that were identified as having a key role in pedestrian safety, had detailed knowledge in specific aspects pertinent to this project, and that that knowledge had not been fully explored in the workshop and/or other review processes.

A list of interviewees and minutes from these sessions are available upon request.

3.3 Consultation feedback

The workshop discussions and online survey were deliberately structured to better understand the life cycle of pedestrian interventions, categorised as follows:

- pedestrian safety planning and intervention selection
- pedestrian safety design
- pedestrian safety evaluation and monitoring of outcomes.

For ease of reference, each sub-heading within this section has been similarly divided into the aforementioned categories. It should be noted that some of the feedback received from stakeholders may overlap/repeat from the Section 2.

3.3.1 Current practices

Pedestrian safety planning and intervention selection

Stakeholders employed similar methodologies when deciding on what pedestrian facilities to investigate and develop. The key resources mentioned by stakeholders included:

- Austroads *Guide to Road Safety* (AGRS)
- Austroads *Guide to Traffic Management* (AGTM)
- Austroads *Guide to Road Design* (AGRD)
 - Specifically, *AGRD Part 6A: Paths for Walking and Cycling*
- Austroads Pedestrian Facility Selection Tool
- Australian Standards
 - Specifically, AS 1742.10 *Manual of uniform traffic control devices, Pedestrian control and protection*
- NZTA's *Pedestrian Network Guidance* (PNG)
- jurisdictional supplements.

It should be noted that while several Austroads publications were commonly referenced by practitioners, jurisdictional supplements were the primary sources for planning and selection of pedestrian facilities. Indeed, jurisdictional supplements take precedence when there is conflicting guidance between the 2 publications.

Interestingly, one stakeholder stated they reference NZTA's 'Pedestrian planning and design guide' document published October 2009. This document has been superseded by the Pedestrian Network Guidance (PNG). In discussion with other practitioners from New Zealand, the PNG is very widely used and referenced, thus the authors of this document have viewed this commentary and practice as singular.

The AS 1742.10 document was recently published (September 2024). It appears all jurisdictions have yet to develop a supplement that references the latest version of this document. It was noted during discussions that TMR are currently working on developing a supplement to AS 1742.10 and are expecting to release this for comment in early 2025.

Pedestrian safety design

Stakeholders employed similar methodologies when designing pedestrian facilities. However, the breadth of resources was not as encompassing in comparison to the planning and intervention stage. The key resources mentioned by stakeholders included:

- Austroads *Guide to Road Design* (AGRD)
 - Specifically, *AGRD Part 4A: Unsignalised and Signalised Intersections, Part 4B: Roundabouts and Part 6A: Pedestrian and Cyclist Paths*
- Australian Standards
 - Specifically, AS 1742.10 *Manual of uniform traffic control devices, Pedestrian control and protection*
- NZTA's *Pedestrian Network Guidance* (PNG)
- jurisdictional supplements.

It should be noted that while several Austroads publications were commonly referenced by practitioners, jurisdictional supplements were the primary sources the design of pedestrian facilities. Indeed, jurisdictional supplements take precedence when there is conflicting guidance between the 2 publications. Jurisdictional Standard Drawings were also noted as a common reference during the design phase.

One stakeholder stated that they reference DTP’s Road Design Note 03-07 Raised Safety Platforms (RSPs). Whilst not an exclusively pedestrian-focussed publication, there is information in here that is not clearly articulated in other publications. Examples of this include stipulating the signage requirements for raised zebra (wombat) crossings as shown in Figure 3.1 and stipulating the pavement colour of a priority Shared Use Path crossing as shown in Figure 3.2. Both of these design details have recently been articulated in the updated AS 1742.10.

Figure 3.1: Road Design Note 03-07 – Raised Safety Platforms (RSP) excerpt of Figure 14 and Figure 15

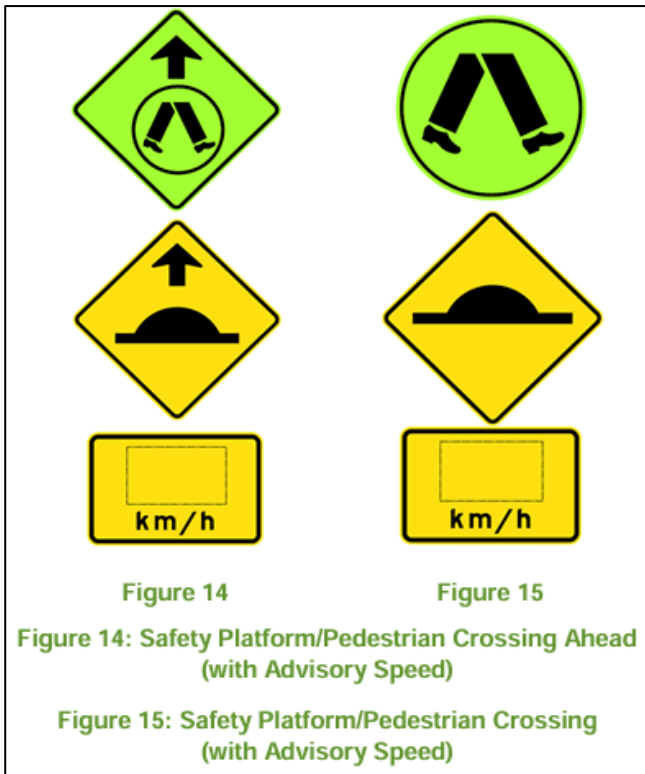
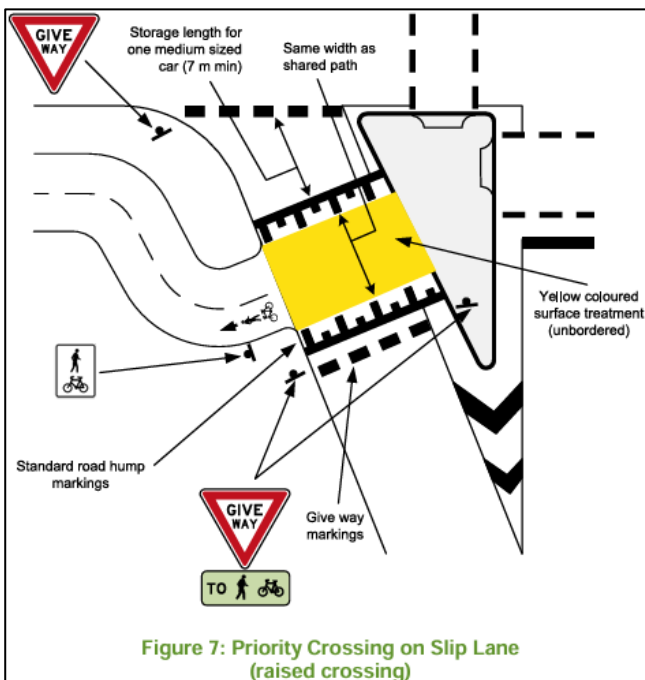


Figure 3.2: Road Design Note 03-07 – Raised Safety Platforms (RSP) excerpt of Figure 7



Pedestrian safety evaluation and monitoring of outcomes

Stakeholders used a range of resources when evaluating the effectiveness of pedestrian treatments and monitoring outcomes. The key resources mentioned by stakeholders included:

- Austroads Publication AP-R509-16 Safe System Assessment Framework
- Transport for NSW's Great Places Toolkit Evaluation Tool
- AusRAP Star Rating
- video analytics
- before and after studies, not necessarily referencing any literature.

It was immediately evident that stakeholders found this stage in a project's lifecycle lacked pertinent information and guidance. In fact, it was common for practitioners to state that performing evaluation on pedestrian safety projects was not typical. Where evaluation studies were conducted, they tended to be ad-hoc and not necessarily referencing any guidelines or publication.

A few stakeholders did discuss the merits of conducting a Safe System Assessment (SSA), however this tool is primarily used to compare different options during the design phase. The SSA framework is not intended to provide evaluation of pedestrian safety performance post-construction.

3.3.2 Gap analysis

The gaps identified by practitioners during the stakeholder engagement process have been captured below.

Pedestrian safety planning and intervention selection

The Austroads *Pedestrian Crossing Facility Selection Tool* is a useful resource for practitioners to investigate appropriate pedestrian safety treatments. While some stakeholders had heard of this tool and were confident in using it, this was not a uniform response. There is an opportunity to improve the marketing of this resource. For instance, there is no mention of this tool in *AGRD Part 6A: Paths for Walking and Cycling* – a key resource for practitioners looking into options for pedestrians crossing over roads.

Other specific planning and intervention selection gaps have been noted below:

- The safety pros and cons of different pedestrian treatments needs to be clearly identified. This could be furthered by acknowledging that several pedestrian safety treatments are not inclusive and may affect people living with disability.
- There may be an inherent flaw in relying on existing pedestrian numbers to judge the appropriateness of different facilities. Pedestrians may intentionally be avoiding an area (so there will be low numbers) because they do not feel safe walking in a particular environment.
- Improved connections between pedestrian planning and Movement and Place.
- Discussion around the role low-cost treatments could play in pedestrian safety (e.g. bolt-down speed cushions, bolt-down wombat crossings).

