South Australia's

Active Travel Design Guide

September 2024

Government of South Australia
Department for Infrastructure and Transport

Build. Move. Connect.

We acknowledge the Traditional Custodians of the Country throughout South Australia and recognise their continuing connection to land and waters.

We pay our respects to the diversity of cultures, significance of contributions and to Elders past, present and emerging.

Disclaimer

Version details

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1. About this guide

1.1 Foreword

The Active Travel Design Guide (the Guide) offers design principles tailored for active travel and green infrastructure development in South Australia. These principles are founded upon best practices, Australian standards, and local design conventions for creating vibrant, cycling and pedestrian-friendly streets.

This Guide offers a basic framework for thinking about design. It uses a street typology matrix that considers the street context and functional needs of movement and local destinations. With these needs in mind, the Guide offers advice and suggestions on different design options.

This Guide should be used alongside Australian and local standards to ensure comprehensive and compliant design outcomes.

> This Guide aims to enhance design outcomes for people walking and wheeling, simplifying the process of designing for active travel and promoting uniformity in outcomes across South Australia.

This Guide assists designers involved in creating solutions for active travel, and is applicable to roads maintained by both state and local governments.

Designing greener streets that encourage active travel brings many benefits for public health and the environment and enhances the quality of life of people living, working and studying in, and visiting, South Australia's cities and communities.

King William Street, Unley Park

1.2 Key terms: walking, wheeling and micromobility

This Guide uses the terms 'people walking', 'people wheeling' and 'micromobility'. These terms are defined below, according to Austroads' 2013 Guide to Traffic Management Part 4: Network Management.

People walking refers to the act of personal movement in a way that captures different users of different abilities, including but not limited to walking on foot and other forms of movement as defined in Rule 18 of the Australian Road Rules:

- 'Who is a pedestrian –
  a. a person driving a motorised wheelchair that cannot travel at over 10 kilometres per hour (on level ground); and
  b. a person in a non-motorised wheelchair; and
  c. a person pushing a motorised or non-motorised wheelchair; and
  d. a person in or on a wheeled recreational device or wheeled toy.'

'Wheeled recreational device' and 'wheeled toy' are defined in the Dictionary section of the Australian Road Rules as follows:

- 'Wheeled recreational device means a wheeled device, built to transport a person, propelled by human power or gravity, and ordinarily used for recreation or play, and
  a. includes rollerblades, rollerskates, a skateboard, scooter, unicycle or similar wheeled device; but
  b. does not include a golf buggy, pram, stroller or trolley, a motor-assisted device other than a motorised scooter (whether or not the motor is operating), or a bicycle, wheelchair or wheeled toy.

Wheeled toy means a child's pedal car, scooter (other than a motorised scooter) or tricycle or a similar toy, but only when it is being used only by a child who is under 12 years old.'

This definition acknowledges that walking is not solely a bipedal activity but includes all methods by which people move through spaces, ensuring accessibility and mobility for everyone, regardless of physical abilities.

People wheeling refers to the act of using a wheeled device for personal transportation or mobility. This encompasses a variety of devices used by individuals to navigate cycle lanes and cycle paths, as defined in the Dictionary section of the Australian Road Rules under the term 'Bicycle':

- 'A vehicle with 2 or more wheels that is built to be propelled by human power through a belt, chain or gears (whether or not it has an auxiliary motor), and—
  a. includes a pedicab, penny-farthing and tricycle; and
  b. includes a power assisted pedal cycle (within the meaning of vehicle standards determined under the Motor Vehicle Standards Act 1989 of the Commonwealth); but
  c. does not include a wheelchair, wheeled recreational device, wheeled toy, or any vehicle (other than a vehicle referred to in paragraph (b)) with an auxiliary motor capable of generating a power output over 200 watts (whether or not the motor is operating).'

Micromobility refers to the use of non-car modes for short urban trips. These lightweight, often electric or human-powered vehicles — such as bicycles, electric scooters or e-bikes — are designed for individual use. Over the past decade, shared micromobility has gained prominence, with private firms and local authorities offering lightweight devices for shared use in communities or urban areas. Accessible via short-term rentals facilitated by mobile apps, these vehicles provide convenient and eco-friendly transport over short distances.

According to earlier definitions, micromobility devices other than pedal cycles or e-bikes are classified as walking devices and are not permitted to use cycle lanes or paths. However, this regulation is currently under review independently in each Australian state. The legalisation of e-scooters on cycle lanes may be considered in future years.

1.3 Document structure

The Guide offers technical design recommendations for walking facilities, cycling facilities, intersections and street greening. Its organisation into distinct chapters facilitates the integration of recommended facilities for walking, wheeling and greening reflective of street context into one street cross-section. Given that intersections bring together all users, a chapter addresses the essential considerations for walking and wheeling connectivity.

These considerations link the street typology and the intensity of needs for all users in the street environment, as street typology and functional needs greatly affect design decisions. The Guide uses the Movement and Place approach, now part of South Australian transport policy, to understand the different ways people move through and use destinations along the streets in the state's cities and communities. A dedicated chapter provides guidance on determining the functional requirements for different types of transport using this approach.

This Guide is not intended to be exhaustive or to encompass all conceivable design scenarios. It is the first guide of its kind in South Australia and serves as an initial reference for designers, helping build consensus on fundamental considerations for green active streets. With this in mind, there exists an opportunity for the Guide to evolve with additional detail and information in the future, informed by feedback from the designers who use it.

In this document, the use of colour orange in design diagrams and illustrations highlights specific infrastructure elements considered in each chapter or section, without suggesting the use of orange paint for installation. Conversely, when the colour green is used in the design diagrams, it indicates that green pavement markings are applicable.

Concepts and context

2. Importance of designing green active streets
3. Strategic drivers
4. Movement and Place street types
5. Road safety and personal security

Design guidance

6. Basic dimensions
7. Walking facilities
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9. Intersections
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Figure 1. Structure of this Guide

2. Importance of designing green active streets

Designing greener streets that encourage active travel is crucial for several reasons:

Promoting walking, cycling and other active modes of transportation reduces reliance on fossil fuel-powered vehicles, decreasing air pollution and greenhouse gas emissions, contributing to improved air quality and combating the impacts of climate change

Promoting public health by encouraging physical activity reduces the risk of chronic diseases such as obesity, diabetes and heart disease

Creating pedestrian-friendly and cyclist-friendly streets enhances community connectivity, social interaction and neighborhood vitality, fostering a sense of belonging and wellbeing among residents

Prioritising active travel modes in street design reduces traffic congestion and noise pollution, making urban environments more pleasant and liveable for everyone.

Designing greener streets that encourage active travel not only benefits the environment and public health but also enhances the overall quality of life in cities and communities. According to the United States Environment Protection Agency, 'A green street provides multiple environmental, social, and economic benefits to communities. These benefits are realised by the entire community: individuals, families, local businesses, local governments and schools. Compared to traditional "grey" streets, green streets are more attractive, increase the safety and walkability of a community, and encourage and support the local economy.'[1]

Numerous studies have delved into the benefits of designing streets to increase walking, wheeling and greening. This section provides a concise summary of the benefits.

1. www.epa.gov/G3/benefits-green-street

Key benefits of green active streets

Health and wellbeing

Encourage more physical activity, contributing to a healthier community with reduced risk of obesity and chronic illness, and lower associated healthcare costs.

Increased activity, including walking and bicycle riding, improves mental wellbeing and decreases the risk of depression and anxiety.

Better access to green spaces, trees and higher aesthetic street environments improve community cohesion and liveability.

Environment

More people walking and cycling, reducing emissions and promoting transportation modes less dependent on carbon.

Lower air and noise pollution levels, particularly in urban areas, due to reduced vehicle emissions and greater pollutant trapping from vegetation.

- Greater potential for urban cooling, with less paved surfacing allowing for improved tree planting and greening, leading to a more comfortable microclimate.
- Improved stormwater runoff quality and better management of water flows.
- Integration of Water Sensitive Urban Design, which reduces the need for manual watering by providing passive irrigation and increasing groundwater recharge.
- Improved ecology and biodiversity outcomes, including urban habitat creation for animals, birds, and insects.
- Increased publicly available green and recreation space.

St Peters Street, St Peters

- Enhanced climate resilience by reducing greenhouse gas emissions and promoting sustainable transportation.
- Green investment, which increases environmental awareness.

Safety and security

- Increased passive surveillance, i.e., more eyes on streets and in neighbourhoods.
- Better safety by encouraging slower speeds and increasing the number and presence of cyclists and pedestrians on a street.
- Well-maintained and visually appealing streets that cultivate positive social conditions, discouraging crime and anti-social behaviour.

Social networking

- More opportunities for public life (meeting, sharing, communicating).
- Improved infrastructure for accessing local destinations by walking and wheeling allows people to interact socially and feel more connected with their local community.
- More walking and wheeling can foster higher levels of place attachment.
- Participation in greening projects or exposure to them promotes social interactions that aid in building and reinforcing social bonds.

Transport

- Reduces car dependence and enables lower-cost alternatives such as walking and bicycle riding.
- Creates opportunities for better use of road space due to higher transport efficiency and less need for car parking.
- Encourages people to walk and ride more, leading to less traffic and lower costs related to congestion.
- Decreased need or demand for car ownership (including households with multiple cars).
- Improved bicycle riding facilities and walkable streets can extend the catchments of existing public transport services.
- Infrastructure for green active travel facilities requires less concrete, and fewer barriers, signals and line markings to build and maintain, with associated savings.

Convenience and efficiency

- More predictable travel times for walking or cycling. Can also result in less unproductive time lost due to congestion.
- Walking or wheeling can be faster than driving for short trips, offering direct access to destinations and avoiding the need to find and walk to parking.

Economy

- Green active streets are visually more attractive to businesses and households, potentially leading to increased rateable property values.
- Street improvements can stimulate a local economy, generating private investment and positive socio-economic change.
- Commercial and shopping areas with good active travel accessibility and landscaping report higher retail sales.
- Higher spend of disposable income in the local economy from health and transport savings.
- Generate higher levels of productivity and job creation such as tourism, manufacturing, shared micromobility, local goods delivery and street vending.
- Urban cooling benefits can reduce building energy demand through reduced local temperatures and shading.
- Green infrastructure reduces pressure on existing urban stormwater management systems, lowering replacement and maintenance costs.

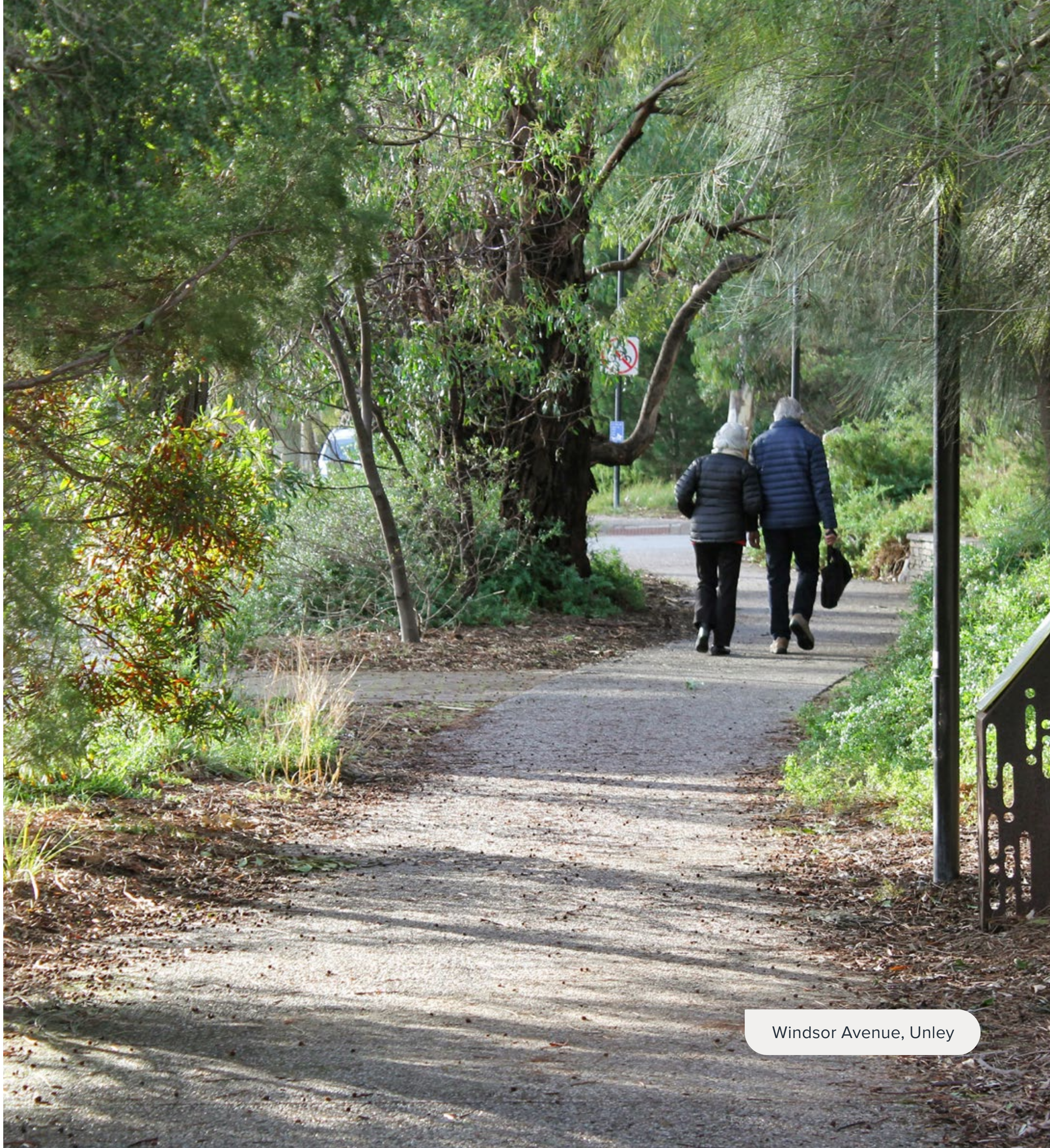
Wilberforce Walk, Forestville

Social equity and independence

- Green active streets and neighbourhoods encourage older people and non-drivers to be active, independent and self-sufficient.
- Safety-focused street designs that prioritise active travel empower children, fostering independence and self-sufficiency by allowing them to confidently undertake short journeys on foot, by bike, skateboard or scooter.
- Cycling or scootering are accessible modes of transportation with low entry and maintenance costs, fostering fairness in transportation.
- Improve equality of access to outdoor spaces and greener environments for recreation and play.

Improved communities

- More inviting neighbourhoods can have a stronger sense of civic pride.
- Providing capacity to enhance and reinforce local character.
- Landscaping provides shade and makes neighbourhoods look more attractive.



Windsor Avenue, Unley

3. Strategic intent

This Guide focuses on providing design guidance to achieve objectives such as increased greening and promoting active travel through street and road design in South Australia. Although there are various strategies already in place to support these objectives, the Guide does not specifically interlink these strategies because strategies are regularly updated, and referencing specific objectives can quickly become outdated. Instead, the Guide offers practical guidance on how to achieve greening and active travel objectives through effective design practices.

> By providing design guidance, this Guide aims to identify strategies and policies in South Australia that encourage greening, walking and wheeling.

The Guide provides a framework for future design rather than designate specific locations for priority projects or direct attention to gaps or deficiencies in current provision. It operates under the assumption that strategic documents, typically developed by state and Local governments, such as transport or network plans, will establish functional objectives for streets, roads and networks. Once this functional context is established, the Guide serves as a resource for obtaining design guidance for achieving best-practice outcomes.

Further insights into specific outcomes, directions, objectives, goals and/or targets for delivering green and active streets in South Australia can be found in Table 1 on page 8.