Pedestrian safety design

Before focusing on specific gaps within the design phase, the authors wanted to acknowledge an overarching comment/theme received from stakeholders. When practitioners are designing for road environments (i.e. for vehicular traffic), the structure of the Austroads publications is very logical and consecutive. As an example, the contents of the *AGRD Part 3: Geometric Design* has been intentionally ordered in a way that a designer can move their way through the publication and step their way through the road design process. It was the opinion of several stakeholders that having all the pertinent road design information contained within this one publication significantly reduces the risk of designer error.

The design of pedestrian facilities is not as straightforward. The primary resource is AGRD *Part 6A: Paths for Walking and Cycling*. However, the same logical structure has not been applied to this document, instead relying on cross-referencing with other Austroads publications. At times, this cross-referencing is explicit such as from Section 7.3.1:

Designers should refer to AGRD Part 4 (Austroads 2017a) and Guide to Traffic Management Part 8: Local Area Traffic Management (Austroads 2016c) for more information on appropriate treatments such as wombat crossings.

However, there are other instances where the cross-referencing is not called out. An example of this can be found in AGRD *Part 3: Geometric Design* Section 4.8, that states:

The width of a footpath for pedestrians is dependent on its location, purpose and the anticipated demand on the facility. The width of the footpath may need to be greater than the recommended minimums in the following situations:

- *at a pedestrian crossing point to allow people to pass those waiting at a bus stop*
- *where service poles or structures restrict the width*
- *where higher pedestrian volumes are anticipated (e.g. near shops)*
- *where outdoor dining is present.*

In comparison the AGRD *Part 6A: Paths for Walking and Cycling* Section 5.1.2 states:

Wider than the minimum width (e.g. up to 5 m) may also be necessary at locations where pedestrian flows are high or where pedestrians gather such as in the vicinity of schools and associated road crossings, at recreation facilities and at important bus stops.

While there is no doubt commonalities across these 2 texts, the communication is not identical. Furthermore, the AGRD *Part 6A* section does not cross-reference AGRD *Part 3* section. Thus, a designer may just read the text from AGRD *Part 6A* and not consider widening the footpath where outdoor dining is present because this information has not been provided/cross-referenced.

The authors acknowledge that this similar cross-referencing issue occurs when designing cycling facilities. In 2017, Austroads released AP-G88-17 *Cycling Aspects of Austroads Guides* which contains information that relates to the planning, design and traffic management of cycling facilities and is sourced from Austroads Guides, primarily the AGRD, the AGTM and the AGRS. There is no pedestrian equivalent document.

Some more specific design gaps have been noted below:

- Best practice slip-lane design for pedestrians.
- Safe System treatments for pedestrians crossing multi-lane roads. There could also be enhanced guidance to investigate reducing the number of lanes where pedestrian facilities are proposed.
- When installing pedestrian facilities at a roundabout, it is preferable to apply a consistent treatment on each leg. However, this may not be appropriate where there is no connection/link at each leg.
 - This was further explored and debated that when pedestrian facilities are not consistent at each leg, the community may have a poor understanding of the difference between different treatments.
 - The treatment selection of pedestrian crossings at roundabouts was also queried by practitioners.
- Generally, AGRD *Part 6A* is written with green-field sites in mind. There is a lack of information of how to design in built-up areas.
- Crossing Sight Distance models – particularly where pedestrians do and do not have priority.
- Improved guidance around access and intersection between paths/roads and paths/paths.
- Pedestrian waiting/storage areas and vehicle swept paths.

- The design of shared zones where pedestrians are the primary transport mode.
- Pedestrian safety on shared paths/crossing over bike paths.
 - The application of floating bus stops was also noted as an issue for practitioners, is this a safe option for pedestrians?
- Pedestrian crossings on higher speed roads.
- Pedestrian treatments at local street thresholds.
- Traffic signal wait times for pedestrians.
 - In discussion with practitioners, traffic signals are inherently installed to benefit the flow of vehicular traffic. There is limited guidance/acknowledgment around the frustration pedestrians face when forced to wait extended periods to cross roads.
- Traffic signal phasing, specifically around why our guidance permits the use of conflicting path movements (between turning vehicles and crossing pedestrians).

Pedestrian safety evaluation and monitoring of outcomes

As mentioned in the Section 3.3.1, evaluating the safety performance of pedestrian projects is not well supported by existing literature. This is a significant gap in the project's lifecycle. As mentioned by one stakeholder, the lack of pedestrian data is a notable hurdle and the collection of pedestrian data is often expensive.

3.3.3 Case studies

During the stakeholder engagement workshops, survey and interviews, practitioners did not readily share Case Studies. Rather, they noted that there is an absence of published case studies. The case studies in this context refers to both the application of pedestrian safety treatments (i.e. the built-form) and also policy, guidance and published materials that support/encourage enhanced pedestrian safety outcomes.

The below are the few case studies that were received:

- Liebig Street, Warrnambool (30 km/h speed zone, frequent raised pedestrian crossings and other traffic management treatments to deter unnecessary traffic).
- Beach Street, Port Melbourne (multi-lane roundabout with splitter island/refuge used to separate each traffic lane).
- Transport for NSW's, 'Evaluation of permanent 40 km/h speed limits: Summary report' (October 2018).

Conversely, the NZTA provides case studies, projects and studies to support the planning and design guidance as part of their Pedestrian Network Guidance suite of resources. Practitioners are also encouraged to "provide case studies to the Waka Kotahi NZ Transport Agency for inclusion on this website so that success and lessons can be shared."

4. Recommendations

This section will focus on the recommended changes to *Austrroads Guide to Road Safety*.

Additional recommendations outside the scope of this project have been noted as Opportunities for Improvement and are discussed in Section 5.

4.1 Austrroads Guide to Road Safety

Table 4.1: Recommendations for Austrroads Guide to Road Safety

Publication	Section	Current text	Recommended text	Reason for recommendation
AGRS Part 1 Introduction and the Safe System	2.2.2 Safe Speed	Principles of 'integration' and 'separation', which are derived from the Swedish Vision Zero philosophy (Swedish Transport Administration 1997) can be applied. For example, in areas where there are large numbers of pedestrians, they should not be exposed to vehicle speeds any higher than 40 km/h and preferably less. This can be done through separating pedestrians from vehicles, or by lowering the travel speed of vehicles to a maximum of 40 km/h, thus 'integrating' the various road users.	Remove text.	<ul style="list-style-type: none"> • Earlier in this Section, the critical crash speeds for various crash types are presented. • For a pedestrian struck by a vehicle a 30 km/h impact speed is mentioned. This is a consistent speed crash threshold as discussed in other Austrroads publications. • The current text could be confusing. Practitioners may instead aim for an operating speed environment of 40 km/h where there are large numbers of pedestrians which is higher than the survivable threshold for vehicle to pedestrian crashes.

Publication	Section	Current text	Recommended text	Reason for recommendation
AGRS Part 1 Introduction and the Safe System	Multiple sections	National Road Safety Strategy 2011–2020 (NRSS)	National Road Safety Strategy 2021-30	<ul style="list-style-type: none"> Update to Australia’s latest RSS. It is also recommended the Social Model approach is referenced/included in Section 2.5 of this Guide. The authors recommend sourcing this information directly from the NRSS 2021-30.
AGRS Part 2 Safe Roads	10.3 Safe System audits	Whole section	<p>Include additional text, perhaps as an opening paragraph:</p> <p>A ‘Safe System audit’ amalgamates and replaces the ‘Safe System Assessment’ (discussed in Section 10.1) and ‘Road Safety Audit’ (discussed in Section 10.2) and is currently only applied in New Zealand.</p>	Safe System audits are only applied and used in New Zealand. For all other Australasian Jurisdictions, a Road Safety Audit and/or Safe System Assessment would be utilised.
AGRS Part 2 Safe Roads	7.1 Facts and actions to improve safety for walking and cycling	New paragraph	<p>Include additional paragraph, above ‘What do we know’:</p> <p>The design of our urban environment influences our mode choices:</p> <ul style="list-style-type: none"> When land use density is higher, the distance between destinations is more walkable and public transport is easier to serve. When the quality of public infrastructure is high, people feel safer walking and are therefore more likely to walk. When people don’t need to drive everywhere, they can live with fewer or no cars – which saves money that is available to be spent, for example, locally. When people drive less, there are fewer greenhouse gas emissions, noise, air and water pollution and injuries/fatalities from vehicle crashes. When people walk more, they build physical activity into their daily lives – improving their health and mental wellbeing. 	Including these benefits of walking strengthens the case for providing safe, connected pedestrian networks.