Prospect Road, Prospect

Strategy or policy document	Walking	Cycling	Greening	Amenity
20-Year State Infrastructure Strategy (under revision at the time of writing) (Infrastructure SA, 2020)	●	●		
The 30-Year Plan for Greater Adelaide (under revision at the time of writing) (Government of South Australia through the Department for Infrastructure and Transport, 2017)	●	●	●	●
State Planning Policies for South Australia (State Planning Commission, 2019)			●	●
(Draft) Cycling Strategy for South Australia 2022-2032 (Government of South Australia, 2022)		●		
South Australia Walking Strategy 2022-2032 (Government of South Australia, Heart Foundation and Wellbeing SA, 2022)	●			
South Australian Walking Strategy 2022-32 Action Plan 2022-2025 (Government of South Australia, Heart Foundation and Wellbeing SA, 2022)	●			
South Australia's Road Safety Strategy to 2031 (Government of South Australia, 2021)	●	●		
South Australia's Road Safety Action Plan 2023-2025 (Government of South Australia, 2023)	●	●		
State Public Health Plan 2019-2024 (Government of South Australia, 2019)	●	●	●	●
State Disability Inclusion Plan 2019-2023 (Government of South Australia, 2019)	●			
Statewide Trails Strategy 2023-2033 (Government of South Australia, 2023)	●	●		
South Australian Government Climate Change Actions (Government of South Australia, 2022)	●	●	●	
Green Infrastructure Commitment (Government of South Australia through the Department for Infrastructure and Transport, 2021)			●	
Water for Good: A plan to ensure our water future to 2050 (Government of South Australia, 2010)			●	
Water sensitive urban design: Creating more liveable and water sensitive cities in South Australia (Government of South Australia through the Department of Environment, Water and Natural Resources, 2013)			●	

Table 1. Strategic SA documents that inform this Guide's approach to implementing active travel initiatives

4. Movement and Place street types

The concept of Movement and Place (also referred to as Link and Place[1]) was developed to describe the natural tension between people using roads and streets to move through (Movement) and to access destinations (Place). Often, the Movement and Place functions compete for road space and signal priority (or priority of way). The Movement and Place concept aims to plan and design for both roles, to support all users now and in the future.

> Recognising the contention between the needs of Movement and Place users, and acknowledging their equal rights to use streets and roads, is pivotal in achieving a harmonious balance in planning and design. Establishing a clear understanding of the diverse needs of these functions within the network by defining a street type marks a crucial initial step. This approach paves the way for more balanced, safer and contextually sensitive solutions.

Historically, road design was optimised for car users, with Place-related needs overlooked, which resulted in road designs that offered much better conditions for car users than for people walking and wheeling. This discouraged active travel and local Place-related economic activity such as local cafes, shops, entertainment venues and service-related businesses. The Movement and Place concept aims to balance these needs with the need for car access and movement, addressing concerns in road planning and design.

1. *Link and Place: A Guide to Street Planning and Design* (Jones, Boujenko and Marshall, Local Transport Today, London, 2007)

Hutt Street, Adelaide

4.1 Movement and Place street classification

Central to the Movement and Place methodology is a two-part classification system, depicted as a matrix (Figure 2). The matrix helps establish how a road's Movement and Place aspects should be balanced when street management and design are being considered.

In categorising a street or its segment, 'Movement' and 'Place' are each given a designation between 1 and 5, according to the strategic importance of the road segment as a conduit for movement and as a destination.

The Movement and Place classification tool is a 5x5 matrix, in which a number '1' on each axis indicates that the Movement or Place function is of strategic priority, and '5' is of local priority. Each cell represents one of 25 street types, labelled from M1P1 in the top left corner and M5P5 in the bottom right corner.

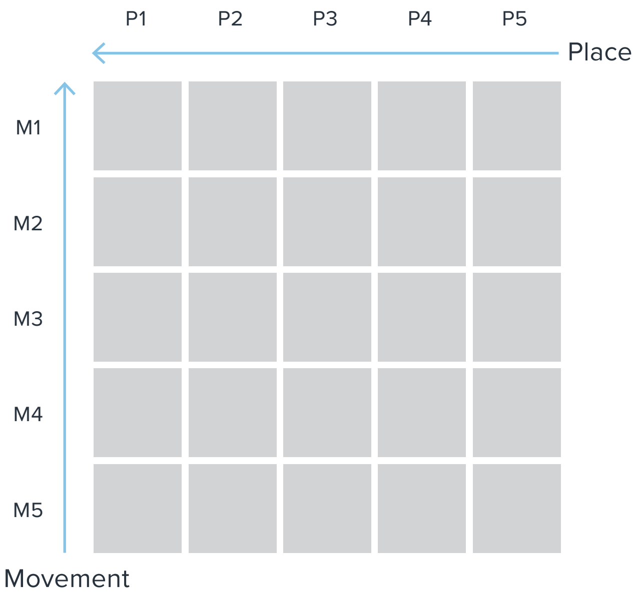


Figure 2. Movement and Place matrix

A road's Movement and Place designations can vary along its length. For many short suburban streets, the entire street will have the same 'M' and 'P' designations. An interstate highway may have the same 'M' and 'P' designations for most of its length, varying when it passes through a regional community. However, a major arterial route within a city may have many segments with different 'M' and 'P' designations within a short distance.

For example, while Goodwood Road is an important commuter route to Adelaide's southern suburbs, so that Movement has a strategic status, there are segments where the 'P' status will be higher than others, such as near the Wayville Showgrounds, in the village shopping and dining precinct, and near schools and childcare centres.

Creating a Place – such as a new land development – without considering movement-related needs may lead to inefficient network outcomes and accessibility issues.

Recognising the complementary relationship between Movement and Place, and that different roads will prioritise aspects of one over the other, ensures, for example that interstate highways can be built to provide routes with few stops for higher-speed freight vehicles, or that lanes and alleys can be developed with priority for people walking and wheeling.

Aligning the Movement function of a road or street with the surrounding Place context, reflected by appropriate design, means the risk of traffic incidents can be reduced, people can rely on timely public transport, and children and young people can walk or ride safely to school.

Grote Street, Adelaide

4.2 Establishing Movement and Place status

Place

Place hierarchy is aligned with the level of pedestrian activity along the street network, generated by local destinations. Place status ranges from P1 (strategic: places of national or state significance) to P5 (local).

Place evaluation needs to consider various factors, including the vibrancy or activation of frontages (for example, commercial shopfronts, eateries and cultural venues that attract significant pedestrian traffic will have a higher Place status), tourism significance and land use designation. Place status often varies throughout the network, with different designations for residential areas, centres, mixed-use or commercial zones, necessitating multiple designations along a single road. This variability in activation can result in distinct Place-based considerations along the same road. In contrast, Movement status may remain consistent along longer stretches of the network.

The Place status Table 2 provides guidance on the distinction between Place status levels.

Hierarchy level	Description and classification components (Metropolitan Adelaide)	Examples
P1	**Places of national or state significance** • Street frontages (extending over 750 metres on both sides) that form part of state significant tourist precincts or are premier destinations for dining, entertainment, and/or high density retail activities. • Cultural, entertainment or concert venues with a capacity of 1,500+ people, and sporting venues that host national games.	**Metropolitan Adelaide:** Rundle Mall, Rundle Street, North Terrace, Jetty Road Glenelg, Main Road (Hahndorf). **Regional South Australia:** Mainstreets in Tanunda, Clare and McLaren Vale.
P2	**Places of metropolitan or city/town significance** • Street frontages (extending over 500 metres on any side of a street) that are popular and well-known destinations with visitors from metropolitan-wide or city/town-wide catchments with dining, entertainment and/or high density retail activities. • Cultural, entertainment or concert venues with for 500-1,500 people.	**Metropolitan Adelaide:** Prospect Road, The Parade, King William Road. **Regional South Australia:** Mainstreets in Naracoorte and Maitland.
P3	**Places of local government (council) significance** • Street frontages (extending over 500 metres on any side of a street) that are popular and well-known destinations with visitors from immediate and adjoining council catchments with commercial, dining, entertainment and/or high density retail activities. • Civic uses such as libraries and town halls. • Cultural, entertainment or concert venues with a capacity <500 people.	**Metropolitan Adelaide:** Brighton Road, Unley Road. **Regional South Australia:** Mainstreets in most townships.
P4	**Places of neighbourhood significance** • Street frontages (extending over 200 metres on any side of a street) that act as neighbourhood activity precincts with commercial, dining, entertainment and/or retail activities. • Presence of large schools with 300+ student enrolments with frontages or key active travel access routes along the street. • Parks, open spaces and local sporting grounds.	
P5	**Places of local significance** • Local places of residence. • Commercial destinations with small numbers of customers arriving mainly by appointment.	

Table 2. Guidance for establishing a Place status

Movement

When addressing Movement needs it is essential to account for the diverse transportation considerations of both freight and individuals using various modes of travel. This encompasses private cars, buses, trains, trams, taxis, bikes, e-bikes, motorbikes, scooters, micro-mobility vehicles, personal mobility devices and pedestrians.

Design perspectives for Movement modes are commonly grouped into general traffic, freight, public transport, cycling and walking. Considering that walking space and Place-related activities (for example, on-street dining, shopping) are primarily addressed within the Place domain, as they are provided for by footpaths, the walking dimension is also encompassed in the Place status. Therefore, four Movement hierarchies are delineated for status assessment: general traffic, freight, public transport and cycling (Table 3).

General traffic, road freight and road public transport often share the same width road lanes and exhibit similar travel speeds. However, it is acknowledged that priority can be allocated among these modes through specific lane designation. In contrast, the speed of travel for cyclists differs significantly, necessitating specific design considerations tailored to accommodate their unique requirements.

Table 3 provides guidance on establishing hierarchy status for roads/streets for perspectives of general traffic (T), freight (F), public transport (PT) and cycling (C). It is recommended that the overall Movement status be determined by selecting the highest status designation among the three generalised motorised modes, with cycling needs considered specifically, as explained further in Figure 3.

Mawson Lakes

Cycling	Public transport	General traffic	Freight
C1 – Regional cycling routes High priority cycling routes that connect the capital city with Urban Activity Centres and other significant destinations.	**PT1 – Priority bus corridors** Core backbone corridors that connect major activity hubs along primary travel routes, providing route connectivity over longer distances at higher speeds.	**T1 – Strategic roads** Roads that connect the largest population centres and key destinations crucial to national economic development. These national roads serve as primary links between capitals, and between Adelaide and major SA cities.	**F1 – Principal freight routes** Roads that offer high connectivity and efficiency for nationally significant freight movements between the capital, major cities, strategic economic regions, and major logistics centres.
C2 – District cycling routes Routes that connect major activity centres with each other and with C1 routes, creating a comprehensive high-quality network linking important destinations. Recreational trails of district significance are also part of C2 level route network.	**PT2 – Frequent bus corridors** Secondary backbone corridors that connect major activity hubs along high-demand routes over shorter distances, with strong integration with the rapid network.	**T2 – Major arterial roads** Roads that provide primary links between urban and outer urban areas, function as bypasses or ring roads, and accommodate high-capacity cross-metropolitan vehicle movements. In rural areas, these roads connect regional towns with higher traffic flows or serve as key tourist routes.	**F2 – Major freight routes** Roads that support the movement of high productivity freight to and from principal freight routes and between them. These routes are well-established and handle regular daily freight movements.
C3 – Local cycling routes Routes that connect local activity centres and residential areas with each other and link to the C1 and C2 networks. Designated trails of mainly local or recreational significance are also included in the C3 network.	**PT3 – Connector bus corridors** Connector corridors that link residential areas and local centres to rapid or frequent networks.	**T3 – Arterial roads** Arterial roads in urban areas that handle moderate capacity metropolitan vehicle movements and connect important destinations, such as activity centres or high-employment areas. In rural areas, these routes link regional towns with moderate to low traffic flows.	**F3 – Local freight routes** Roads that facilitate the movement of high productivity freight to and from key nodes, depots and delivery destinations, and connect to higher-order (F1 and F2) freight roads.
		T4 – Collector roads Roads that collect and channel traffic from local streets to higher-order roads. In rural areas, these roads may have low traffic flows.	
		T5 – Local streets and access roads Streets or tracks used only for local movements. In rural areas, these roads are often unpaved or unsealed, usually have very low traffic volumes and mainly provide first and last-mile connections.	

Table 3. Guidance for establishing a Movement status for individual modes

Understanding street type references

The diagram below illustrates the assumptions regarding street types depicted in this guide in relation to street design cross-sections.

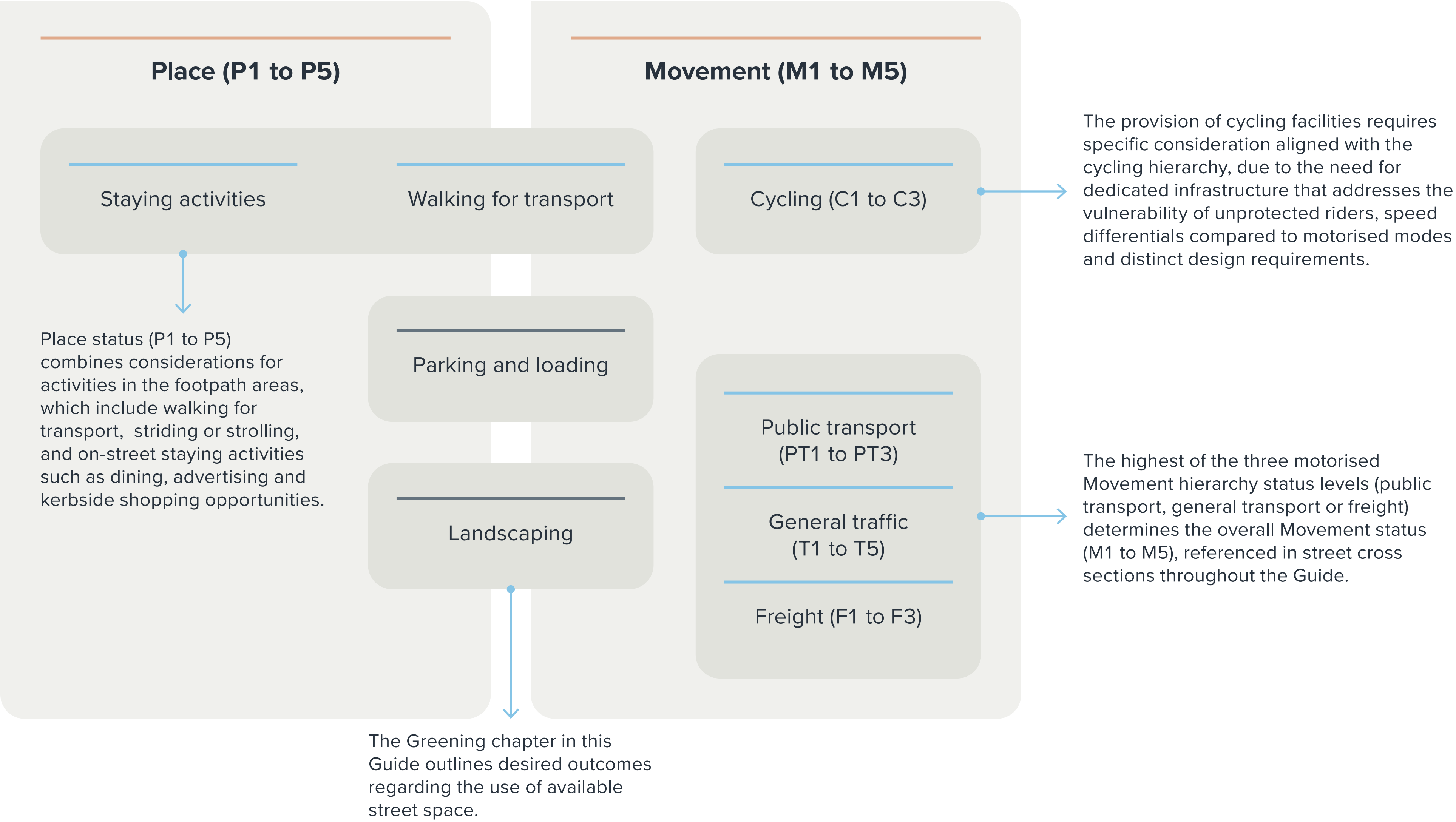


Figure 3. Movement and Place considerations for network planning

5. Road safety and personal security

Safety in public spaces encompasses several critical components that relate both to mobility-related road safety and personal security.

5.2 Road safety

Road safety encompasses the strategies and practices aimed at preventing fatalities and injuries among road and street users during travel. It is widely acknowledged that the loss of lives on roadways is unacceptable, prompting a global recognition for redesigning road systems to mitigate such risks. Numerous nations, including Australia, have embraced a 'vision zero' philosophy, committing to achieving zero fatalities or serious injuries over a set period. In Australia, the 'Safe System' approach adopts a multi-sectoral strategy, integrating various initiatives to realise the 'vision zero' goal and establish a secure mobility framework.

The Safe System[1] states that:

> The road system needs to put layers of protection in the form of safe roads, vehicles, speeds, people around the fallible and vulnerable human in order to prevent deaths and serious injuries.

1. www.towardszerofoundation.org/the-safe-system

The National Road Safety Strategy 2021-30[2] and South Australia's Road Safety Action Plan[3] advocate for the adoption of the 'Safe System' framework. This framework is based on an understanding that road users are fallible and will make mistakes in judgment, attention or behaviour while using the road. To improve safety, design should focus on measures that reduce the risk of crashes, make collisions less severe, and minimise injuries. This approach aligns with the four Safe System principles.[4]

The four Safe System principles are:

1. Human fallibility: People make mistakes which can lead to crashes.
2. Human vulnerability: The human body has a limited physical ability to tolerate crash forces.
3. Road Safety is a shared responsibility.
4. Building a safe and forgiving road system.

It is recognised that road infrastructure has historically catered mainly to motorised vehicles and has not been designed as a forgiving system. The existing road systems frequently expose road users to situations where errors are expected, posing a risk of harm particularly for people walking and wheeling.

2. National Road Safety Strategy 2021-30 (Commonwealth of Australia, 2021)
3. South Australia's Road Safety Action Plan 2023-2025 (Government of South Australia, 2023)
4. www.towardszerofoundation.org/the-safe-system

The process of enhancing and developing new active travel infrastructure to reduce the risk of harm to vulnerable road users will understandably take time.

Road crash statistics indicate that the human factor is the primary cause in the majority of crashes. Factors such as excessive speeds, inattention and distraction often contribute to crashes. Therefore, it is advisable to consider the capabilities and limitations of road users as the foundation for designing the road and traffic environment.[5]

> Safety should be the prime consideration for all road/street types and must be considered in terms of likely conflicts.

Using the Movement and Place approach to design streets and roads, thereby considering both functional movement needs and placemaking, aids in identifying crucial priorities and mitigating risks effectively.

Building upon the aforementioned considerations and research conducted by Austroads,[6] the following are key design principles summarising aspects of the Safe System approach aimed at ensuring the safety of active travel users. These principles guided the design treatments recommended further in this Guide.

5. Road Safety Manual (CROW Netherlands, 2009)
6. Integrating Safe System with Movement and Place for Vulnerable Road Users, AP-R611-20 (Austroads, Sydney, NSW, 2020)

Design principles

Speeds and mode separation

- The separation of largely non-compatible road user types or designs that provide for appropriate speeds and/or impact angles, should an incident occur, will lead to greater safety.
- The risk of harm from crashes diminishes when cars travel at or below 30 km/h. Therefore, any streets or roads where motorised vehicles travel above 30 km/h should provide dedicated and separated facilities for cyclists.
- Reduce vehicle entry speeds through intersections by implementing raised threshold platforms and surface treatments.
- Reduce vehicle speeds through T-intersections by implementing raised threshold platforms and surface treatments at entry points.
- Introduce area-wide speed limit reductions to 30 km/h or 40 km/h with traffic calming features.

Path continuity

- Ensure the continuity of protected facilities for active travel users, extending them seamlessly up to and through intersections.
- Prevent filtered turns through the movement paths of active travel users by fully controlling or limiting left and right turns.

Crossing opportunities

- Implement intersection phasing that stops vehicle movements during movements of active travel users.
- Include countdown timers on signalised pedestrian crossings.
- Introduce scramble crossings (crossing systems at traffic intersections where all vehicular traffic is stopped to allow pedestrians cross in any direction at the same time).
- Include cyclist phases at traffic signals.
- Introduce auto activation of pedestrian phases.
- Provide pedestrian crossing opportunities within a visible distance.
- Include modal filters in cul-de-sac streets.
- Reduce the speed of vehicles at crossings by implementing treatments such as raised platforms to create a continuous, at-grade path for people wheeling and walking across the road.

Further details:

- Towards Safe System infrastructure: a compendium of current knowledge, AP-R560-18 (Austroads, Sydney, NSW, 2018)
- Integrating Safe System with Movement and Place for Vulnerable Road Users, AP-R611-20 (Austroads, Sydney, NSW, 2020)
- www.visionzerochallenge.org

Jetty Road, Grange

5.2 Personal security

Neighbourhood crime levels and perceptions of safety are influenced by a range of personal, social and built environment factors and affect how likely people are to walk and cycle. Built environment attributes that promote visibility and natural surveillance or reflect social control and place attachment, have well documented associations with feeling safe.

Incorporating Crime Prevention Through Design (CPTED) elements such as effective street lighting, neighborhood maintenance and working to reduce physical incivilities such as litter, graffiti and vandalism, along with street features promoting safety from crime, such as front porches and neighborhood upkeep, can foster walking and cycling. This not only caters to recreational needs but also addresses environmental concerns.

> Allowing people to observe and be observed easily will help deter criminal activity.

Key concepts

Surveillance

Surveillance refers to the regular monitoring of a space so that for a potential offender there is a heightened risk (real and/or perceived) of being observed and apprehended. There are three different types of surveillance that can be provided in a place:

- **Natural surveillance:** Users of a space being able to clearly view or otherwise sense what is happening nearby as part of their normal day-to-day activity.
- **Technical surveillance**: Formal monitoring of a space using technology e.g. closed-circuit television (CCTV).
- **Formal guardians**: People who are obligated to be in a space observing, e.g. front-of-house staff, security guards.

Access control

Access control refers to methods of intentionally attracting, channelling or restricting the movement of people through a space. This can be communicated through cues that may range from subtle to explicit and may include secure physical barriers depending on the situation. There are three different types of access control that can be applied in a place:

- **Natural access control**: The tactical use of landscape and built form features to guide movement, e.g., building configuration, pathways, garden beds, etc.
- **Technical/mechanical access control:** Hardware installed specifically for security purposes such as gates, alarms, locks, etc.
- **Formal/organised access control:** People who are obligated to control access to a space, e.g., front-of-house staff, security guards.

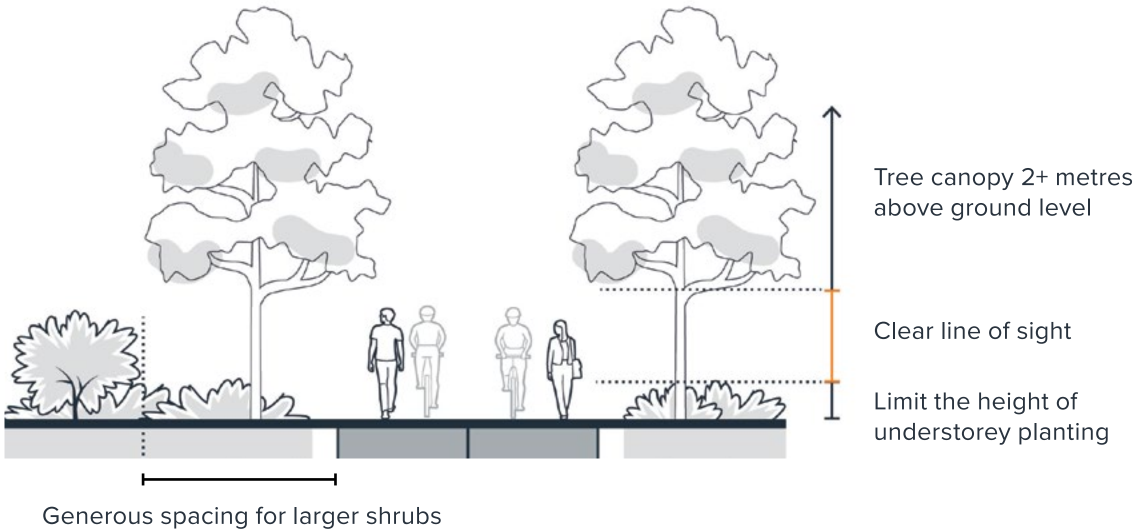


Figure 4. Clear line of sight illustration

Territorial reinforcement

Territorial reinforcement refers to the expression of ownership or stewardship of a place. This can be through clear delineations of private, semi-private and public spaces, and indicators that a space is regularly cared for. Effective territorial reinforcement aims to reduce ambiguity and avoid creating spaces that are perceived as belonging to no-one and subsequently may become more vulnerable to criminal activity.

Activity and space management

Activity and space management involves fostering legitimate utilisation while deterring inappropriate usage of a given space. This is achieved through structured planning and oversight of activities, organic community governance of the space and the thoughtful design of environments to clearly communicate their intended purposes.

Design principles

Surveillance

- Active travel paths should be designed to maximise opportunities for natural surveillance by allowing overlooking from adjacent areas.
- Clear sight lines must be established and maintained along paths between destination points, and at consistent intervals along active travel paths.
- Consider the impact of vegetation growth on sightlines and aim to eliminate or minimise potential hiding spots. Utilise low planting with maximum height of 0.6 metres and high-branching trees with at least two metres of clear trunk to achieve this objective.
- Avoid tall bushes, dense shrubs and dense clusters of trees immediately adjacent to routes and at predictable stopping points such as road crossings. If they are to be provided, there should be a generous offset from the path of travel and should not pose a concealment risk.

Access control

- Use landscaping for access control, to naturally control the flow of people walking and wheeling into and out of legitimate areas.
- Use lighting in a tactical manner to encourage the use of safest paths and discourage access to spaces that are relatively unsafe at night.

Territorial enforcement

- Good maintenance practice should occur to indicate an area is owned and cared for. Well-kept environments also signal community pride and discourage criminal behavior.
- Select robust materials that will not easily show signs of wear and tear.

Windsor Avenue, Unley

6. Basic dimensions

This chapter offers fundamental dimensions for key active travel users, which inform the design recommendations in this Guide. Historically, minimal space has been allocated for active travel users and landscaping, which are often added as afterthoughts following the allocation for motorised vehicle needs. However, there has been a recent shift towards a more deliberate effort to proportionally increase space allocation, taking into account diverse user needs, as well as considerations such as safety, comfort, amenity, biodiversity, urban cooling, and resilience.

While this section focuses on the fundamental physical dimensions of active travel users, broader street design dimensions are discussed later in the Guide. It is emphasised that when designing for active travel users, broader considerations should include:

- **A clear path:** Ensuring a clutter-free environment with no obstacles or fixed objects obstructing the journey.
- **Passing zones:** Providing sufficient space within the clear path area for users to pass, tailored to accommodate different user types.
- **Buffer or clearance spaces:** Allocating appropriate clearance to kerbs, active frontages, fixed objects (such as poles and bollards) and landscaping.
- **Adequate space around potential obstructions:** Allowing enough room around street furniture, outdoor dining areas, public transport stops, bicycle or scooter parking facilities, food vendors, automatic teller machines (ATMs) and landscaping to facilitate smooth movement.
- **Additional provisions for staying activities:** Incorporating space, where necessary, for café or restaurant seating, on-street seating for takeaway food consumption, or seating/benches that encourage on-street socialising.

This chapter considers design considerations that address universal design factors and cater for people walking and people wheeling.

Bonython Park Trail

6.1 Universal access

Throughout their lives, many Australians will encounter disability, a natural aspect of the human journey. Barriers, whether physical or otherwise, within our surroundings can significantly impede movement and consequently limit choice.

> Most people start and end their day walking, so streets need to be accessible for everyone, including those using mobility aids. Making streets universally accessible improves the overall wellbeing of the community.

This Guide recommends designing inclusive streets that are inviting and easy to navigate for people of all ages and abilities. It advises following the principles of universal design, summarised in Figure 5.

Some specific considerations for ensuring inclusivity in street design for a broad spectrum of disabilities are:

- Designing for safety by prioritising the most vulnerable users: children, seniors and people with disabilities
- Making pathways smooth and slip resistant, accessible and free of obstructions to accommodate all people, including those with a disability, those using different mobility aids or support devices, and those with strollers and small children
- Incorporating tactile signage for navigation to ensure safety and aid orientation, especially at crossing points
- Minimising sensory overload and providing clear and consistent cues, reducing unnecessary noise, clutter and bright lighting
- Using simple language in signage, wayfinding and instructions
- Providing information in different formats like braille, audio and large print
- Increasing greening and opportunities for social interaction and connection
- Ensuring comfort by incorporating various seating options, installing drinking fountains and universally designed toilets.

1. Equitable use
The design is useful and marketable to people with diverse abilities.

2. Flexibility in use
The design accommodates a wide range of individual preferences and abilities.

3. Simple and intuitive use
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or current concentration level.

4. Perceptible information
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

5. Tolerance for error
The design minimises hazards and the adverse consequences of accidental or unintended actions.

6. Low physical effort
The design can be used efficiently and comfortably and with a minimum of fatigue.

7. Size and space for approach and use
Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

Figure 5. The seven principles of universal design

Source: Centre for Excellence in Universal Design, www.universaldesign.ie

6.2 People walking

While a path width clear of obstructions for an able person walking typically measures one metre, this width is insufficient for accommodating parents with prams or walking with young children. A path width of 1.2 metres is generally accepted as adequate for most people, while a width of 1.8 metres comfortably accommodates the passage of two wheelchairs.

It is recommended to adopt a width of 1.8 metres as the desirable walking path width in areas with low pedestrian volumes. Although a narrower width of 1.5 metres could allow a wheelchair and a parent with a pram to pass, 1.5 metres is considered a minimum and not an optimal design width.

> The desirable width for a walking path in areas with low pedestrian volumes is 1.8 metres, which comfortably allows the passage of two wheelchairs.

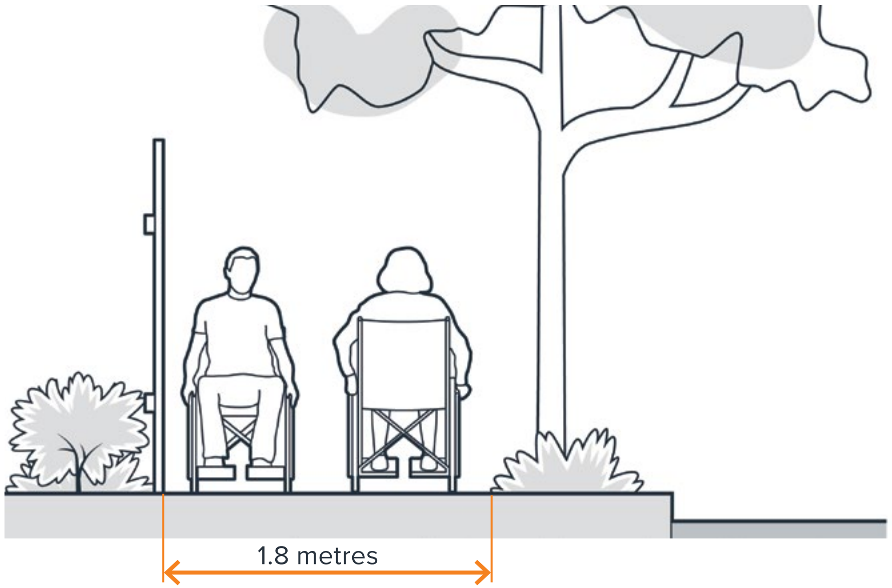
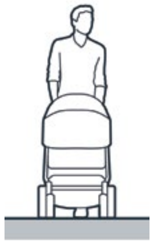
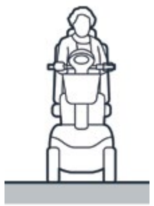


Figure 6. Desirable walking path width in areas of low pedestrian volumes

Minda Coast Park, Brighton

	Width	Length/depth	Height	Turning and manoeuverability	Speed range
Person walking	 0.65 to 0.8	 0.5 to 0.7	0.9 to 1.9	1 x 1	1 km/h to 15 km/h
Adult with a pram	 0.65 to 0.8	 1.8 to 2.1	0.9 to 1.9	2.5 x 2.5	1 km/h to 10 km/h
Person in a wheelchair	 0.65 to 0.85	 1.2 to 1.7	1.6 to 1.7	1.5 x 1.5	3 km/h to 5 km/h
Person with a mobility scooter (compact and full size)	 0.5 to 0.85	 0.7 to 1.6	1.6 to 1.7	1.5 x 1.5 (compact) 2.85 x 2.85 (full size)	6 km/h to 12 km/h

Note:

While this table offers generalised dimensions, it recognises the extensive range of human experiences and characteristics and acknowledges that it does not encompass the full spectrum of human diversity.

Table 4. Basic dimensions for people walking (in metres) – guide only

6.3 People wheeling

Advancements in product innovation have significantly broadened the array and availability of bicycles, scooters and other micromobility devices for users. These options now encompass solutions for transporting cargo, children, pets, as well as a diverse range including tricycles, prams, tandems and specialised bicycles catering to individuals with specific mobility needs. These vehicles vary in dimensions, weight and manoeuvrability, as illustrated in Table 5 on page 24.

Riders do not consistently travel in a straight line, particularly when traversing uphill gradients or uneven terrain. Moreover, to prevent inadvertent contact or interference, adequate passing clearance is crucial. Therefore, design envelopes should incorporate a broader dynamic width to accommodate the natural deviations of cyclists in motion and facilitate safe passing manoeuvres.

Designs that accommodate the widest dimensions of cycles or micromobility devices will promote broader participation, safety and comfort, thereby ensuring accessibility for all.