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p>Sourced from https://www.nzta.govt.nz/walking-cycling-and-public-transport/walking/walking-standards-and-guidelines/pedestrian-network-guidance/walking-in-new-zealand/</p> <p>The NZTA developed the following infographic (refer to Figure A.1) that can be used when engaging with the community, it communicates the key benefits of walking in plain language and uses New Zealand statistics and facts.</p>	
AGRS Part 3 Safe Speed	Table 5.2	Pedestrians should be prioritised in most street environments, with facilities such as footways of 1.5 m and wider...	Pedestrians should be prioritised in most street environments, with facilities such as footpaths of 1.5 m and wider...	<ul style="list-style-type: none"> • Replace 'footways' with a more conventional term 'footpaths'. • The term 'footways' is believed to be derived from the UK, but would not be a common term in the Australasian context. • The authors also recommend updating the '1.5 m' metric in accordance with the recommendations made in AGRD Part 6A Table 5.1. Perhaps using a figure of '1.8 m and wider' would be more contemporary.
AGRS Part 3 Safe Speed	Table 5.2	New dot-point	<ul style="list-style-type: none"> • Where pedestrians cross over the carriageway, a 30 km/h aspirational operating speed should be adopted. However, the decision to vary from these values should not be taken lightly. In applying design exceptions, a documented, extensive level of risk assessment and development of mitigation strategies is required for justification. 	<ul style="list-style-type: none"> • This table discusses 'Design Philosophy'. the Safe System speeds are an important foundation of design philosophy and should be mentioned. • This statement aligns with the text in Section 1.1 and Section 2.1.3.

Publication	Section	Current text	Recommended text	Reason for recommendation
AGRS Part 4 Safe People	2. High-Risk Road User Demographics	New section	<p>References:</p> <ul style="list-style-type: none"> • <i>Keeping People Safe When Walking – Understanding Inequity in Pedestrian Safety Outcomes</i> (Austroads 2026) • NZTA – Pedestrian Network Guidance: Walking in NZ – A Safe System for Walking (NZ Transport Agency Waka Kotahi (n.d.)) <p>Pedestrians in Australia:</p> <p>Pedestrian deaths, along with all road user deaths, have been on a downward trajectory over the longer term, with a reduction in pedestrian deaths of about 60% over the last 35 years. However, progress has stalled in the past decade, at an average of 160 pedestrian deaths per year. This equates to 0.62 pedestrian deaths per 100,000 population each year in Australia. Similarly, pedestrian hospitalisations plateaued in the past decade at an average of 2,608 per year.</p> <p><i>What are the statistics telling us?</i></p> <ul style="list-style-type: none"> • Older pedestrians are most at risk of being killed in crashes. People aged 65 years or older make up 37% of all pedestrian deaths, but represent only 17% of the population, meaning they are 2.9 times more likely to be killed while walking than those under 65 years when adjusted for population. • Nearly twice as many males are killed while walking than females. They are also 30% more likely to be hospitalised. • 162 Aboriginal and Torres Strait Islander pedestrian deaths were reported in Australia between 2012 and 2021, compared to 1,018 pedestrian deaths amongst other Australians. However, when adjusted for population, Aboriginal 	<ul style="list-style-type: none"> • This section discusses road user demographics that are involved in crashes at a disproportionately higher rate. • The authors have recommended introducing a new sub-section on Pedestrians to articulate the risk profile and context of this road user group.

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p>and Torres Strait Islander peoples are 3.7 times more likely to be killed as pedestrians than other Australians.</p> <ul style="list-style-type: none"> Local Government Areas (LGAs) with the highest proportion of most disadvantaged households experience highest rates of pedestrian death. The LGAs with the highest proportion of disadvantaged households have a death rate of 2.2 per 100,000 population per year, 3.6 times higher than the rest of Australia (0.6). The majority of pedestrian deaths in Australia occur in locations with a speed limit of 50 km/h (29% of pedestrian deaths) or 60 km/h (33%). This probably reflects both the commonality of those speed limits in urban areas and the risk of fatality if a pedestrian is hit at 50-60 km/h. <p>Pedestrians in New Zealand: From 2015 to 2019, pedestrians accounted for about one in 10 (10.37%) of all road deaths in New Zealand. In the main urban centres, on roads subject to urban speed limits, about one in four road deaths (24.08%) were pedestrians.</p> <p>Annually, an average of 34 pedestrians are killed and 905 are reported injured on New Zealand roads. While the number of pedestrians killed is trending downwards, reported pedestrian injuries have been unchanged for the last 15 years, despite the decline in walking by children who are the largest group at risk.</p> <p><i>Who is involved?</i> Both older and young pedestrians are at particular risk as they tend to have lower cognitive, sensory, and physical abilities.</p>	

Publication	Section	Current text	Recommended text	Reason for recommendation
			<ul style="list-style-type: none"> • In New Zealand, those aged over 75 are involved in 24% of pedestrian fatalities, although they represent only 6% of the population. • Those aged under 19 represent 33% of injuries, yet make up only 26% of the population. However, teenagers tend to walk further than other age groups, so their risk (by hours of exposure) is not substantially higher than older groups. That said, just over one-third of death or serious injury crashes involving male pedestrians aged 13–20 were identified as involving ‘antisocial behaviours such as street racing, playing chicken with the traffic, and being involved in fights on the street. <p><i>Where are crashes occurring?</i></p> <p>In New Zealand, crashes involving pedestrians occur mainly:</p> <ul style="list-style-type: none"> • while pedestrians are crossing roads (around 70%) • in built-up areas (61% of pedestrian deaths and 94% of injuries) • near residential land use (half), commercial land use (one third), and within two kilometres of the pedestrian’s home (57%) • on relatively main roads rather than minor roads (43% on roads classified by TLAs as ‘arterial urban’, 32% on ‘major or medium urban’, and only 12% on ‘minor or access urban’ roads) • away from formal pedestrian crossings (92%) 	

Publication	Section	Current text	Recommended text	Reason for recommendation
			<ul style="list-style-type: none"> when pedestrians are most likely to be out and about (e.g. during daytime, in fine weather, before and after the school day). Children are more likely to be injured in a road traffic incident in the area between 0.5 km and 1.5 km from school, and not at the school gate. More than nine in every 10 reported pedestrian casualties occurred on urban roads (those with a speed limit of 70 km/h or less). However, only 2% of urban crashes are fatal while 36% of rural crashes are fatal. 	
AGRS Part 4 Safe People	2. High-Risk Road User Demographics	The road user groups noted in the subsections below have been identified through statistical analysis to be involved in crashes at a disproportionately high rate. It does not specifically note the most vulnerable users on the road network (pedestrians, cyclists and motorcyclists), although there is significant overlap. Vulnerable road user groups are those that are disproportionately prone to high-severity crashes given that a crash occurs, whereas high-risk road user groups may result from disproportionate representation in crash likelihood and/or severity.	The road user groups noted in the subsections below have been identified through statistical analysis to be involved in crashes at a disproportionately high rate.	<ul style="list-style-type: none"> The text in red is being recommended for removal. The text states that ‘motorcyclists’ are not specifically noted in the section. This is erroneous. Section 2.3 explicitly discusses ‘Motorcyclists’. In addition, if the above recommendation is supported and developed, then this text becomes obsolete.
AGRS Part 4 Safe People	New Section 13. Human Factors	N/A	Reference NZTA – Pedestrian Network Guidance: Pedestrian Planning Principles – Pedestrian Characteristics	This new section is being recommended to provide practitioners information about pedestrian capabilities and characteristics. This text draws a line between transport infrastructure and design decisions and the diverse human experience.

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p>Humans are diverse. Designing streets and places for pedestrians means designing for all manner of human capabilities and states. Every human is unique in their physical, mental, and sensory capabilities. These capabilities can change over time or in different situations, for example if a person is under the influence of alcohol or drugs, carrying luggage, or accompanying a small child. In addition, states such as anxiety, happiness, and wellness can affect how easy it is to travel as a pedestrian.</p> <p>The NZTA developed the following infographic (refer to Figure A.1) displaying different human states and capabilities.</p> <p>Pedestrians have different characteristics that affect their safety, confidence and comfort when walking, including when using a mobility aid. People’s different capabilities (vision, hearing, body, mind, hands) and their momentary state - that is, how they are feeling - can impact how they can travel. Decisions made by those who design streets and places affect how easy it is for people to travel, even if their capabilities are reduced, or they are not feeling as well as they could be.</p> <p><i>Vision:</i></p>	

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p>Limited vision affects pedestrians' comfort, safety, and ability to find their way on paths, determining when it is safe to cross, keeping alignment when crossing roads, and in public spaces where there are no well-designed pedestrian facilities; car parks can be an example. Making street and path environments safe for people with low or no vision requires separation from other modes, or for those other modes to be travelling slowly, along with legible and consistent design. Separated spaces mean that pedestrians are not likely to be in conflict with heavier, faster modes of travel. Where people cannot be physically separated (when crossing streets for example, and in shared zones) slow traffic speeds reduce impact speeds and can increase pedestrian confidence.</p> <p>People with low vision rely on contrasting colours and surface textures. Pedestrian routes should include visually contrasting and tactile cues for blind people to follow.</p> <p><i>Hearing:</i></p>	