For a solitary rider traveling in a straight trajectory, the designated rider envelope is typically one metre. However, considering dynamic width and passing clearance, it is determined that a path or lane width of 2.4 metres is necessary to comfortably accommodate two riders passing each other, making it the recommended design width. Note that this width may not suffice for broader design vehicles like wheelchair bicycles and child trailer bicycles, which necessitate a width of up to 3 metres.

The minimal design width for a one-directional path or lane is 2 metres, accommodating the side-by-side riding of a parent and child. However, this width is deemed inadequate for two riders to pass each other comfortably and is therefore not recommended for busier routes.

Another critical consideration in designing for individuals using wheeled devices is their eye height. While for a standard 1.8-metre bicycle, the eye height is typically 1.4 metres, this dimension varies for children's bicycles, tricycles and hand cycles. These vehicles often have lower eye heights and lower clearance from kerbs and obstacles.

> The desirable width for a passage of people wheeling (e.g., cycle lanes or cycle paths) is 2.4 metres, which comfortably allows the passage of two riders.

This guide applies the concept of desirable width to various street layouts and intersection conditions, offering recommendations for optimal width in scenarios where existing streets are constrained.

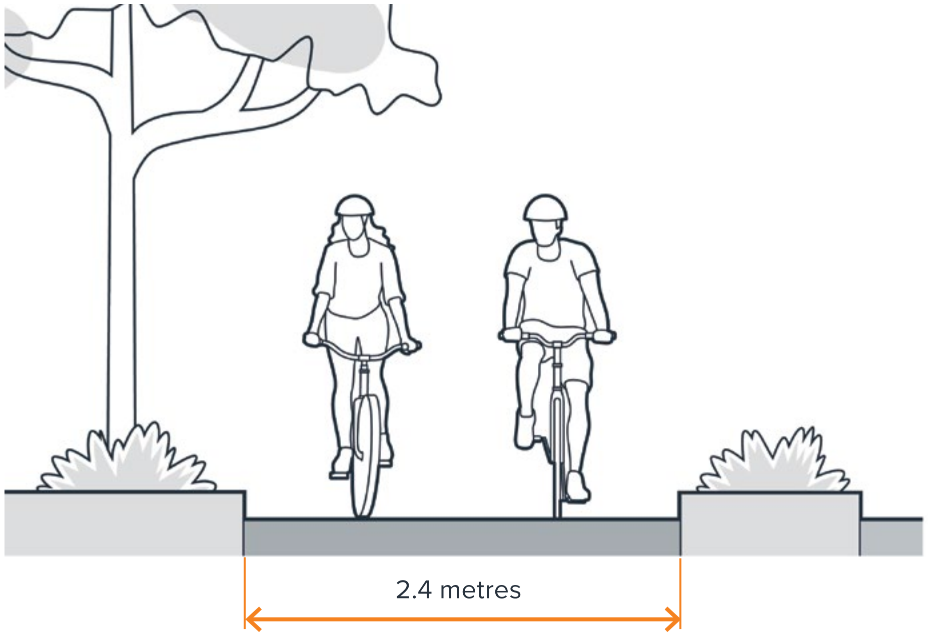
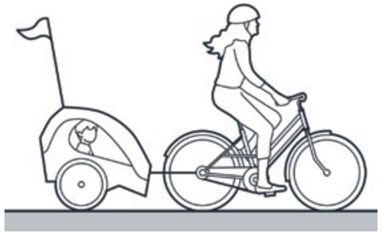
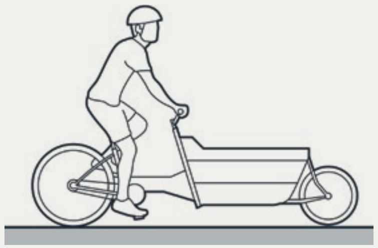


Figure 7. One-way desirable cycle lane or path width

	Width	Length/depth	Height	Turning and manoeuverability	Speed range
Person on a cycle	0.7 to 0.8	 1.8	1.8	4.5 x 4.5	12 km/h to 50+ km/h
Cycle with a trailer	0.8	 3	1.8	6 x 6	12 km/h to 25 km/h
Cargo cycle	0.7 to 0.8	 2.5	1.8	5.5 x 5.5	12 km/h to 25 km/h
Person on an e-scooter	0.65	 1 to 1.3	1.7 to 2	4.5 x 4.5	12 km/h to 15 km/h

Note:

While this table offers generalised dimensions, it acknowledges that a much wider array of wheeled vehicles are in use and does not fully encompass the diverse spectrum of wheeled users.

Table 5. Basic dimensions for people wheeling (in metres) – guide only

7. Walking facilities

Footpaths serve as multi-functional spaces accommodating various activities and purposes. These include pedestrian traffic, recreational activities such as children's play, areas for advertising or traffic signage, outdoor dining spaces, landscaping and shading structures, designated spots for cycle and scooter parking, provision of seating, placement of wayfinding signage, drinking fountains, public art, bus stop infrastructure, phone boxes and toilets. The integration of these diverse functions introduces a level of complexity and potential contention.

This Guide acknowledges the diversity and complexity of roles that footpaths serve and underscores the necessity for a context-sensitive, bespoke design approach in every situation to attain optimal outcomes.

The Guide provides fundamental design dimensions.

- The dimensions for **footpath or walking path width** presume these routes will remain unobstructed, with additional width necessary for accommodating street furniture such as seating or phone boxes (note that guidance on basic dimensions for outdoor dining has been provided separately from footpath width recommendations). Width recommendations were formulated based on the Movement and Place street types.
- For street types with **high place designations** (P1, P2, and P3), determining the optimal width dimension is best accomplished by calculating the pedestrian comfort level of service, using methods such as Fruin calculations.[1] This approach offers a more precise means of catering to current pedestrian volumes and speeds, ensuring that footpaths are designed to suit actual usage patterns rather than assumed ones.
- **Verge width** dimensions are determined based on the varying levels of pedestrian comfort in proximity to traffic, backed by published research findings.[2] It is important to note that wider verges provide enhanced outcomes in terms of greening and stormwater retention, as detailed in chapter '10. Greening' on page 89.

1. Pedestrian Comfort Guidance for London (Transport for London, London, 2019)
2. Walking Space Guide: Towards Pedestrian Comfort and Safety (Transport for New South Wales, NSW Government, 2020)

7.1 Footpath and verge widths

The Guide provides suggested dimensions for footpath and verge widths, based on Movement and Place street types outlined earlier. Given the variability in street widths and varying local context, four general dimensions are included:

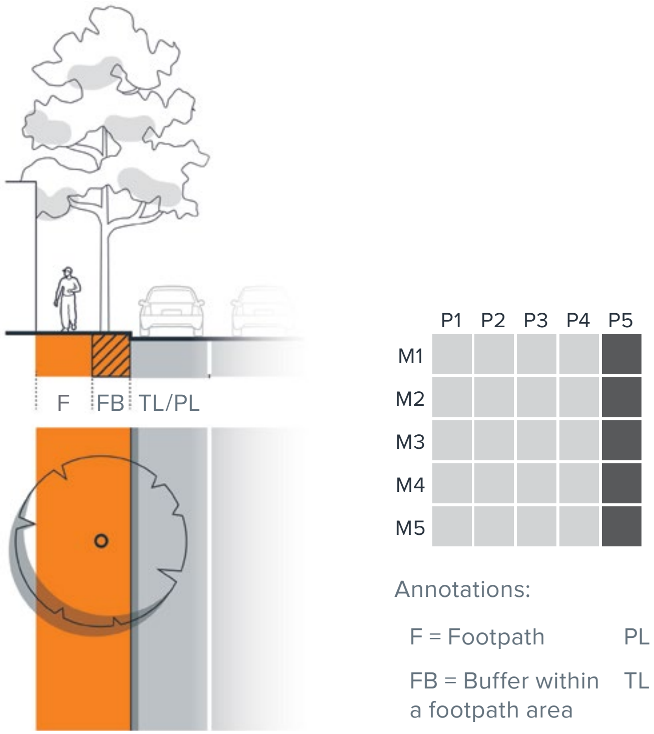
- **Desirable width:** Preferred dimensions to maximise the effectiveness of the design type
- **Minimum width:** Dimensions for narrow streets, providing the minimum acceptable level of service
- **Isolated constrained locations:** Dimensions for rare localised instances, such as when constrained by mature trees or historic street features, where street width is restricted over short lengths (under 20 metres), typically occurring only once within a 150-metre block. This allowance recognises that maintaining continuous facility connectivity outweighs meeting minimum width requirements for the entire length. Cross-section designs with constrained widths should not exceed path lengths of 20 metres.

Note that desirable and minimum dimensions are for a clear walking path, devoid of obstructions and do not encompass additional widths for verges or outdoor dining areas (refer to section '7.2 Outdoor dining' on page 31 for further information). In areas with mature trees, dimensions detailed for 'isolated constrained locations' are appropriate to use to ensure preservation of established vegetation.

	Desirable design width	Minimum design width	Isolated constrained locations
P1	4.5	4	2
P2	4	3	2
P3	3	2	1.5
P4	2	1.8	1.2
P5	1.8	1.5	1.2

Table 6. Summary of footpath width recommendations (in metres)

Streets of local significance



Annotations:

F = Footpath

FB = Buffer within a footpath area

PL = Parking lane

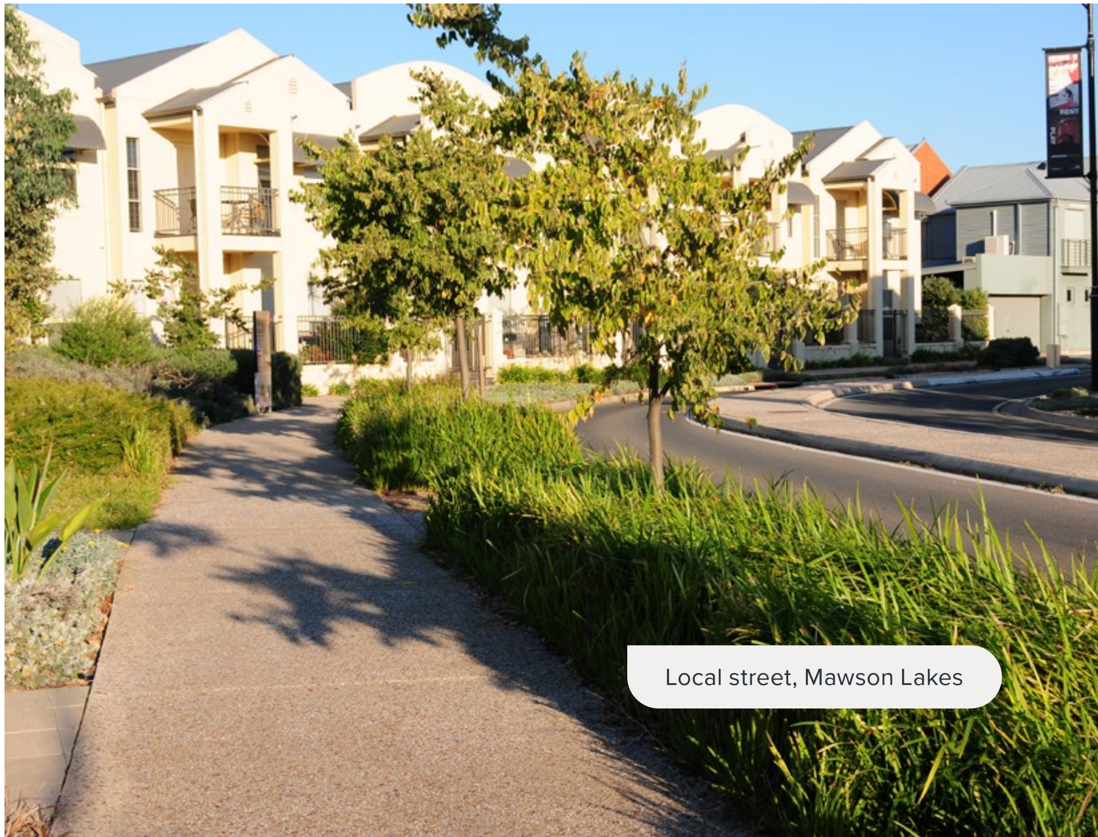
TL = Traffic lane

Figure 8. Design considerations for streets of local significance

Streets designated as Place status P5 provide access to residential areas, small-scale businesses, lower density employment areas and other local uses. These streets typically experience low levels of pedestrian activity and do not contain significant destinations. However, they can accommodate a range of traffic levels, from local (M5) to national (M1). Even highways may have dwellings adjacent and therefore must cater to Place-related access needs. While footpath width remains consistent for walking and on-street activities for P5 designation, it is advisable to increase buffer width with higher levels of traffic movement.

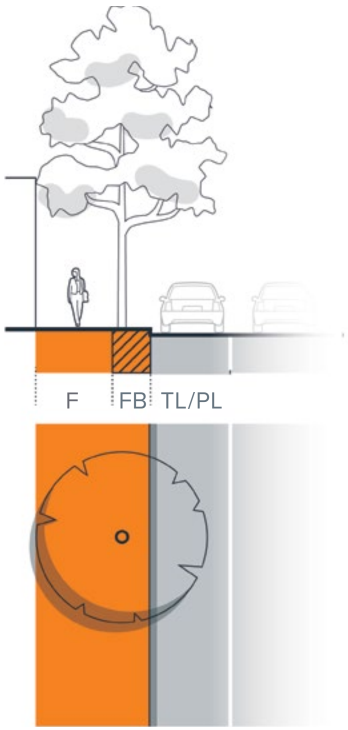
	Desirable	Minimum	Isolated constrained locations
F – Footpath width	1.8	1.5	1.2
FB – Footpath buffer width			
• M4P5 and M5P5	1.2+	1	0.6
• M2P5 and M3P5	1.8	1.5	0.6
• M1P5	2.2+	1.6	0.6

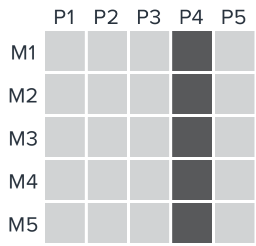
Table 7. Recommended dimensions (in metres) for streets of local significance



Local street, Mawson Lakes

Streets of neighbourhood significance





Annotations:

F = Footpath
FB = Buffer within a footpath area
PL = Parking lane
TL = Traffic lane

Figure 9. Design considerations for streets of neighbourhood significance

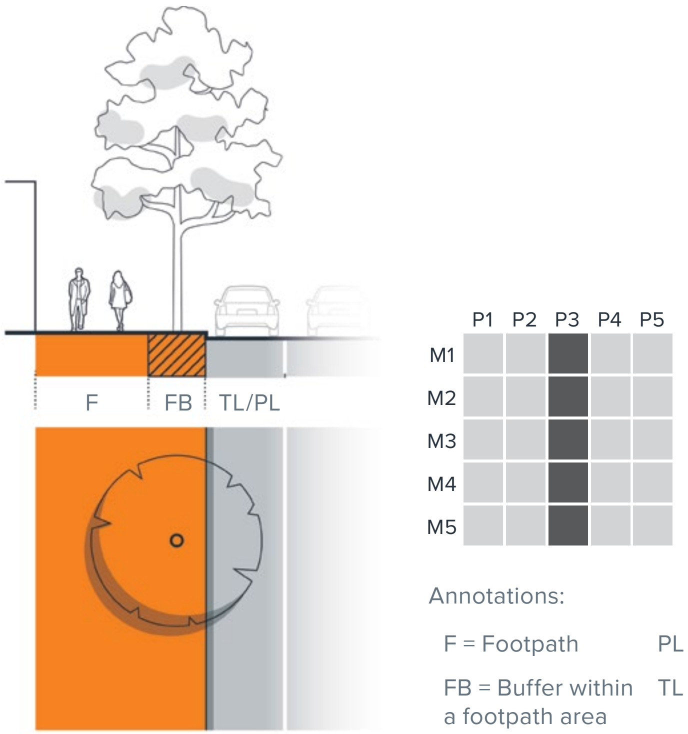
Streets designated as Place status P4 typically serve as hubs for neighbourhood-level destinations, drawing visitors from local area catchments. These streets often feature neighbourhood mainstreets, local schools and open spaces. Consequently, footpath widths need to accommodate, for example, families or groups walking and facilitate the ease of passing one another.

	Desirable	Minimum	Isolated constrained locations
F – Footpath width	2	1.8	1.2
FB – Footpath buffer width			
• M4P4 and M5P4	1.2+	1	0.6
• M2P4 and M3P4	1.8	1.5	0.6
• M1P4	2.2+	1.6	0.6

Table 8. Recommended dimensions (in metres) for streets of neighbourhood significance

King William Street, Kent Town

Streets of council significance



Annotations:

F = Footpath

FB = Buffer within a footpath area

PL = Parking lane

TL = Traffic lane

Figure 10. Design considerations for streets of council significance

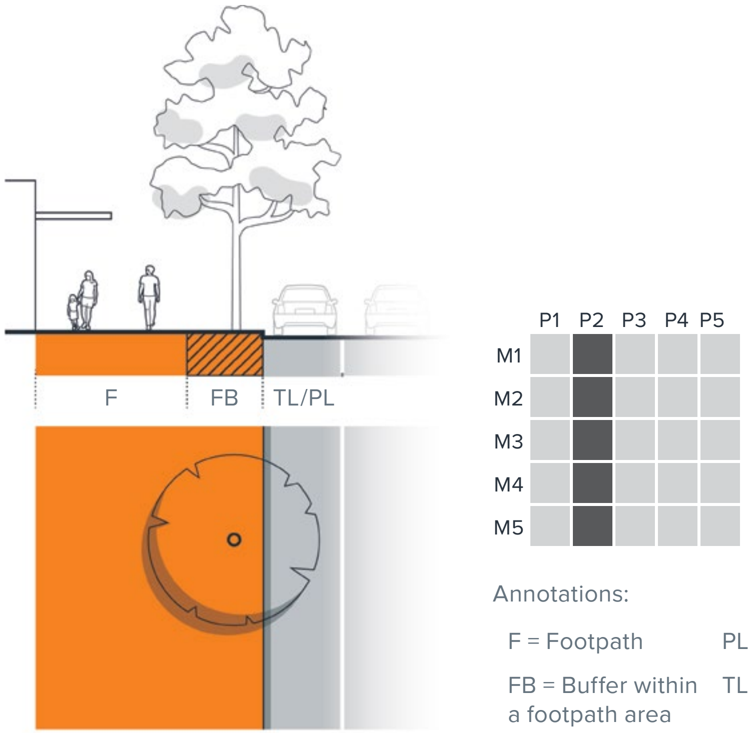
Streets designated with Place status P3 typically serve as busier mainstreets in activity centres, attracting visitors from Council-wide and adjoining areas. All streets and roads with high Place status (P1, P2 or P3) that also combine high Movement status (M1, M2 or M3) require careful management of traffic impacts through wider buffers, reduced speeds and ample safe crossing points.

In urban settings, P3 streets often feature paved footpaths extending to the kerb, also incorporating structural elements of shade structures. Greening can be achieved through tree planting, climbers and strategically placed planters surrounding seating areas. Additional footpath widths are necessary to accommodate essential street infrastructure including commercial signage, seating, public art installations and other elements crucial for enhancing the vibrancy and functionality of these urban spaces.

	Desirable	Minimum	Isolated constrained locations
F – Footpath width	3	1.8	1.2
FB – Footpath buffer width			
• M4P3 and M5P3	1.2+	1	0.6
• M2P3 and M3P3	1.8	1.5	0.6
• M1P3	2.2+	1.6	0.6

Table 9. Recommended dimensions (in metres) for streets of council significance

Streets of city or town significance



Annotations:

F = Footpath

FB = Buffer within a footpath area

PL = Parking lane

TL = Traffic lane

Figure 11. Design considerations for streets of city or town significance

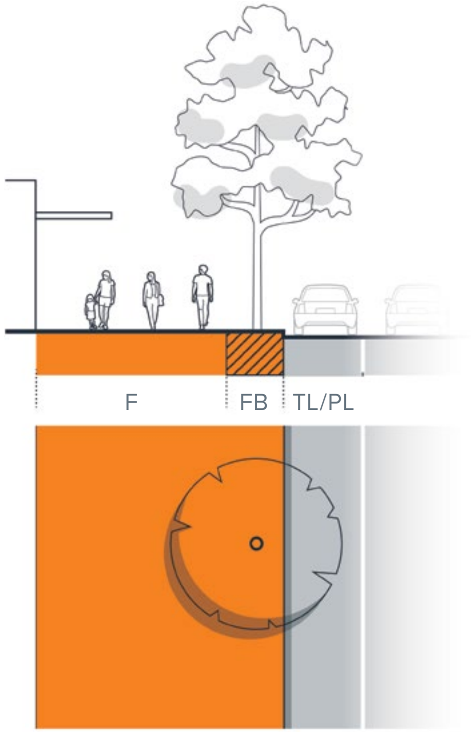
Streets designated with Place status P2 serve as significant destinations that attract visitors from across a city or a town. They evolve into focal points for community gatherings, offering essential services and shopping, recreational facilities, leisure activities and/or cultural attractions.

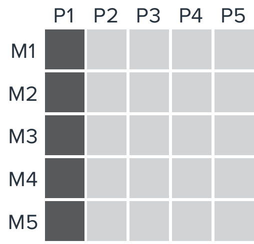
All streets and roads with high Place status (P1, P2 or P3) that also combine high Movement status (M1, M2 or M3) necessitate the careful management of traffic impacts through wider buffers, reduced speeds and ample safe crossing points.

	Desirable	Minimum	Isolated constrained locations
F – Footpath width	4	3	2
FB – Footpath buffer width			
• M4P2 and M5P2	1.2+	1	0.6
• M2P2 and M3P2	1.8	1.5	0.6
• M1P2	2.2+	1.6	0.6

Table 10. Recommended dimensions (in metres) for streets of city or town significance

Streets of national or state significance





Annotations:

F = Footpath

FB = Buffer within a footpath area

PL = Parking lane

TL = Traffic lane

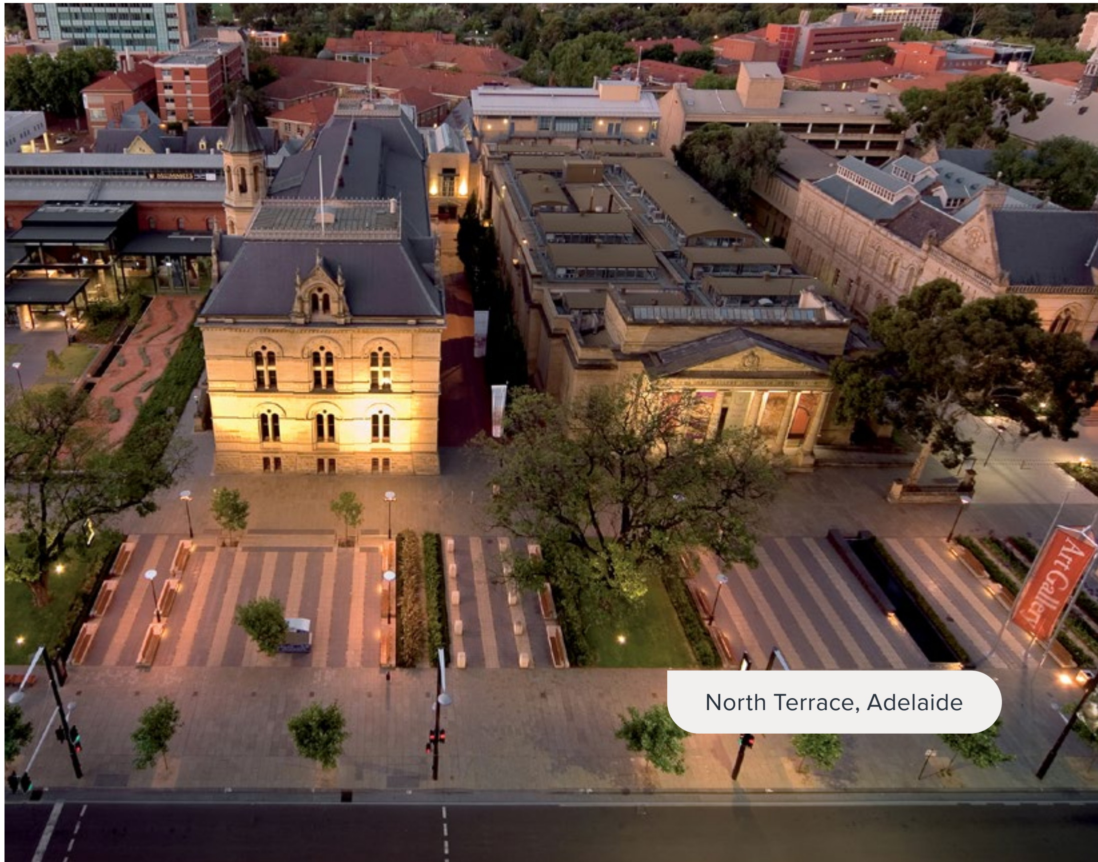
Figure 12. Streets of national or state significance

P1 streets encompass all the characteristics of P2 streets but exhibit an even greater density of activities. They may evolve into sought-after destinations for national and international tourists. The design ethos of these places revolves around incorporating distinctive elements of identity and showcasing local character, thereby honouring and celebrating their significance.

Outdoor dining is a customary feature of P1 streets as businesses capitalise on an area's high foot traffic. There are two alternative placements for outdoor dining: against the building and at the edge of the footpath. These scenarios are elaborated upon in the subsequent section '7.2 Outdoor dining' on page 31. Note that the street width required for outdoor dining activities is an additional consideration beyond the width requirements outlined in the table for this street typology.

	Desirable	Minimum	Isolated constrained locations
F – Footpath width	4.5	4	2
FB – Footpath buffer width			
• M4P1 and M5P1	1.2+	1	0.6
• M2P1 and M3P1	1.8	1.5	0.6
• M1P1	2.2+	1.6	0.6

Table 11. Recommended dimensions (in metres) for streets of state significance



North Terrace, Adelaide

7.2 Outdoor dining

Outdoor dining enhances the vibrancy of many streets, not only by attracting more business to dining establishments but also by enriching the liveliness and enjoyment of the public realm, fostering a sense of local character, safety and security in local streets. Thoughtfully integrated, it can contribute to making streets more inviting for people walking and wheeling. Encouraging patrons to frequent local destinations also reduces the overall necessity for long-distance travel, thereby minimising environmental impacts.

When planning streets to accommodate outdoor dining, it is important to allocate ample space for chairs, tables and additional furnishings while also ensuring suitable offsets to uphold the safety and convenience of other street users. This may include allowances for items such as umbrellas and screens. Typically, councils have their own specific guidelines and requirements for outdoor dining, which should be taken into account during the design phase. However, the following guidance serves to cover basic considerations.

Design notes:

- Consistency in the alignment of outdoor dining is preferable for each street, either positioned against the kerb or adjacent to the building, rather than alternating between the two.
- A wider kerb offset may be required in circumstances such as where the outdoor dining is adjacent to a loading zone, accessible parking space, or if bollards are required.
- Seat backs should ideally not face towards an adjacent pedestrian zone and kerb, particularly if there is no barrier or a large buffer between the seat and the kerb. The width recommendations are based on this assumption.
- Subtle tactile indicators, such as a small ridge, changes in paving texture, or a row of individual studs, may help vision-impaired individuals safely navigate outdoor dining areas, particularly when these areas are positioned against buildings rather than the kerb.
- Protuberances may be used to provide additional space for outdoor dining where the footpath width is limited and demand for outdoor dining is high.
- Where possible, street furnishings should be aligned with the side property lines rather than in the middle of building frontages. This can help avoid excessively breaking up a space that is potentially available for outdoor dining.

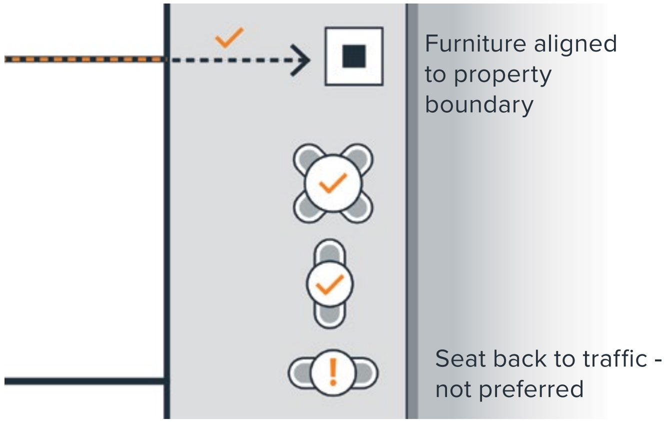


Figure 13. Street furniture positioning

Myrtle Street, Prospect

Dining is typically deemed unsuitable along corridors with high Movement status due to noise, particularly those with M1 status and often with M2 status and with car speeds above 40 km/h.

On streets and roads designated M3, M4, or M5, outdoor dining can be facilitated provided that car speeds are maintained below 40 km/h and there is ample space available, including sufficient footpath width to accommodate unobstructed walking paths, buffers from moving traffic and dining zones.

Table 12 offers fundamental dimensions for outdoor seating, aiding in determining the suitability of dining in different locations. No fixed 'desirable' dimension is provided, as it varies based on the outdoor dining capacity desired by individual businesses.

These width dimensions are intended to complement the previously outlined desirable footpath and footpath buffer dimensions for different street types.

		Minimum	**Preferred**
O2	Outdoor dining zone - for settings with two chairs	1	1.3
O4	Outdoor dining zone - for settings with four chairs	1.5	2
F	Footpath	Refer to previous pages	
K	Lateral kerb offset	0.6	1+ in some cases
I	Longitudinal offsets from street infrastructure	1	1.2
L	Property line gap	0.8	1.2
C	Longitudinal offsets from building corners	2	3

Table 12. Recommended dimensions (in metres) for outdoor dining zones

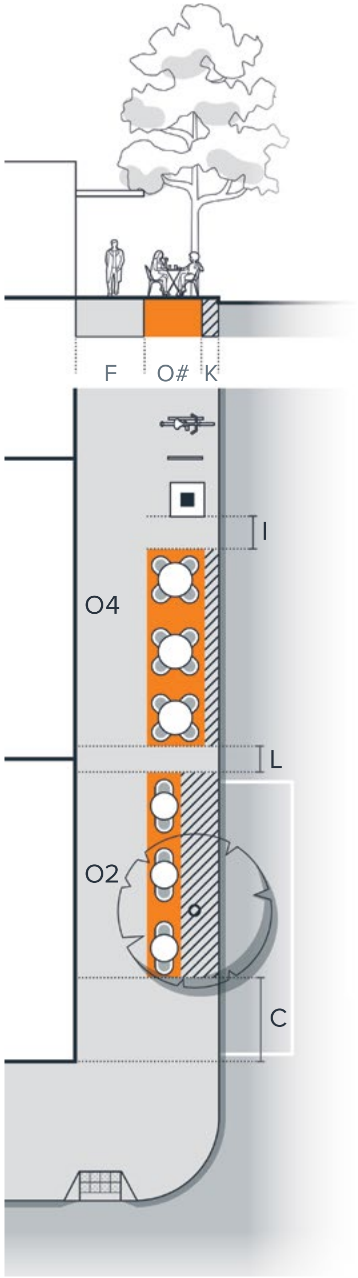
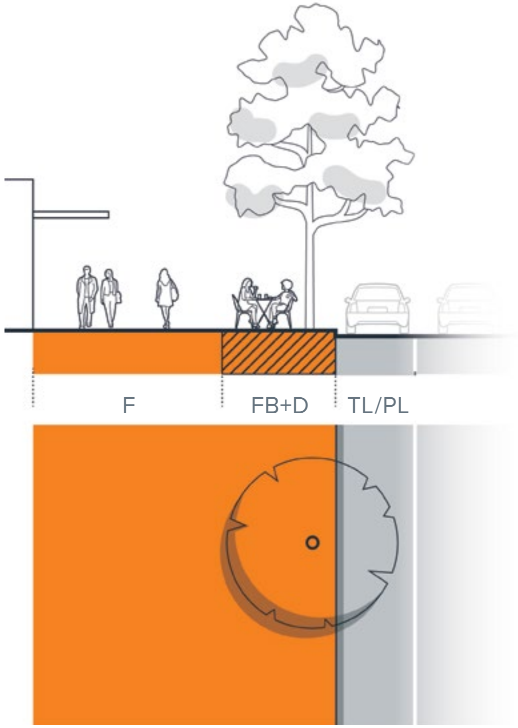


Figure 14. Outdoor dining zones

Outdoor dining at the edge of the footpath



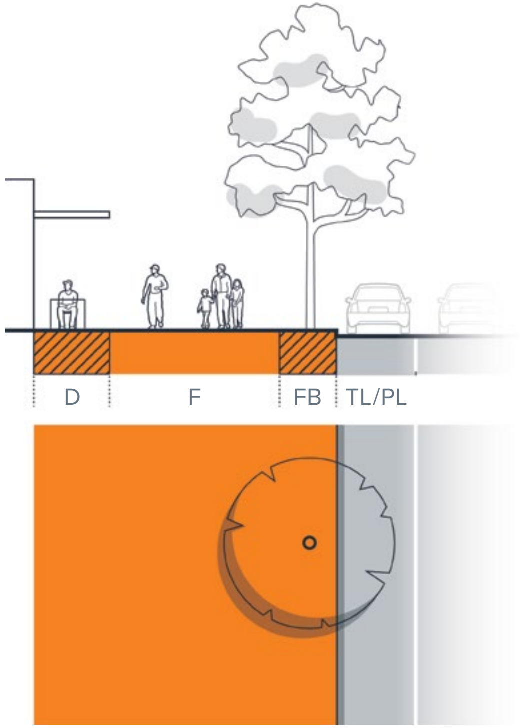
This placement of outdoor dining furniture is prevalent in South Australia. It maintains clear building frontages aiding navigation for individuals with visual impairments.