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p>Pedestrians' ability to hear affects their comfort using paths, and crossing roads and public spaces. When crossing the road, pedestrians who cannot hear well rely on their sight and traffic control devices (such as traffic signals) to be safe. On paths, many pedestrians who cannot hear well are affected by people approaching from a direction they cannot see. Devices such as bicycles, skateboards, and scooters on paths can be very concerning for pedestrians whose hearing is compromised. It is very important to separate spaces for people travelling at different speeds and in low-speed environments where pedestrians mix with cyclists and other forms of micro-mobility.</p> <p><i>Body:</i></p> <p>People vary in their size and physical strength. Many people, including children, shorter adults, and people who use wheelchairs or mobility scooters on paths and road crossings, cannot see over obstacles as well as other people can, and are also less likely to be visible to drivers. Safe street and crossing design means designing for those least likely to be seen.</p> <p>Some people can walk, but not very far, or very quickly. Some people can move using a mobility aid and/or a support person, but rely on that aid and/or support person to help them. Design features that help people whose body strength is limited include seating, step-free choices and wayfinding information (to connect with public transport, for example). Designing safe environments where traffic speeds are low will mean that people with limited strength are less likely to be injured.</p>	

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p><i>Hands and arms:</i> Peoples’ hand strength varies, so transport that includes opening doors or reaching to press buttons, such as push buttons at signalised crossings, is not always accessible. Some people have strength in one hand, or one side of their body only. Handrails on both sides of staircases are important. Arm rests on both sides of a seat so that people can choose where to sit and so that they can support themselves to stand up again is important, as are back rests so people can support themselves when seated.</p> <p><i>Mind:</i> People with conditions such as autism; with neurological disease such as dementia; and with mental health problems exist in all communities. Further, people under the influence of alcohol or drugs (including prescription) are also prevalent. There is no objective way to prioritise for them specifically within a town or city, as part of pedestrian network planning. However, identifying gaps in accessible walking networks and working to retrofit best-practice infrastructure can help people to walk, wherever they live. Given that walking is a determinant of good health, including good mental health, prioritising accessible pedestrian networks can help people maintain healthy state of mind; as well as supporting access for people who are experiencing anxiety or depression.</p>	

Publication	Section	Current text	Recommended text	Reason for recommendation
			<p>People vary in their ability to navigate complex environments such as busy urban streets. For example, visual clutter, objects on the footpath, unusual lighting, unexpected designs, and high traffic volumes of pedestrians and vehicles (including cyclists) can affect a person’s ability to identify and navigate the continuous accessible path of travel, therefore creating a complex environment. The principles described here summarise design guidance for people with autism; people with learning disability, people unfamiliar with conventions, including children; and for people with dementia or other conditions affecting cognition, including stroke.</p>	
AGRS Part 4 Safe People	Section 6 Use of Facilities	Note that improper use of facilities is not limited to vehicles only and includes jay walking, pedestrians crossing on a red light when there are no vehicles present, and cyclists riding on footpaths.	Note that improper use of facilities is not limited to vehicles only and includes jay walking , pedestrians crossing on a red light when there are no vehicles present, and cyclists riding on footpaths.	<ul style="list-style-type: none"> • The authors recommend removing the term ‘jay walking’ from this text. • The term ‘jaywalking’ is typically used neutrally in Australia referring to crossing a street outside of designated crosswalks or against traffic signals. • However, in many urban areas, pedestrian infrastructure is unevenly distributed, and people may be forced to cross streets at non-designated points due to the absence of safe alternatives. The term “jaywalking” can be viewed as implicitly blaming the individual rather than systemic issues associated with insufficient provision of safe crossing facilities.
AGRS Part 6 Road Safety Audit	7.7.2 Thematic (Road User Specific) Audits	New section	<p>Recommended text following the second paragraph:</p> <p>A thematic audit focussing on pedestrian safety may be suitable in environments where pedestrian volumes and/or risks are elevated. Such environments include (but are not limited to):</p>	Lacking in this section are examples of when to apply a thematic audit focussing on pedestrian safety. This additional text provided practitioners typical scenarios where a pedestrian-focussed RSA may be appropriate.

Publication	Section	Current text	Recommended text	Reason for recommendation
			<ul style="list-style-type: none"> • Pedestrianised areas • Adjacent public transport stops and stations • Adjacent schools and universities • Adjacent hospitals, medical and aged care facilities • Car parks • Shared paths • Areas where pedestrian safety has been reported as an issue • Streets categorised under the Movement and Place Framework as having a high place value. 	
AGRS Part 6 Road Safety Audit	10.4.3 Planning Site Inspections	New text	Where there are existing pedestrian facilities (e.g. footpaths, shared paths, pedestrian crossing points), the site inspection should involve travelling as a pedestrian. This will give auditors enhanced perspective about the risks pedestrians face at the location under assessment.	<ul style="list-style-type: none"> • This text is proposed to reduce the risk of Road Safety Audits being inspected solely from dashcam footage/the perspective of vehicle road users. • The authors have limited the application of conducting RSAs on-foot to locations where there are existing pedestrian facilities (e.g. footpaths). This is primarily for the safety of auditors (i.e. do not want to encourage auditors to walk where there are no pedestrian facilities).
AGRS Part 6 Road Safety Audit	Table H 5: Prompt list covering walking and cycling	To aid legibility the existing table has been reproduced in the row below. Additional recommended text has been added in red. Strike through text is being recommended for removal.		<ul style="list-style-type: none"> • The authors have added additional prompts to reflect on the diversity of human experiences and explicitly consider the vehicle volumes and speeds at conflict points. • The authors contend that the prompt list is on the wordy side. Additionally, there is pertinent information from other prompt lists – thus, an expectation that practitioners are viewing multiple prompt lists when conducting their audits.

Publication	Section	Current text	Recommended text	Reason for recommendation
				<ul style="list-style-type: none"> The authors had considered re-structuring this table, but acknowledge that this would then be inconsistent with the other prompt lists offered in this Guide. A separate prompt list should be produced for cyclists.
Feasibility	Preliminary design	Detailed design	Pre-opening	Existing roads (post-opening)
<ul style="list-style-type: none"> Considering the adjacent land use, what demographics/characteristics of pedestrians are expected within the area under assessment? Where are pedestrian desire lines? Where pedestrian desire lines cross over the carriageway, what crossing facilities are provided? Does the concept appropriately consider the requirements of pedestrians? 	<ul style="list-style-type: none"> Considering the adjacent land use, what demographics/characteristics of pedestrians are expected within the area under assessment? Where are pedestrian desire lines? Where pedestrian desire lines cross over the carriageway, what crossing facilities are provided? Also: <ul style="list-style-type: none"> What are the sightlines like (both from the driver's perspective and pedestrian's)? What are the vehicle speed/volumes? Have pedestrian routes been provided where required? Do shared facilities take account of the needs of all user groups? Can verge strips dividing footways/cycleways and carriageways be provided? 	<ul style="list-style-type: none"> Considering the adjacent land use, what demographics/characteristics of pedestrians are expected within the area under assessment? Where are pedestrian desire lines? Where pedestrian desire lines cross over the carriageway, what crossing facilities are provided? Also: <ul style="list-style-type: none"> What are the sightlines like (both from the driver's perspective and pedestrian's)? What are the vehicle speed/volumes? What are the grades on footpaths/kerb ramps and how may this affect people using wheelchairs? In large rainfall events, will ponding occur in pedestrian areas? Where would pedestrians be likely to travel? 	<ul style="list-style-type: none"> Are pedestrian desire lines well catered for with safe crossing facilities? Are the following adequate? <ul style="list-style-type: none"> visibility; signs; surfacing; other guardrails; drop kerbing or flush surfaces; tactile paving 	<ul style="list-style-type: none"> Considering the adjacent land use, what demographics/characteristics of pedestrians are expected within the area under assessment? Where are pedestrian desire lines? Where pedestrian desire lines cross over the carriageway, what crossing facilities are provided? Also: <ul style="list-style-type: none"> What are the sightlines like (both from the driver's perspective and pedestrian's)? What are the vehicle speed/volumes? What are the grades on footpaths/kerb ramps and how may this affect people using wheelchairs? In large rainfall events, will ponding occur in pedestrian areas? Where would pedestrians be likely to travel?

Publication	Section	Current text	Recommended text	Reason for recommendation
		<ul style="list-style-type: none"> • Where footpaths have been diverted, will the new alignment the same users free access? • Are footbridges/subways sited to attract maximum use? • Is specific provision required for special and vulnerable groups? (i.e. the young, older users, mobility and visually impaired?) • Are tactile paving, flush kerbs and guard railing proposed? • Is it specified correctly and in the best location? • Have all walking needs been considered, especially at intersections? • Are these routes clear of obstructions such as signposts, lamp columns etc? 	<ul style="list-style-type: none"> • Have the needs of pedestrians been considered especially at intersections and roundabouts? • Are any proposed drop kerbs flush with the adjacent highway? • Is tactile paving proposed? • Is it specified correctly and in the best location? 	<ul style="list-style-type: none"> • Do actual crossing points relate to desire lines? And if not, does this introduce increased levels of significant risk? • Are there appropriate travel paths and crossing points for pedestrians? • Is a safety fence installed where necessary to guide pedestrians to crossings or overpasses • Is a safety barrier installed where necessary to separate vehicle and pedestrian flows? • Are pedestrian facilities suitable for night use? • Is there adequate separation distance between vehicular traffic and pedestrians on footways • Is there an adequate number of pedestrian crossings along the route? • At crossing points is fencing oriented so pedestrians face oncoming traffic? • Is there adequate provision for older people the elderly, older people, people with disability the disabled, people with disability, children, wheelchairs, and baby carriages? (for example, holding rails, kerb and median crossings, ramps)

Publication	Section	Current text	Recommended text	Reason for recommendation
				<ul style="list-style-type: none"> • Are adequate handrails provided where necessary? (for example, on bridges, ramps) • Is signing about pedestrians near schools adequate and effective? • Is signing about pedestrians near any hospital adequate and effective? • Is the distance from the stop line to a cross walk sufficient for truck drivers to see pedestrians?

Publication	Section	Current text	Recommended text	Reason for recommendation
AGRS Part 7 Road Safety Strategy and Management	4.3 Developing a road safety strategy	New text following the final dot point.	<p>When developing a road safety strategy, it is vital to recognise that the transport system serves not only vehicles but also people moving on foot, on bicycles, mobility devices, and via public transport.</p> <p>Pedestrians, in particular, are among the most vulnerable road users and often experience the greatest risk in environments predominantly designed for vehicle flow. A comprehensive strategy must therefore ensure that pedestrian safety is embedded in all phases of planning, design, and implementation. This includes providing safe, direct, and accessible walking routes; reducing vehicle speeds in areas of high pedestrian activity and local neighbourhood streets; and integrating pedestrian safety into land use and urban design.</p> <p>Where pedestrians cross over the carriageway, a 30 km/h aspirational operating speed should be adopted.</p> <p>Consideration of pedestrian infrastructure should be elevated from an ancillary element to a core component of road safety planning, ensuring all people – regardless of age, ability, or location – can travel safely on foot.</p> <p>Neglecting non-vehicular modes risks undermining the equity, effectiveness, and sustainability of any strategy aiming to achieve zero harm.</p>	<ul style="list-style-type: none"> As mentioned, there is not a significant amount of pedestrian literature within this publication. This additional text ensures that practitioners developing road safety strategies are not thinking <u>only</u> about vehicles – but all transport users.

5. Opportunities for Improvement

The gaps identified in Sections 3.3.2 and broadly discussed in Section 2 could be addressed through a variety of methods, including the development and application of improved guidance. As part of this research report, the authors have developed guide-ready materials to close these gaps which can be found in Section 4.

The other opportunities for improvement pertaining to pedestrian safety (discovered during the literature review and/or noted by stakeholders) are not covered within the scope of this project. However, for due-diligence, these other opportunities for improvements have been collated below:

- Austroads has published ‘Cycling Aspects of Austroads Guides’ which contains information that relates to the planning, design and traffic management of cycling facilities and is sourced from Austroads Guides, primarily the Guide to Road Design, the Guide to Traffic Management and the Guide to Road Safety.

There is an opportunity to develop a similar ‘Pedestrian Aspects of Austroads Guides.’ Having all pedestrian planning and design related materials stored in one publication would enable more streamlined sourcing and cross-referencing.

- As previously discussed, the Austroads *Guide to Road Design Part 6A: Paths for Walking and Cycling* is a primary resource for practitioners designing pedestrian facilities.

There is an opportunity to split this publication into ‘Paths for Walking’ and ‘Paths for Cycling’. This suggestion would allow practitioners to source information exclusively for pedestrians within the one publication – and not be overloaded with information about other transport modes (cyclists). The authors acknowledge that there may be a disbenefit in this approach of considering road users in isolation, rather than considering all users in an integrated manner.

- As mentioned in Sections 3.3.1 and 3.3.2, evaluating the safety performance of pedestrian projects is not well supported by existing literature. This is a significant gap in the project’s lifecycle. There is an opportunity to develop a robust evaluation framework so practitioners can:

- measure the benefits associated with pedestrian facilities to justify funding
- predict the safety (and other) benefits associated with pedestrian treatments
- conduct pre- and post- opening studies in a consistent, meaningful manner

This proposed framework could also encourage industry to develop/enhance pedestrian modelling tools and application. The authors note that AITPM have developed, ‘Pedestrian Modelling Guidelines’ which would be a useful reference in this space. During the stakeholder consultation, this reference was not sighted by practitioners indicating it has perhaps not been adopted widely within industry.

- *AGTM Part 3 Transport Study and Analysis Methods* Table E.1: Ways to assess future demand for walking is sourced from NZ Transport Agency 2009, Pedestrian planning and design guide, NZTA, Wellington, New Zealand. There is a more recent source for the information NZTA’s Research Report 676. This source notes that “estimating latent demand for walking and cycling is an emerging science in New Zealand, with limited research into the application and effectiveness of the different methods employed around the country over the past decade.” An additional opportunity for consideration is undertaking further research and development of more reliable ways to estimate latent demand for walking in order to improving demand forecasting for walking. The outputs of this could then be used to inform future updates to the *AGTM Part 3 Transport Study and Analysis Methods*. It would also be beneficial to articulate when it is more appropriate to attempt to estimate latent demand or design for the long-term Movement and Place classification.
- There is an opportunity to investigate emerging areas of conflict, particularly pedestrians vs e-micromobility devices.

- As discussed in Section 2.3.2, signalised T-intersections typically have crosswalks on the left side of the terminating road. There is an opportunity to further explore when practitioners should investigate crosswalks on both sides of the intersection. While having crosswalks on both sides would certainly improve pedestrian desire lines and connectivity objectives, adopting this arrangement introduces new conflict point(s) between right turning vehicles and pedestrians. Typically, these right turn movements are at higher speeds which should form part of the discussion. In contrast, without a three-way crossing, pedestrians may be overexposed to traffic due to having to cross two legs of traffic instead of just one (depending on their direction of approach).
- Some Australian jurisdictions have set the target of zero road trauma by 2050 as discussed in the Austroads Webinar WEB-ZRT-24 'Is Zero Road Trauma Possible?' All Australian jurisdictions signed up to the National Road Safety Strategy 2021-2030 with the Vision zero by 2050.

The Wramborg Model, which is widely referenced in Austroads publications, stipulates that at a vehicle impact speed of 30 km/h, there is a 10% chance a pedestrian will be killed. Yet this 30 km/h impact speed is still used as the target/aspirational operating speed in pedestrianised environments. Additionally, if Serious Injuries are to be considered, even lower operating speeds would be required to achieve the 'target of zero road trauma by 2050'.

To this end, there is an opportunity to investigate and articulate the safe speed threshold for pedestrianised areas and advocate for a speed **below** 30 km/h.

- In addition to the above, the authors acknowledge that the way speed zoning is applied and managed across jurisdictions could be more aligned with pedestrian safety outcomes. This includes the review of our urban default speed zones. The authors understand there are currently Austroads projects within the speed realm and have not made recommendations on this topic within this report.
- There is an opportunity to re-develop the AGTM Part 7 and AGTM Part 12 with the Movement and Place framework and Safe System principles embedded. Pedestrian safety is discussed throughout the Guides, however, could be more encompassing and articulate pedestrian behaviours, demographics and the vulnerability of pedestrians. Key to this re-development would be extending the definition and considerations of the term 'traffic' to include the timely and safe management and throughput of pedestrian traffic. The authors contend that the term 'traffic' has historically been vehicular-focused – yet this term should encompass people movement (not just people in vehicles). This approach would be consistent with the term 'movement' within the Movement and Place framework. Moreover, the long-term Movement and Place classification of an environment should be driving the design and development of pedestrian facilities.
- In combination with the above, Movement and Place guidance could also be embedded into the AGTM Part 1. The below is an excerpt from AGTM Part 1, Section 4.3:

Each particular situation or area will have its own set of issues to be addressed and its own set of specific objectives. Detailed objectives can sometimes be in conflict with one another and compromise is often needed.

It would be beneficial for practitioners to have guidance around how this conflict can and should be managed. No doubt, reference to the Movement and Place framework would be a valuable resource to manage the identified conflict.