The primary drawbacks of this arrangement are that food service intersects with pedestrian pathways and that additional barriers or clearances from traffic lanes are required.

Figure 15. Outdoor dining at the edge of the footpath

Rundle Street, Adelaide

Outdoor dining against the building frontage



While less prevalent, this arrangement of outdoor dining furniture has been adopted in select South Australian locations, such as Prospect Road and Main Street (Mount Barker Road) in Hahndorf. As outdoor furniture obstructs building frontages, it becomes necessary to incorporate a tapping line into the design to enhance accessibility for individuals with visual impairments.

This arrangement needs a specific approval from the relevant council and consultation with visually impaired users is recommended.

Figure 16. Outdoor dining against the building frontage

Mount Barker Road, Hahndorf

7.3 Mid-block crossings

Creating a walkable environment necessitates the safe passage of pedestrians across streets and roads. Adequate provision of safe pedestrian crossings at all intersections is imperative, with design guidance included in chapter '9. Intersections' on page 66. This section outlines potential solutions for mid-block locations, which aim to establish crossing opportunities in addition to road network intersections. Note that in South Australia, the Road Rules permit cyclists to use pedestrian-only crossings, thereby expanding the options and facilitating the ability of cyclists to safely cross the road.

To effectively mitigate the barrier posed by roads, crossings should be strategically placed at regular intervals, taking into account the anticipated volume of people walking and wheeling in the area. A recommended guideline for crossing frequency in urban settings suggests intervals of approximately every 80 to 100 metres, with particular emphasis on avoiding gaps between crossings exceeding 200 metres.[1] Therefore, it is essential to place crossing points strategically along major desire lines, such as entry points to important destinations like schools or parks, and to coordinate them with bus stops or transport hubs.

This section includes four main mid-block crossing types:

- Zebra crossings
- Wombat crossings
- Pedestrian Actuated Crossings
- Crossing refuge islands.

At a minimum, mid-block crossings should match the width of the paths they connect, with dimensions also complying with widths determined by the type of crossing. In busy areas, the standard crossing width may not be sufficient, especially near schools or where cycle lanes or paths connect. Mid-block locations often allow for a wider design compared to crossings at intersections. When planning a crossing, consideration should be given to making it wider, if possible, keeping in mind constraints such as driveways, utility covers and the turning paths of large vehicles.

Political and social pressure to maintain on-street parking can negatively affect the creation of new mid-block crossing opportunities, leading to fewer crossing options or to placing facilities away from desired crossing points. To ensure safe and accessible crossing opportunities, it is essential to highlight during consultations with the community, local government officials and councillors the benefits of removing parking for better crossing outcomes.

This Guide discusses the suitability of the four most common mid-block crossings for the various street types. Additional considerations for their suitability should consider the mean speed of approaching cars, car volumes, the number of lanes to be crossed, and the effect on public transport and emergency vehicles, as covered in the Australian Standard 1742.10 Manual of Uniform Traffic Control Devices Part 10: Pedestrian control and protection (Austroads, 2019).

Further technical guidance:

- Australian Standard 1742.10 Manual of Uniform Traffic Control Devices Part 10: Pedestrian control and protection (Austroads, 2019)
- DIT Supplement to AS 1742.10: Manual of uniform traffic control devices - Part 10: Pedestrian control and protection (DIT, 2024).

Beach Road, Morphett Vale

1. Global Street Design Guide (National Association of City Transportation Officials, New York, 2016)

Zebra crossings

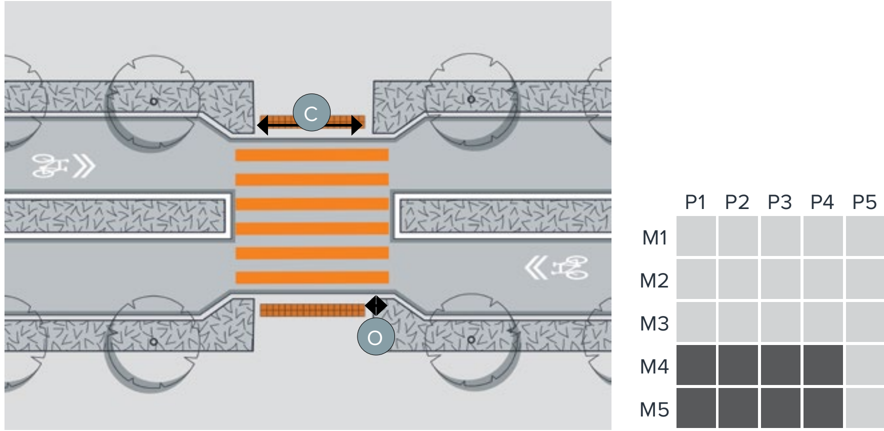


Figure 17. Zebra crossing

In South Australia, historical restrictions on zebra crossings have led to a decline in driver awareness and comprehension of these crossings, as exposure has mainly been limited to wombat-type crossings. Reintroducing zebra crossings presents an opportunity to foster broader acceptance and understanding among drivers, thereby cultivating a culture of heightened driver awareness to enhance safety for all road users.

This crossing type is suitable for M4 or M5 roads with one traffic lane in each direction and mean vehicle speeds of 30 km/h or less. Zebra crossings offer a high level of service level by giving priority to pedestrians but require users to navigate kerb ramps to access them.

Similarly to wombat crossings, zebra crossings allow people walking and wheeling to cross in one movement, better accommodating adults with prams and longer wheeled devices, such as bicycles with trailers.

Zebra crossings offer a cost advantage over the installation of wombat crossings as they generally do not interfere with existing drainage flows, unless used in conjunction with kerb extensions.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
C – crossing width	4	5	1.5	1.5
O – offset between stripe and access	1.5	1	1	1

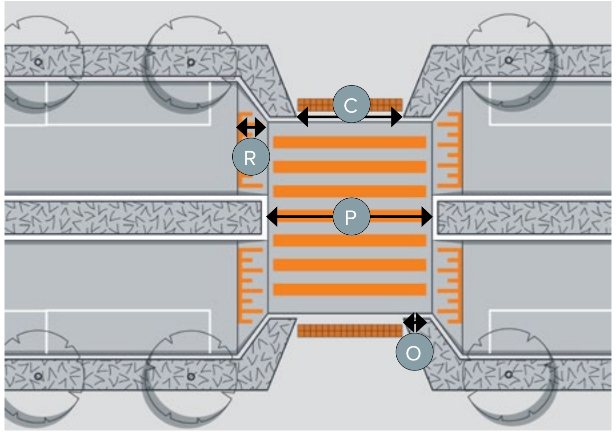
Table 13. Recommended dimensions (in metres) for zebra crossings

Design notes:

- Refer to the DIT Supplement to AS 1742.10: Manual of uniform traffic control devices - Part 10: Pedestrian control and protection (DIT, 2024).
- A minimum crossing stripe length of 6 metres is required, extending an additional 1 metre beyond each side of the crossing width.
- Kerb extensions should be provided for better visibility and to reduce car speeds.
- Can be installed on roads where a traffic lane in each direction and a bicycle lane in each direction is provided.

Seaview Road, Henley

Wombat crossings



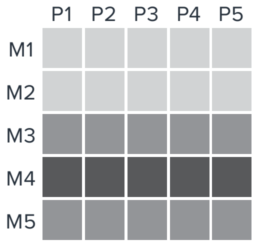


Figure 18. Wombat crossing

Wombat crossings are well suited to streets with low traffic volumes, one lane in each direction and mean car speeds of 40 km/h or less. This type of crossing is best suited for M4 streets near busy destinations but can also be appropriate for M3 streets with low car volumes and one lane in each direction. Wombat crossings offer a high level of service for people walking by giving them priority and improving access through the raised platform that is level with the footpath, aligning with Universal Design principles. The raised platform enhances safety by reducing car speeds. This type of crossing is widely understood by drivers, leading to high compliance rates.

Wombat crossings allow people walking and wheeling to cross in one movement, better accommodating adults with prams and longer wheeled devices such as bicycles with trailers. Wombat crossings are also widely used at side streets and slip lanes to prioritise people walking and wheeling. This is covered in chapter '9. Intersections'.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
P – platform length	6.6	7	6.6	6.6
R – ramp length	1.2	1.2	1.2	1.2
C – crossing width	4	6.4	1.5	1.5
O – offset between stripe and access	1	1	0	0

Table 14. Recommended dimensions (in metres) for wombat crossings

Design notes:

- Guide people to the centre of the crossing by using low height planting in non-trafficable areas.
- Retrofitting a wombat crossing into an existing street will affect the continuous flow of stormwater, necessitating drainage changes as part of the design.
- Adequate lighting levels must be ensured for safety and visibility.
- Refer to the DIT Supplement to AS 1742.10: Manual of uniform traffic control devices - Part 10: Pedestrian control and protection (April 2024).


Jetty Street, Grange

Crossing refuge islands and pedestrian median walkthroughs

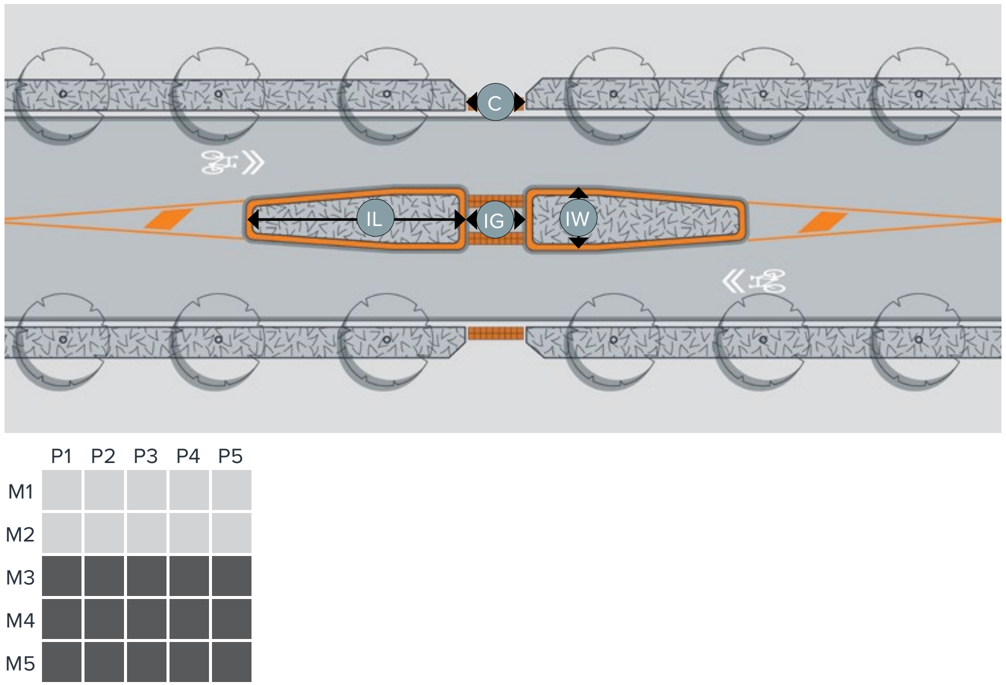


Figure 19. Crossing refuge island

Pedestrian refuge islands provide spaces for people waiting to cross multiple lanes of traffic, allowing them to negotiate one direction of traffic at a time. Pedestrian refuges should avoid narrowing the road unexpectedly or posing risks to cyclist riding on-road. Cars must navigate around the refuge easily, with enough space from both the refuge and parked cars. When placing refuges near bus stops, they should be positioned upstream for better visibility.

Since this crossing facility does not prioritise people walking and wheeling over car movement, it is considered to offer a low level of service, often causing delays to people crossing and the possibility of risk-taking. However, its low cost makes it a cost-effective improvement to existing crossing environment, despite providing only marginal benefits.

Pedestrian median walkthroughs have the same design elements as pedestrian refuges, except the island lengths as they are installed within a continuous median.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
IL – island length	3.5	3.5	3.5	1.5
IW – island width	3	3	2.4	1.8
IG – island gap	3	5	2.4	2.1
C – crossing width	To match path	To match path	1.5	1.2

Table 15. Recommended dimensions (in metres) for a crossing refuge island

Design notes:

- Refer to the DIT Supplement to AS 1742.10: Manual of uniform traffic control devices - Part 10: Pedestrian control and protection (April 2024) for general requirements, including the guidance on assessing two-way traffic volumes and the level of difficulty to cross the road.
- The constrained island width of 1.8 metres for a refuge island should only be considered if measures to provide a wider refuge are not practical or cost effective, requiring road widening, and where very low numbers of cyclists are anticipated.
- Kerb extensions can be used to improve intervisibility and to reduce the distance crossed.
- Landscaping, including trees, should be installed within the islands, and their location and choice of species must consider sightlines and the potential impact of root systems on paving.
- In high-quality streetscapes, islands can be squared to enhance their appearance and allow more space for landscaping. However, their shape must accommodate vehicle turn paths near intersections, with corners facing oncoming traffic using a 0.5 metre radius.

Pedestrian actuated traffic signals or PAC

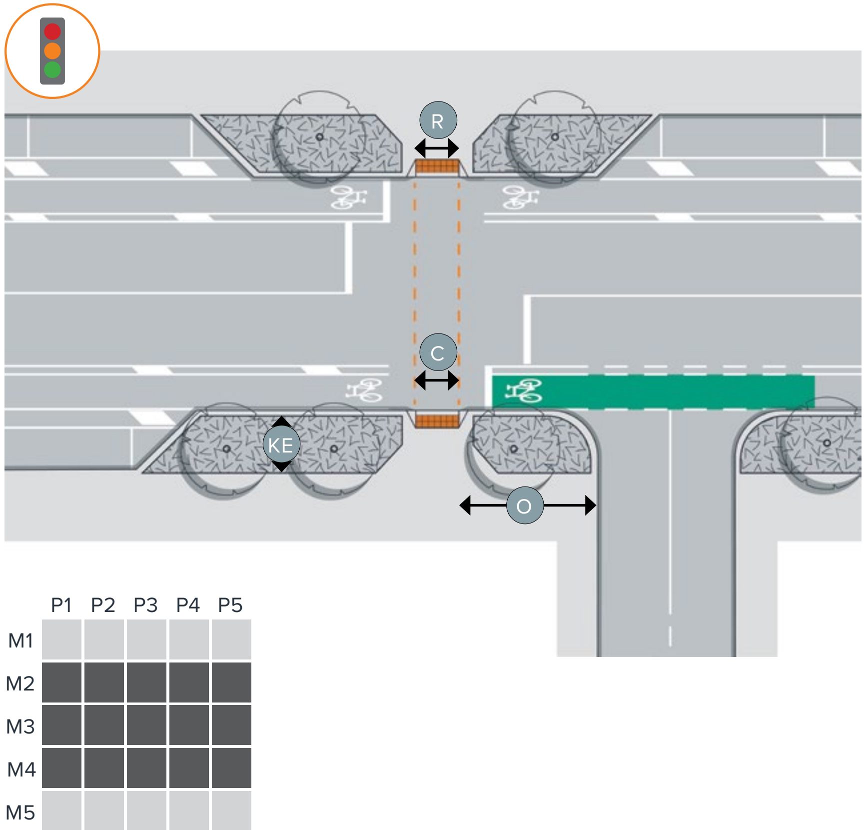


Figure 20. Pedestrian actuated traffic signals

Pedestrian actuated crossings (PAC) should be considered for arterial and collector roads (M2, M3 and M4) that have multiple lanes of traffic and operating speeds of up to 70 km/h.

Once activated, cars are stopped by a red signal followed by a green ‘walk’ signal allowing people walking or wheeling to cross. Generally, the duration of the crossing phase is set to allow for the safe crossing of people travelling at a speed of 1.2 metres per second (the 15th percentile walking speed) with additional clearance times provided to allow for people who have just left the footpath to complete their crossing. For PACs located on street types that are classified P1, P2, P3 or P4 places, where large schools are also present, a crossing speed of 0.8 metres per second (the 10th percentile walking speed) should be used. To mitigate delays to cars, a higher crossing speed up to 1.35 metres per second can be used for the clearance times.