- As mentioned in Section 2.3.1, there is not a significant amount of literature pertaining to pedestrians within the AGRS *Part 5 Safe Vehicles*. There is an opportunity to provide greater clarity to Austroads members what matters most in relation to vehicle design and safety features to advance road safety – for instance the pedestrian safety implications of:
 - different vehicle characteristics of size, shape and mass
 - vehicle safety features (technologies) including their uptake in the vehicle fleet over time, and also how they are used in practice, and their effectiveness in pedestrian trauma reduction
 - the limitations of vehicle safety features (technologies) in reducing specific types of pedestrian trauma
 - the effects of window tinting and films. The authors have sighted unpublished material that suggests the application of window tinting and films within Australia may fall below contemporary standards set by other international jurisdictions. Additional research within this space is required to understand the Australasian and international standards and possible impacts to pedestrian (and more broadly road) safety.
- Some jurisdictions require high-levels of street lighting in order to install raised pedestrian priority crossings. While the reasoning for this is sound, some practitioners view the street lighting levels as onerous and this has ultimately impacted on the implementation of raised pedestrian priority crossings. There is an opportunity to investigate and document an appropriate lighting level for raised pedestrian priority crossings, and a framework to risk-rate different lighting conditions vs different treatments.
 - of particular interest to practitioners, is it safer to install a raised pedestrian priority with below-standard lighting levels or no pedestrian treatment?
 - the authors acknowledge that this area requires additional research.
- The authors have recommended for inclusion in AGRD *Part 7: New and Emerging Treatments* reference to raised pedestrian-actuated traffic signals. During discussions with stakeholders, the value of providing detailed case studies was clearly expressed. The authors do not have detailed design information nor evaluation of raised POSs and recommend that further investigation is undertaken to provide more information within this section. Additional examples of pedestrian emerging treatments should also be investigated and included.
- Additional study and research into pedestrian safety in rural/remote areas is required. As noted in *Keeping People Safe When Walking – Stream 2: Understanding Inequity in Pedestrian Safety Outcomes* (Austroads 2026), First Nations people are disproportionately affected by road trauma. Meaningful change requires addressing these safety challenges in ways that respond both to the infrastructure-related barriers and the lived experiences of First Nations peoples.
- Pedestrian countdown timers are discussed in AGTM Part 9 and are noted as able “to create a more pedestrian friendly environment by giving pedestrians more information and greater awareness of their ability to cross the road.” This statement appears to be from 2013. The authors recommend that further research is undertaken to define the benefits and/or disbenefits of this technology.

6. Conclusions

This project aims to support Austroads members in enhancing pedestrian safety practices by improving transport guidance, methodologies, and planning approaches. The research identifies opportunities to strengthen a systems-based approach to pedestrian safety – spanning planning, intervention selection and design, evaluation, and outcome monitoring.

To inform this work, the methodology focused on understanding the experiences of practitioners across Australasia in developing pedestrian safety treatments. A literature review was conducted to compile national-level resources and compare them with jurisdiction-specific guidelines.

A significant component of the project involved direct engagement with practitioners. A comprehensive stakeholder consultation process was undertaken to validate current resources and identify gaps in the existing guidance. During this process, practitioners also contributed additional guidance documents, which were subsequently included in the literature review.

Insights from the literature review and stakeholder engagement informed a series of recommendations to update, strengthen, or in some cases, retire elements of existing transport guidance.

The authors acknowledge that these recommendations will not eliminate the risk of vehicle-to-pedestrian crashes and also concede there is additional research and work to be undertaken to achieve our vision of zero harm on the transport network. Nonetheless, the recommendations are a step-towards a more Safe System aligned transport network. This work highlights the importance of viewing the transport system through a human-centred lens rather than a vehicle-centric one. Ultimately, improving pedestrian safety outcomes relies on prioritising pedestrian movement and acknowledging the bio-mechanical limits of the human body.

References

Austroads publications

- Austroads (n.d.) [Pedestrian Facility Selection Tool](#), Austroads website, accessed 17 January 2025.
- Austroads (2015) *Guide to Road Design Part 6B: Roadside Environment*, 2.1 edn, Austroads, Sydney, NSW.
- Austroads (2015a) *Improving the Performance of Safe System Infrastructure: Final Report*, AP-R498-15, Austroads, Sydney, NSW.
- Austroads (2016) *Safe System Assessment Framework*, AP-R509-16, Austroads, Sydney, NSW.
- Austroads (2020a) *Guide to Traffic Management Part 1: Introduction to the Guide to Traffic Management*, 4.0 edn, Austroads, Sydney, NSW.
- Austroads (2020b) *Guide to Traffic Management Part 2: Traffic Theory Concepts*, 3.0 edn, Austroads, Sydney, NSW.
- Austroads (2020c) *Guide to Traffic Management Part 3: Transport Study and Analysis Methods*, 4.0 edn, Austroads, Sydney, NSW.
- Austroads (2020d) *Guide to Traffic Management Part 4: Network Management Strategies*, 5.0 edn, Austroads, Sydney, NSW.
- Austroads (2020e) *Guide to Traffic Management Part 5: Link Management*, 4.0 edn, Austroads, Sydney, NSW.
- Austroads (2020f) *Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management*, 4.0 edn, Austroads, Sydney, NSW.
- Austroads (2020g) *Guide to Traffic Management Part 7: Activity Centre Transport Management*, 3.0 edn, Austroads, Sydney, NSW.
- Austroads (2020h) *Guide to Traffic Management Part 8: Local Street Management*, 3.0 edn, Austroads, Sydney, NSW.
- Austroads (2020i) *Guide to Traffic Management Part 9: Transport Control Systems – Strategies and Operations*, 4.0 edn, Austroads, Sydney, NSW.
- Austroads (2020j) *Guide to Traffic Management Part 10: Transport Control – Types of Devices*, 3.0 edn, Austroads, Sydney, NSW.
- Austroads (2020k) *Guide to Traffic Management Part 11: Parking Management Techniques*, 3.0 edn, Austroads, Sydney, NSW.
- Austroads (2020l) *Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments*, 3.0 edn, Austroads, Sydney, NSW.
- Austroads (2020m) *Guide to Traffic Management Part 13: Safe System Approach to Transport Management*, 4.0 edn, Austroads, Sydney, NSW.

- Austrroads (2020n) *Integrating Safe System with Movement and Place for Vulnerable Road Users*, AP-R611-20, Austrroads, Sydney, NSW.
- Austrroads (2021) *Guide to Road Design Part 6A: Paths for Walking and Cycling*, 2.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2021a) *Guide to Road Design Part 1: Objectives of Road Design*, 5.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2021b) *Guide to Road Design Part 3: Geometric Design*, 3.4 edn, Austrroads, Sydney, NSW.
- Austrroads (2021c) *Guide to Road Design Part 7: New and Emerging Treatments*, 1.0 edn Austrroads, Sydney, NSW.
- Austrroads (2021d) *Guide to Road Safety Part 1: Introduction and the Safe System*, 1.0 edn, Austrroads, Sydney, NSW.
- Austrroads (2022) *Guide to Road Safety Part 6: Road Safety Audit*, 6.0 edn, Austrroads, Sydney, NSW.
- Austrroads (2023a) *Guide to Road Design Part 4: Intersections and Crossings: General*, 2.2 edn, Austrroads, Sydney, NSW.
- Austrroads (2023b) *Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*, 3.2 edn, Austrroads, Sydney, NSW.
- Austrroads (2023c) *Guide to Road Design Part 4B: Roundabouts*, 3.2 edn, Austrroads, Sydney, NSW.
- Austrroads (2023d) *Guide to Road Design Part 4C: Interchanges*, 2.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2023e) *Guide to Road Design Part 5: Drainage: General and Hydrology Considerations*, 4.0 edn, Austrroads, Sydney, NSW.
- Austrroads (2023f) *Guide to Road Design Part 5A: Drainage: Road Surface, Networks, Basins and Subsurface*, 2.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2023g) *Guide to Road Design Part 5B: Drainage: Open Channels, Culverts and Floodway Crossings*, 1.2 edn, Austrroads, Sydney, NSW.
- Austrroads (2024a) *Guide to Road Design Part 6: Roadside Design, Safety and Barriers*, 4.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2024b) *Guide to Road Safety Part 2: Safe Roads*, 2.0 edn, Austrroads, Sydney, NSW.
- Austrroads (2024c) *Guide to Road Safety Part 3: Safe Speed*, 1.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2024d) *Guide to Road Safety Part 4: Safe People*, 1.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2024e) *Guide to Road Safety Part 5: Safe Vehicles*, 1.1 edn, Austrroads, Sydney, NSW.
- Austrroads (2024f) *Guide to Road Safety Part 7: Road Safety Strategy and Management*, 2.0 edn, Austrroads, Sydney, NSW.
- Austrroads (2024g) *Prioritising Active Transport*, AP-R711-24, Austrroads, Sydney, NSW.
- Austrroads (2025a) *Keeping People Safe When Walking – Stream 1: Literature Review*, AP-R728-25, Austrroads, Sydney, NSW.

Austrroads (2025b) *Keeping People Safe When Walking – Stream 1: Pedestrian Data Improvement Recommendations*, AP-R729-25, Austrroads, Sydney, NSW.

Austrroads (2025c) *Keeping People Safe When Walking – Stream 1: Pedestrian Safety Problem and Project Methodology*, AP-R727-25, Austrroads, Sydney, NSW.

Austrroads (2025d) *Keeping People Safe When Walking – Stream 1: Recommended Pedestrian Safety Interventions*, AP-R730-25, Austrroads, Sydney, NSW.

Austrroads (2026) *Keeping People Safe When Walking – Stream 2: Understanding Inequity in Pedestrian Safety Outcomes*, AP-R755-26, Austrroads, Sydney, NSW.

Jurisdictional supplements

Department of Transport (Vic) (2012) *Supplement to Austrroads Guide to Road Design Part 4: Intersections and Crossings: General (Version 2.2)*, Department of Transport, Melbourne, VIC.

Department of Transport (Vic) (2021a) *Supplement to Austrroads Guide to Road Design Part 1: Objectives of Road Design (Version 3.0)*, Department of Transport, Melbourne, VIC.

Department of Transport (Vic) (2021b) *Supplement to Austrroads Guide to Road Design Part 3: Geometric Design (Version 5.0)*, Department of Transport, Melbourne, VIC.

Main Roads Western Australia (2021) *Supplement to Austrroads Guide to Road Design – Part 1: Objectives of Road Design*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023a) *Supplement to Austrroads Guide to Road Design – Part 4: Intersections and Crossings: General*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023b) *Supplement to Austrroads Guide to Road Design – Part 4A: Unsignalised and Signalised Intersections*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023c) *Supplement to Austrroads Guide to Road Design – Part 4C: Interchanges*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023d) *Main Roads Supplement to the Austrroads Guide to Traffic Management Part 1: Introduction to the Guide to Traffic Management*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023e) *Main Roads Supplement to Austrroads Guide to Traffic Management Part 2: Traffic Theory Concepts*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023f) *Main Roads Supplement to Austrroads Guide to Traffic Management Part 3: Transport Study and Analysis Methods*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023g) *Main Roads Supplement to Austrroads Guide to Traffic Management Part 4: Network Management Strategies*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023h) *Main Roads Supplement to Austrroads Guide to Traffic Management Part 5: Link Management*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023i) *Main Roads Supplement to the Austrroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings Management*, Main Roads Western Australia, Perth, WA.

Main Roads Western Australia (2023j) *Main Roads Supplement to Austrroads Guide to Traffic Management Part 7: Activity Centre Transport Management*, Main Roads Western Australia, Perth, WA.

- Main Roads Western Australia (2023k) *Main Roads Supplement to Austroads Guide to Traffic Management Part 8: Local Street Management*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2023l) *Main Roads Supplement to Austroads Guide to Traffic Management Part 10: Transport Control – Types of Devices*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2023m) *Main Roads Supplement to Austroads Guide to Traffic Management Part 11: Parking Management Techniques*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2023n) *Main Roads Supplement to Austroads Guide to Traffic Management Part 13: Safe System Approach to Transport Management*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024a) *Supplement to Austroads Guide to Road Design – Part 3: Geometric Design*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024b) *Supplement to Austroads Guide to Road Design – Part 4B: Roundabouts*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024c) *Supplement to Austroads Guide to Road Design – Part 5: Drainage – General and Hydrology Considerations*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024d) *Supplement to Austroads Guide to Road Design – Part 5A: Drainage – Road Surface, Networks, Basins and Subsurface*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024e) *Supplement to Austroads Guide to Road Design – Part 5B: Drainage – Open Channels, Culverts and Floodways*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024f) *Supplement to Austroads Guide to Road Design – Part 6: Roadside Design, Safety, and Barriers*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024g) *Supplement to Austroads Guide to Road Design – Part 6A: Paths for Walking and Cycling*, Main Roads Western Australia, Perth, WA.
- Main Roads Western Australia (2024h) *Supplement to Austroads Guide to Road Design – Part 6B: Roadside Environment*, Main Roads Western Australia, Perth, WA.
- Queensland Department of Transport and Main Roads (2021a) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 1: Objectives of Road Design*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2021b) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 6B: Roadside Environment*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2021c) *Queensland Guide to Traffic Management Part 1: Introduction to the Guide to Traffic Management*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2021d) *Queensland Guide to Traffic Management Part 2: Traffic Theory Concepts*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2021e) *Queensland Guide to Traffic Management Part 3: Transport Study and Analysis Methods*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2021f) *Queensland Guide to Traffic Management Part 10: Transport Control – Types of Devices*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

- Queensland Department of Transport and Main Roads (2021g) *Queensland Guide to Traffic Management Part 12: Integrated Transport Assessments for Developments*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2021h) *Queensland Guide to Traffic Management Part 13: Safe System Approach to Traffic Management*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022a) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 7: New and Emerging Treatments*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022b) *Queensland Guide to Road Safety Part 1: Introduction and the Safe System*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022c) *Queensland Guide to Road Safety Part 2: Safe Roads*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022d) *Queensland Guide to Road Safety Part 3: Safe Speed*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022e) *Queensland Guide to Road Safety Part 4: Safe People*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022f) *Queensland Guide to Road Safety Part 5: Safe Vehicles*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022g) *Queensland Guide to Road Safety Part 6: Road Safety Audit*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2022h) *Queensland Guide to Road Safety Part 7: Road Safety Strategy and Management*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2023a) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 3: Geometric Design*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024a) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 4: Intersections and Crossings: General*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024b) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024c) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 4B: Roundabouts*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024d) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 4C: Interchanges*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024e) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 5: Drainage – General and Hydrology Considerations*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

- Queensland Department of Transport and Main Roads (2024f) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 5A: Drainage – Road Surface, Networks, Basins and Subsurface*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024g) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 5B: Drainage – Open Channels, Culverts and Floodway Crossings*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024h) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety, and Barriers*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024i) *Road Planning and Design Manual – Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024j) *Queensland Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings Management*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024k) *Queensland Guide to Traffic Management Part 7: Activity Centre Transport Management*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Queensland Department of Transport and Main Roads (2024l) *Queensland Guide to Traffic Management Part 9: Transport Control Systems – Strategies and Operations*, Queensland Department of Transport and Main Roads, Brisbane, QLD.
- Transport for NSW (2011a) *Austroads Supplement for Guide to Traffic Management Part 1: Introduction to Traffic Management*, Version 1.1, Transport for NSW, Sydney, NSW.
- Transport for NSW (2011b) *Austroads Supplement for Guide to Traffic Management Part 2: Traffic Theory Concepts*, Version 2.0, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013a) *Austroads Supplement for Guide to Traffic Management Part 3: Traffic Studies and Analysis (2013)*, Version 2.0, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013b) *Austroads Supplement for Guide to Traffic Management Part 4: Network Management (2009)*, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013c) *Austroads Supplement for Guide to Traffic Management Part 5: Link Management*, Version 2.0, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013d) *Austroads Supplement for Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings (2013)*, Version 2.0, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013e) *Austroads Supplement for Guide to Traffic Management Part 7: Traffic Management in Activity Centres (2009)*, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013f) *Austroads Supplement for Guide to Traffic Management Part 8: Local Area Traffic Management (2008)*, Version 2.1, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013g) *Austroads Supplement for Guide to Traffic Management Part 9: Traffic Operations (2009)*, Version 2.0, Transport for NSW, Sydney, NSW.

- Transport for NSW (2013h) *Austroads Supplement for Guide to Traffic Management Part 11: Parking Management Techniques (2009)*, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013i) *Austroads Supplement for Guide to Traffic Management Part 12: Traffic Impacts of Developments (2009)*, Transport for NSW, Sydney, NSW.
- Transport for NSW (2013j) *Austroads Supplement for Guide to Traffic Management Part 13: Road Environment Safety (2009)*, Transport for NSW, Sydney, NSW.
- Transport for NSW (2017) *Austroads Supplement for Guide to Traffic Management Part 10: Traffic Control and Communication Devices (2016)*, Version 3.0, Transport for NSW, Sydney, NSW.
- VicRoads (2011a) *Supplement to Austroads Guide to Road Design Part 4A: Signalised and Unsignalised Intersections (Rev. 2.0)*, VicRoads, Melbourne, VIC.
- VicRoads (2011b) *Supplement to Austroads Guide to Road Design Part 4B: Roundabouts (Rev. 2.0)*, VicRoads, Melbourne, VIC.
- VicRoads (2011c) *Supplement to Austroads Guide to Road Design Part 6B: Roadside Environment (Rev. 2.0)*, VicRoads, Melbourne, VIC.
- VicRoads (2013) *Supplement to Austroads Guide to Road Design Part 5: Drainage – General & Hydrology Considerations, Part 5A: Road Surface, Networks, Basins & Subsurface, Part 5B: Open Channels, Culverts & Floodways (Rev. 1.0)*, VicRoads, Melbourne, VIC.
- VicRoads (2015a) *Supplement to Austroads Guide to Traffic Management Part 1: Introduction to Traffic Management (2015)*, VicRoads, Melbourne, VIC.
- VicRoads (2015b) *Supplement to Austroads Guide to Traffic Management Part 3: Traffic Studies and Analysis (2013)*, Edition 1, VicRoads, Melbourne, VIC.
- VicRoads (2015c) *VicRoads Supplement to Austroads Guide to Traffic Management Part 4: Network Management Strategies*, VicRoads, Melbourne, VIC.
- VicRoads (2015d) *Supplement to Austroads Guide to Traffic Management Part 5: Link Management*, VicRoads, Melbourne, VIC.
- VicRoads (2015e) *Supplement to Austroads Guide to Traffic Management Part 6: Intersections, Interchanges, and Crossings*, VicRoads, Melbourne, VIC.
- VicRoads (2015f) *Supplement to Austroads Guide to Traffic Management Part 7: Traffic Management in Activity Centres (2015)*, VicRoads, Melbourne, VIC.
- VicRoads (2015g) *Supplement to Austroads Guide to Traffic Management Part 8: Local Area Traffic Management*, VicRoads, Melbourne, VIC.
- VicRoads (2015h) *Supplement to Austroads Guide to Traffic Management Part 11: Parking Management Techniques (2008)*, VicRoads, Melbourne, VIC.
- VicRoads (2015i) *Supplement to Austroads Guide to Traffic Management Part 12: Traffic Impacts of Developments (2009)*, VicRoads, Melbourne, VIC.
- VicRoads (2015j) *Supplement to Austroads Guide to Traffic Management Part 13: Road Environment Safety (2015)*, VicRoads, Melbourne, VIC.
- VicRoads (2018a) *Supplement to Austroads Guide to Traffic Management Part 2: Traffic Theory Concepts*, Edition 2, VicRoads, Melbourne, VIC.