Glynburn Road, Magill

In addition, the frequency of crossing activation within the same place status should be less than 90 seconds. Activation frequencies longer than this often lead to frustration and risk taking, particularly near schools.

A staggered PAC arrangement using a two-stage crossing should only be considered where significant traffic congestion or queuing issues would prevent the use of a PAC with a single crossing stage. The two-stage crossing results in a significantly lower level of service for people crossing.

	Desirable	**Overtaking, high volume**	**Minimum**	**Isolated constrained locations**
C – crossing width	5 to 10	15	5	2.4
R – ramp width	To match crossing width			
O – offset from intersection	30	30	15	0
KE – kerb extension width	2.5	2.5	2	2

Table 16. Recommended dimensions (in metres) for a PAC

Design notes:

- Refer to the DIT Supplement to AS 1742.10: Manual of uniform traffic control devices - Part 10: Pedestrian control and protection (DIT, 2024) for general requirements.
- The constrained offset distance of 0 metres should only be considered when a larger offset significantly inconveniences high volumes of people walking and wheeling within P1 and P2 places.
- A single aspect red lantern may be needed to control the side road, lane or shared zone vehicle traffic.
- Kerb extensions can be used to improve intervisibility and to reduce the distance crossed, with an additional benefit of reducing delays to motor traffic.
- A landscaped area with low height plantings (less than 0.9 metres) is the preferred treatment to deter people crossing outside the marked crossing area.
- PACs are not suitable where posted speed limits are greater than 70 km/h.

8. Cycling facilities

In developing effective cycling infrastructure, it is essential to recognise the dynamic nature of streets and the diverse traffic conditions they exhibit. Different street typologies demand tailored solutions for accommodating people wheeling, taking into account factors such as traffic intensity and car speed.

This Guide offers a nuanced approach, acknowledging that one-size-fits-all solutions do not exist. It provides a spectrum of cycle facility options that can be selected based on specific street characteristics. This guidance not only provides a range of alternatives but also incorporates key design dimensions to ensure an understanding of the spatial and traffic context. By embracing this flexible and context-sensitive approach, urban planners and designers can create cycling infrastructure that integrates with the existing urban fabric while prioritising safety and accessibility for all road users.

Design recommendations for wheeling facilities can be found in the following chapters:

- '6. Basic dimensions' – key design envelope information
- '8. Cycling facilities' – design considerations for mid-block cycling facilities: cycle lanes, cycle paths, shared paths and approaches for low-traffic environments
- '9. Intersections' – intersection design recommendations that match facility types introduced in chapters 7 and 8.

8.1 General design considerations

Distinction between bicycle paths and bicycle lanes

There is a legal difference between cycle lanes and cycle paths. This difference affects the road rules, signage and lane markings used for each.

The Australian Road Rules (153, Part 11) define a cycle lane:

- 'A bicycle lane is a marked lane, or the part of a marked lane—
  - a. beginning at a bicycle lane sign applying to the lane, or a road marking comprising both a white bicycle symbol and the word "lane" painted in white; and
  - b. ending at the nearest of the following:
    - i. an end bicycle lane sign applying to the lane, or a road marking comprising both a white bicycle symbol and the words "end lane" painted in white;
    - ii. an intersection (unless the lane is at the unbroken side of the continuing road at a T-intersection or continued across the intersection by broken lines);
    - iii. if the road ends at a dead end—the end of the road.'

Bicycle lane sign

End bicycle lane sign

Australian Road Rules (243, Part 14) define a cycle path:

- 'Bicycle path means a length of path beginning at a bicycle path sign or bicycle path road marking, and ending at the nearest of the following:
  - a. an end bicycle path sign or end bicycle path road marking;
  - b. a separated footpath sign or separated footpath road marking;
  - c. a road (except a road-related area);
  - d. the end of the path.'

Bicycle path sign

End bicycle path sign

In a road environment, cycle lanes hold priority across side streets, whereas cycle paths are required to give way at side streets unless specific provisions, such as wombat crossings or give way signs, are implemented to alter this priority.

Buffers

Buffers play a crucial role in enhancing the safety and security of people wheeling by effectively preventing cars from encroaching onto designated cycle lanes and paths.

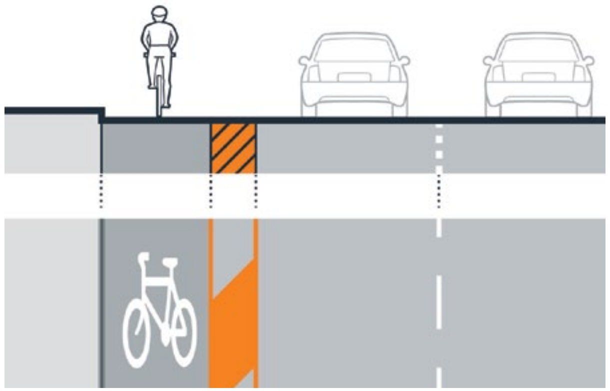
People wheeling in cycle lanes adjacent to parking lanes are at continuous risk of injury from opening car doors unless a buffer is installed (Figure 21). There is also a risk of cars encroaching onto cycle lanes from the traffic side, making a second buffer to the right of the cycle lane an important safety feature. If street width constraints prevent the installation of recommended buffer widths on both sides, priority should be given to the buffer on the parking side.

Figure 21. Buffer as a protection zone from driver's door opening

While this Guide provides recommended buffer width dimensions for various facility types, different buffer designs can be considered (Figure 22), each with varying cost implications:

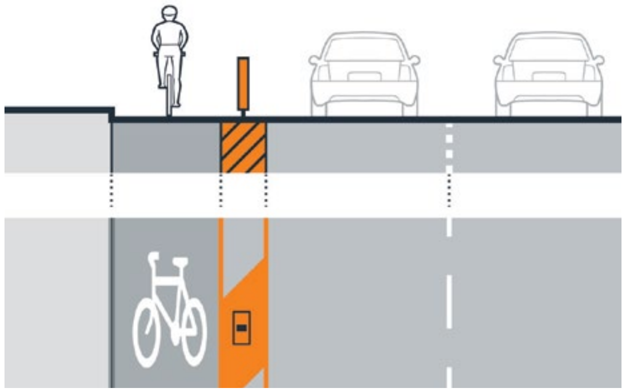
- Painted lines only (provide the lowest level of protection)
- Painted lines and flexi-poles
- Landscaped buffers (provide the highest level of protection when they include a kerb)
- Kerbed buffers (provide the highest level of protection).

A Buffers with painted lines only



Buffers with painted lines alone do not prevent cars from encroaching into cycle lanes or paths. This buffer type offers the lowest level of protection.

B Buffers with painted lines and flexi-poles

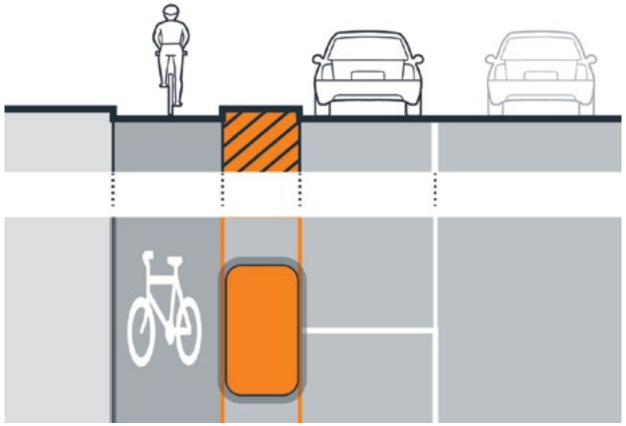


Flexi-poles improve painted buffers by providing some physical separation from cars by deterring encroaching into cycle lanes or paths. Effective spacing is 6 metres or less. When creating separation from parked vehicles, align flexi-poles with car door positions. Aesthetics of flexi-poles may not suit streets with high Place status.

C Landscaped buffers

Landscaped buffers use greenery and kerbs or beams for physical separation. They are visually pleasing but require maintenance. Consider plant growth impacts on cycle lanes or paths and sight lines.

D Kerbed buffers



Kerbed buffers use concrete, rubber or plastic for physical separation. When at least 1.2 metres wide, they provide space for loading strollers or luggage, bin placement (see Figure 23) and parking control signage. They offer the most effective protection against car intrusion.

Figure 22. Four main buffer types

Noncontiguous kerbed buffers represent a frequently chosen design alternative, aiming to lower costs and streamline implementation.

When redesigning streets to incorporate buffers, a critical aspect is the potential impact on the existing stormwater system. Noncontiguous buffers, by design, circumvent the necessity for stormwater modifications. In instances where on-street parking aligns with and is at the same elevation as a cycle lane or path, it is recommended that a noncontiguous buffer be at least two metres in length. Additionally, to deter vehicles from parking within the cycle lane or path, maximum gaps in the buffer should not exceed four metres.

Buffers also have the potential to impact people walking across the road and when entering or leaving parked vehicles. Non-contiguous buffer arrangement mitigates this, if formed from two metre long buffers with four metre gaps. This arrangement aligns with typical six-metre intermediate parallel parking spaces.

To prevent cars from parking within the cycle lane or path, maximum gaps in the buffer should not exceed four metres when used adjacent to parallel on-street parking. Where angle parking is maintained adjacent to the cycle lane, a median buffer that assimilates a wheel stop arrangement should be provided and gaps for drainage provided.

Surface of cycle lanes and paths

The creation of a smooth and even riding surface on cycle lanes and paths is crucial for minimising vibration and reducing the effort required to maintain cycling momentum.

As the preferred pavement choice, asphalt surfacing stands out for its attributes, offering low rolling resistance, exceptional skid and slip resistance and serving as an economically viable, long-term solution.

Consideration should be given to permeable pavement using porous materials to address concerns related to the heat island effect and to minimise the reliance on drainage infrastructure. However, it is advisable to refrain from using block paving or imprint paving, as the bevelled edge of the blocks may induce vibrations, posing potential issues to rider comfort.

In light of budget considerations, it is anticipated that the majority of cycle lanes and paths protected by buffers will use the existing kerbside road pavement. To ensure optimal conditions, a thorough assessment of the road pavement's state is recommended, aligning with the suggested surface tolerances outlined in Section 5.6 of the Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021). This becomes especially critical in areas with adjacent trees and at points where the kerb water table intersects the carriageway edge.

In instances where issues like a lip forming at the water table/carriageway interface are encountered, an effective (albeit more costly) solution involves replacing the existing kerb and water table with a semi-mountable kerb, featuring a water table matching the width of the cycle lane or path.

The asphalt and concrete pavements detailed in DIT's Guide to Bikeway Pavement Design Construction and Maintenance (DIT, 2015) for South Australia may be supplemented with architectural type concrete finishes, such as exposed aggregate concrete, to complement high quality streetscapes.

Parking lanes and parking controls

Parking lane dimensions are not explicitly outlined in the design cross sections due to their dependence on factors like the size of vehicles commonly loading at the kerbside, such as private or freight vehicles.

A standard design width for a parking lane is typically 2.1 metres. In areas designated for commercial vehicle loading, it is recommended to provide a wider parking lane of 2.6 metres. To facilitate the movement of trolleys transporting heavy items, the installation of successive kerb ramps from the carriageway level to the footpath level becomes imperative to ensure seamless access.

In streets with on-street parking, the recommended buffer width for parallel parking is a minimum of one metre adjacent to the parking edge. However, under exceptional circumstances such as limited road widths or areas with parking controls resulting in notably low parking turnover volumes, this width may be reduced to a minimum of 0.4 metres. For locations with angle parking, a minimum buffer width of 1.5 metres is recommended.

For cycle lanes and paths traversing areas where adjacent car parking is permitted near walking destinations:

- Each parking space should be distinctly marked, allowing drivers to align their doors with pedestrian-accessible areas, thereby minimising obstacles such as posts, columns and plantings.
- Parking control signs are to be located within the buffer, avoiding areas where car doors are expected to open.

Stormwater drainage

Stormwater drainage adjustments will generally be necessary when kerbs need to be shifted. However, in cases of on-road cycle lanes where gaps can be incorporated in the buffer kerbs, stormwater drainage modifications may not be required.

Stormwater drainage at both kerb alignments is required and infrastructure should be located to enable landscape planting within the buffer.

Bins and waste collection

Buffers measuring one metre or more may serve as designated bin presentation areas. For buffers less than one metre, specific arrangements for waste collection must be specified, such as implementing “no stopping” restrictions on waste collection days in areas where parking is available.

It is not uncommon for the mechanical arm of waste collection vehicles to straddle kerbside cycle lanes for bin collection. Due to the infrequency and predictability of this operation, the risk remains low. However, designers should aim to establish bin presentation zones in locations that minimise the need for the mechanical arm to cross cycle lanes or paths. A one-metre buffer between the cycle lane or path and parked cars is the absolute minimum width required for this purpose.

Field trials conducted by the City of Adelaide revealed that a buffer level (at grade) with the adjacent cycle path or lane allows bins to be replaced by the mechanical arm without bins toppling over. However, trials of a one-metre buffer protruding vertically above the cycle lane resulted in bins falling onto the cycle lane when placed inaccurately.

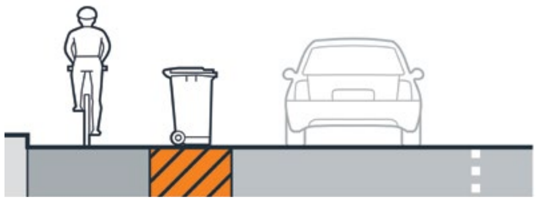


Figure 23. The use of buffer as the bin presentation zone

Alternatively, if on-street parking is present, a bin presentation zone can be established within the parking lane, coupled with a No Stopping restriction activated from 6 pm the evening before waste collection day until 6 pm on the day of collection. The on-street bin presentation zone should be shielded from approaching traffic by kerb extensions.

Lighting

Additional lighting poles along the roadway are unlikely to be needed when installing cycling infrastructure within an existing road. Upgraded luminaires may be required to achieve the lighting requirements of AS/NZS 1158 and can often be considered as part of an asset renewal program to upgrade to LED type lighting. The effects of planting trees and the resultant shadowing will need to be considered.

Redesign aligned with asset renewal projects

Councils across South Australia have illustrated the benefits and potential for enhancing active travel outcomes alongside their asset renewal programs. Through advanced programming, it is feasible to create designs that surpass mere like-for-like replacements. Instead, cost-effective active travel design solutions can be integrated within the original budget constraints. For instance, practical initiatives such as introducing buffered cycle lanes after a standard road resurfacing project, or replacing roundabouts with continuous footpath treatments and pedestrian refuge islands, exemplify this approach.

Design vehicles

Accommodating the turning movements of large vehicles, i.e. decision around the design motor vehicle type, will have a significant effect on the design outcome for people wheeling. The large turning circles of large vehicles often results in generous and speed inducing corner radii, cycle lane and buffer widths reduced and road crossing distances increased, increasing the exposure to potential conflicts between people walking or wheeling, and cars. The need to design for large motor vehicles should be minimised to specific street types only where there is a demonstrated need to accommodate such a vehicle. It is suggested for local roads, often connecting to arterial roads, that the AS 2890 template be used as the check vehicle, representing the majority of waste collection type vehicles, and the B85 as the design vehicle. This approach has been successfully adopted within the metropolitan area.

Tables with recommended dimensions

The Guide provides suggested dimensions for design of cycle facilities. Given the variability in street widths and varying local context, four general dimensions are included:

- **Desirable width:** Preferred dimensions to maximise the effectiveness of the design type.
- **Minimum width:** Dimensions for narrow streets, providing the minimum acceptable level of service.
- **Isolated constrained locations:** Dimensions for rare localised instances, such as when constrained by mature trees or historic street features, where street width is restricted overs short lengths (under 20 metres), typically occurring only once within a 150-metre block. This allowance recognises that continuous facility connectivity outweighs meeting minimum width requirements for the entire length. Cross-section designs with constrained widths should not exceed path lengths of 20 metres.
- **Overtaking and high-volume routes:** Dimensions for areas with significant numbers of people wheeling, where side-by-side wheeling is common. These locations often correspond with high-status cycling route C1 and require wider provisions to accommodate higher user volumes while maintaining a high level of service.