VicRoads (2018b) *Safe System Assessment Guidelines*, Version 1.0, VicRoads, Melbourne, VIC.

VicRoads (2020) *Supplement to Austroads Guide to Road Design Part 4C: Interchanges (Version 3.0)*, VicRoads, Melbourne, VIC.

VicRoads (2022) *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling (Version 3.0)*, VicRoads, Melbourne, VIC.

VicRoads (2023a) *Supplement to Austroads Guide to Traffic Management Part 9: Transport Control Systems – Strategies and Operations (2020)*, Version 2.0, Department of Transport and Planning, Melbourne, VIC.

VicRoads (2023b) *Supplement to Austroads Guide to Traffic Management Part 10: Transport Control – Types of Devices (2020)*, Version 2.0, Department of Transport and Planning, Melbourne, VIC.

VicRoads (2024) *Supplement to Austroads Guide to Road Design Part 6: Roadside Design, Safety, and Barriers (Version 6.0)*, VicRoads, Melbourne, VIC.

Other sources

AITPM (2024) *AITPM Pedestrian Guidelines*, Version 2, Australian Institute of Traffic Planning and Management, Lutwyche, QLD.

Commonwealth of Australia (2023a) *Australian Transport Assessment and Planning Guidelines Part M4: Active Travel*, Australian Government, Canberra, ACT.

Commonwealth of Australia (2023b) *Australian Transport Assessment and Planning Guidelines Part M4: Active Travel – Background Report*, Australian Government, Canberra, ACT.

Department of Transport and Planning (2023) *Cycling Infrastructure Adjacent to Bus and Tram Stops*, Version 1.0, Department of Transport and Planning, Melbourne VIC.

NZ Transport Agency Waka Kotahi (n.d.) [Pedestrian Network Guidance](#), accessed 17 January 2025.

NZ Transport Agency Waka Kotahi (2021) *Path Behaviour Markings Guidance Note*, NZ Transport Agency Waka Kotahi, Wellington, NZ.

NZ Transport Agency Waka Kotahi (2024) *Monetised Benefits and Costs Manual*, Version 1.7.1, NZ Transport Agency, Wellington, NZ.

Queensland Department of Transport and Main Roads (2023b) *Guideline Smart pedestrian crossings*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

Queensland Department of Transport and Main Roads (2024m) *Queensland Road Safety Technical User Volumes (QRSTUV) Guide to Safe System Assessment*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

Queensland Department of Transport and Main Roads (2022i) *Queensland Road Safety Technical User Volumes (QRSTUV) Guide to Schools*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

Queensland Department of Transport and Main Roads (2025) *Queensland Road Safety Technical User Volumes (QRSTUV) Guide to Speed Management*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

Queensland Department of Transport and Main Roads (2019) *Technical Guideline Raised priority crossings for pedestrians and cycle paths*, Queensland Department of Transport and Main Roads, Brisbane, QLD.

Transport for NSW (2023) *Pedestrian Crossing Guideline*, TS 00043, Transport for NSW, Sydney, NSW.

Transport for NSW (2020) *Walking Space Guide*, TS 01589, Transport for NSW, Sydney, NSW.

VicRoads (2016) *Help Phones Policy*, Revision 1.0, VicRoads, Melbourne, VIC.

Appendix A Figures Referenced in Section 4

Figure A.1: NZTA PNG Walking in New Zealand

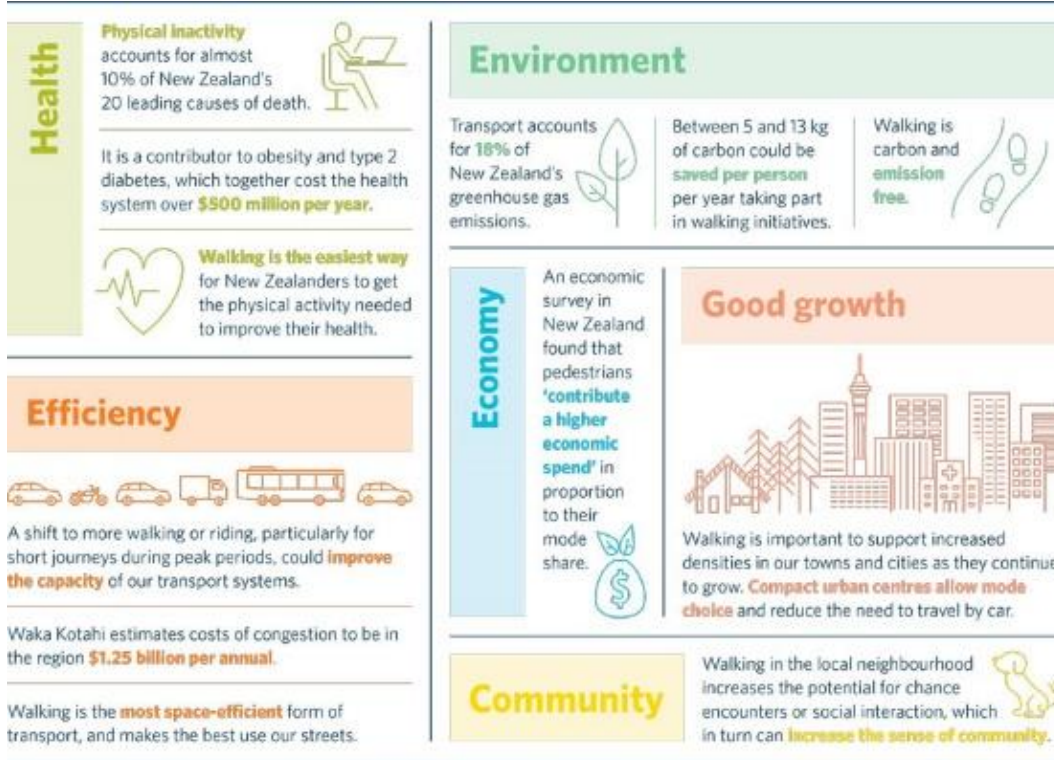
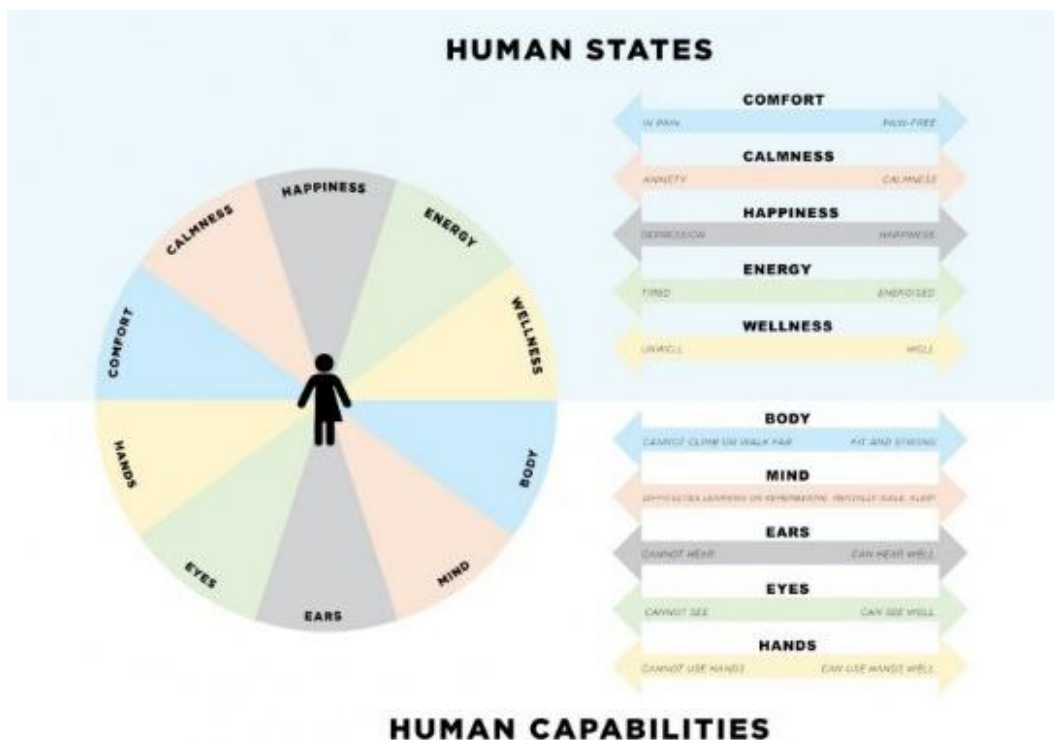


Figure A.2: NZTA PNG Pedestrian Characteristics





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