8.2 Cycling link types

	Guide page number	Brief description	Figure reference	Cycling status	Movement status	Place status	Key risks to manage
Cycle lanes							
One-way protected cycle lanes	46	One-way on-road cycle lanes protected from traffic by physical buffers	Figure 24, Figure 25	C1, C2, C3	M2, M3, M4	All	Cars entering from side streets giving way
One-way cycle lanes	48	One-way on-road cycle lanes not physically protected from traffic	Figure 26	C3	M4, M5	All	Cars and car parking users encroaching on cycle lanes
One-way cycle lanes – treatments for constrained interfaces	49	One-way cycle lanes at busy pedestrian frontages and at interfaces with bus stops	Figure 27, Figure 28	–	–	–	Conflicts between people wheeling and people walking
Cycle paths and shared paths							
One-way cycle paths	52	One-way cycle paths adjoined to but differentiated from a pedestrian path	Figure 29	C1, C2, C3	M2, M3, M4	All	Conflicts between people wheeling and people walking, and people wheeling giving way to cars at side streets
Two-way cycle paths	53	Two-way cycle paths physically separated from a pedestrian path by landscaping or physical buffers	Figure 30	C1, C2, C3	All	All	People walking onto the cycle paths
Two-way on-road cycle paths	54	Two-way cycle paths installed on a road and physically separated from a pedestrian path and car lanes by landscaping or physical buffers	Figure 31	C1, C2, C3	M3, M4, M5	P4, P5	Intersection manoeuvres
Shared paths	55	Shared pedestrian and cycling paths	Figure 32	C1, C2, C3	M1, M2, M3, M4	P4, P5	Conflicts between people wheeling and people walking
Paths along M1 corridors	57	Shared pedestrian and cycling paths along M1 corridor		C1, C2, C3	M1	All	Cyclist amenity, cyclist speed and protection from traffic
Cycle facilities in low traffic environment							
Two-way local streets with sharrow markings	page 59	Two-way local streets with sharrow markings	Figure 33, Figure 34	C3	M5	All	Cars overtaking people wheeling
One-way local streets with contra-flow cycle movement	page 61	One-way local streets with contra-flow cycle movement	Figure 35, Figure 36	C3	M5	All	Cars not expecting people wheeling travelling in the opposite direction

Table 17. Index of cycling link types included in the Guide

Refer to Chapter ‘12. Key technical references’ for a comprehensive list of reference documents that will provide additional design guidance.

Movement street type	One-way protected cycle lanes	One-way cycle lanes	One-way cycle paths	Paths alongside M1 corridor	Two-way cycle paths	Two-way on-road cycle paths	Shared paths	Two-way local streets with sharrow markings	Contra-flow cycling on one-way local street	Contra-flow protected cycle lane on one-way street
M1				✔ Recommended	✔ Recommended		✔ Recommended P4, P5			
M2	✔ Recommended		✔ Permitted C1, C2 ✔ Recommended C3		✔ Recommended		✔ Recommended P4, P5			
M3	✔ Recommended		✔ Permitted C1, C2 ✔ Recommended C3		✔ Recommended	✔ Permitted P4, P5	✔ Recommended P4, P5			
M4	✔ Recommended	✔ Recommended C3	✔ Permitted C1, C2 ✔ Recommended C3		✔ Recommended	✔ Permitted P4, P5	✔ Recommended P4, P5			
M5		✔ Recommended C3			✔ Recommended	✔ Permitted P4, P5	✔ Recommended P4, P5	✔ Recommended C3	✔ Recommended Low speed, low volume	✔ Recommended

Table 18. Selection of cycle facility types

Note:

For street types with a movement status of M4 and M5 that are not designated as cycle routes C1, C2, or C3, installing cycle lanes or paths is recommended when daily traffic volumes exceed 3,000 vehicles or 85th percentile speeds exceed 50 km/h. When speed and traffic volumes are below these levels, mixing users is acceptable.

Legend

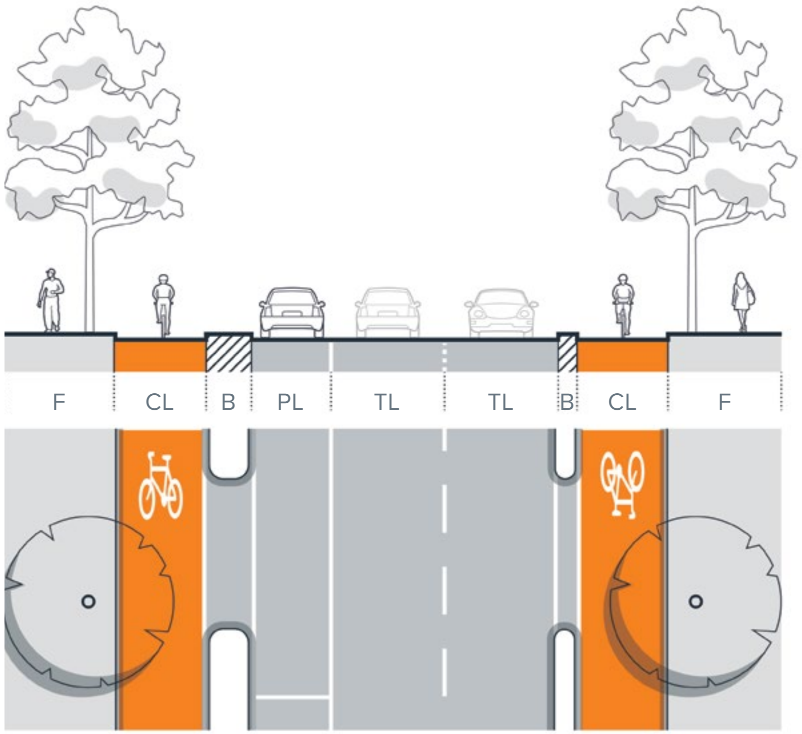
✔ (dark) **Recommended**

If relevant to limited cycle or Place street types, it will be stated. Otherwise, it applies to all cycle and Place street types.

✔ (light) **Permitted in some circumstances**

8.3 Cycle lanes

One-way protected cycle lanes



Annotations:

F = Footpath
CL = Cycle lane
B = Buffer
PL = Parking lane
TL = Traffic lane

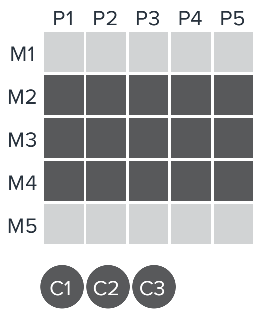


Figure 24. One-way protected cycle lanes

One-way protected cycle lanes are lanes installed on each side of the road, with buffers providing physical protection for people wheeling from cars and people walking. This separation can be achieved through kerbed or landscaped buffers or by elevating the cycle lane to a different level than the footpath and road, creating a stepped design (see further information on stepped design on page 47).

	Desirable	**Overtaking, high volume**	**Minimum**	**Isolated constrained locations**
CL – One-way cycle lane width	2.4	3	2	1.2
B – Buffer width	1	1+	0.4	0
PL – Parking lane width	2.1	2.1	2	2
PL – Parking lane with loading width	2.6	2.6	2.6	2.6

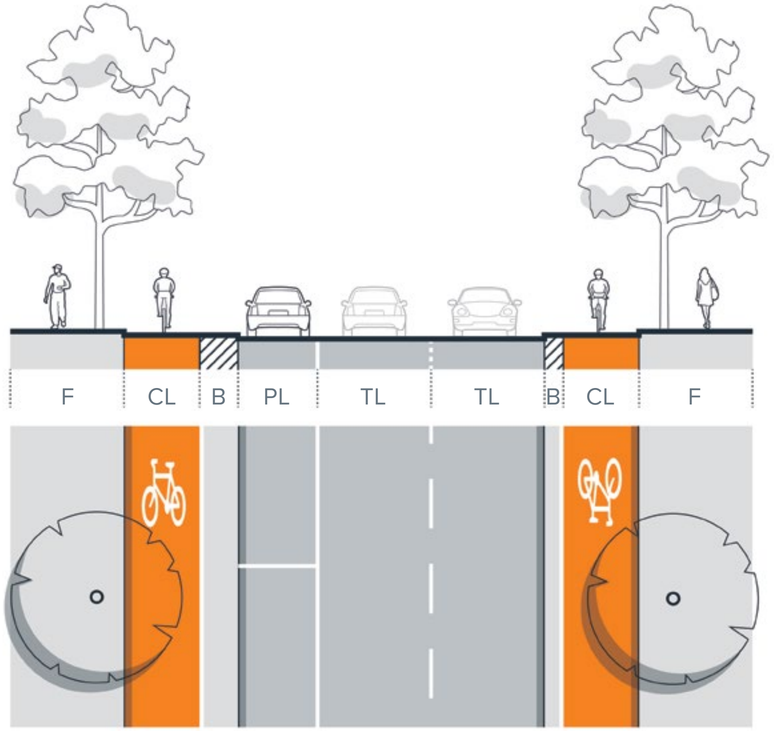
Table 19. Recommended dimensions (in metres) for one-way protected cycle lanes

Design notes:

Preference for mountable or semi-mountable kerbs with a maximum height of 10 cm on both sides of the bicycle lane or path.

In street sections with no kerbside parking, maintaining buffer widths as indicated by Table 19 is still recommended, to provide protection from moving traffic. ‘Desirable’ buffer width can be reduced to 0.6 metres.

Stepped design variant of one-way protected cycle



Annotations:

F = Footpath
CL = Cycle lane
B = Buffer
PL = Parking lane
TL = Traffic lane

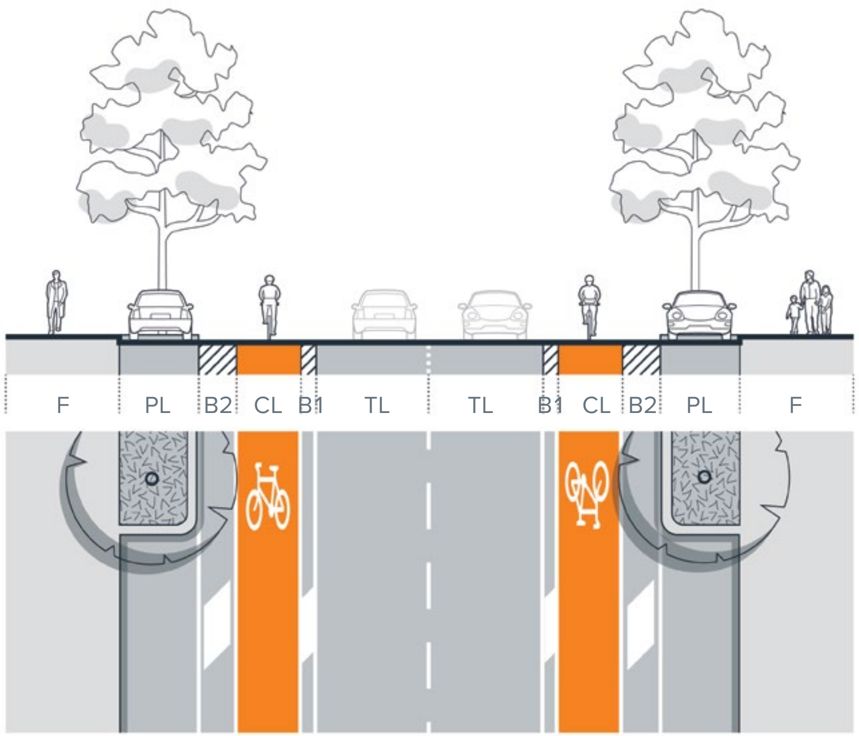
Refer Table 19 on page 46 for recommended dimensions

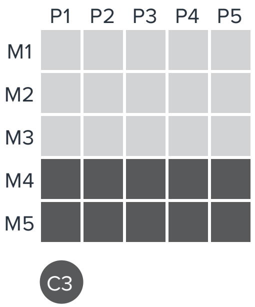
Figure 25. One-way separated cycle lanes – stepped design variant

The stepped design variant is a refined approach to the previously outlined general design. It offers heightened protection against nearby cars by elevating the cycle lane above the road, effectively eliminating conflicts arising from parking manoeuvres. This design is particularly suited to locations where superior streetscape outcomes are essential, such as bustling city centres with high levels of pedestrian activity or busy activity hubs. It is also well-suited for areas adjoining establishments with substantial passenger loading and unloading demands, such as hotel foyer interfaces, schools and taxi zones. Stormwater drainage at both kerb alignments is required. Note that an additional design detail is suggested for public transport stops on page 50.

Frome Street Bikeway, City of Adelaide

One-way cycle lanes





Annotations:

F = Footpath

PL = Parking lane

B2 = Buffer between parking lane and cycle lane

CL = Cycle lane

B1 = Buffer between cycle lane and traffic lane

TL = Traffic lane

Figure 26. One-way cycle lanes

One-way cycle lanes presented here feature painted buffers that do not physically separate people wheeling from other users, unlike the protected one-way cycle lanes described on page 46.

In street settings featuring kerbside parking and on-road cycle lanes without kerbed buffers, people wheeling face exposure to car parking manoeuvres and the risk of doors opening onto cycle lanes. Consequently, this design is recommended exclusively for streets with low traffic speeds and volumes, and is not considered appropriate for C1, C2 or high volume cycle routes.

Painted cycle lanes without physical barriers risk being encroached upon by cars, either as an alternative driving lane or for waiting to enter traffic from parking.
To maintain legibility, the total width of the cycle lane and buffers should not exceed 2.5 metres, making it narrower than a standard car lane.

This design may be specifically suited to streets where tree plantings have been integrated into road build-outs, serving to introduce or enhance street greening while simultaneously reducing traffic travel speeds.

	Desirable	**Minimum**	**Isolated constrained locations**
CL – Cycle lane width	1.5	1.2	1.2
B1 – Buffer width, traffic side	0.3	0.3	0
B2 – Buffer width, parking side	0.7	0.4	0
	For locations with angle parking (as opposed to parallel), buffer on a parking side of 1.5 metres is recommended.		
PL – Parking lane	2.1	2	2

Table 20. Recommended dimensions (in metres) for one-way cycle lanes

One-way cycle lanes – treatments for constrained interfaces

One-way cycle lanes at busy pedestrian frontages

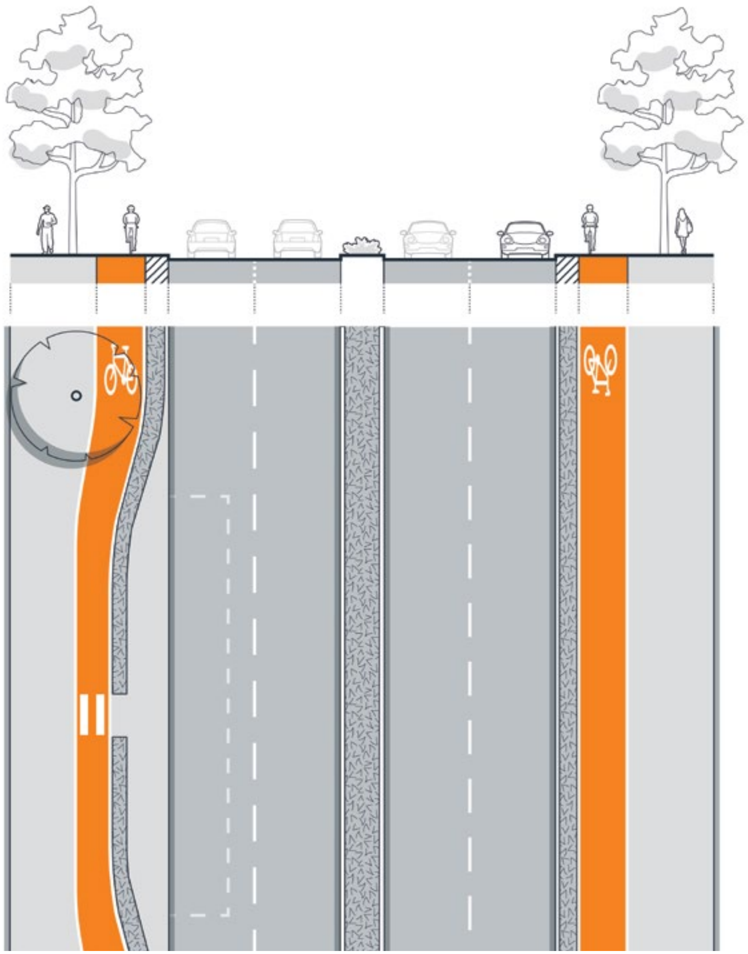


Figure 27. One-way cycle lanes at busy pedestrian frontages

In areas where high numbers of people walking require frequent access between the footpath and the kerbside—such as at taxi ranks or other passenger-loading areas near hotels and busy venues like theatres, concert halls, or cinemas—a zebra crossing with warning signs and markings can effectively alert people wheeling to the presence of a busy crossing point, mitigating potential conflicts.

Frome Street Bikeway, City of Adelaide

One-way cycle lanes at interfaces with bus stops

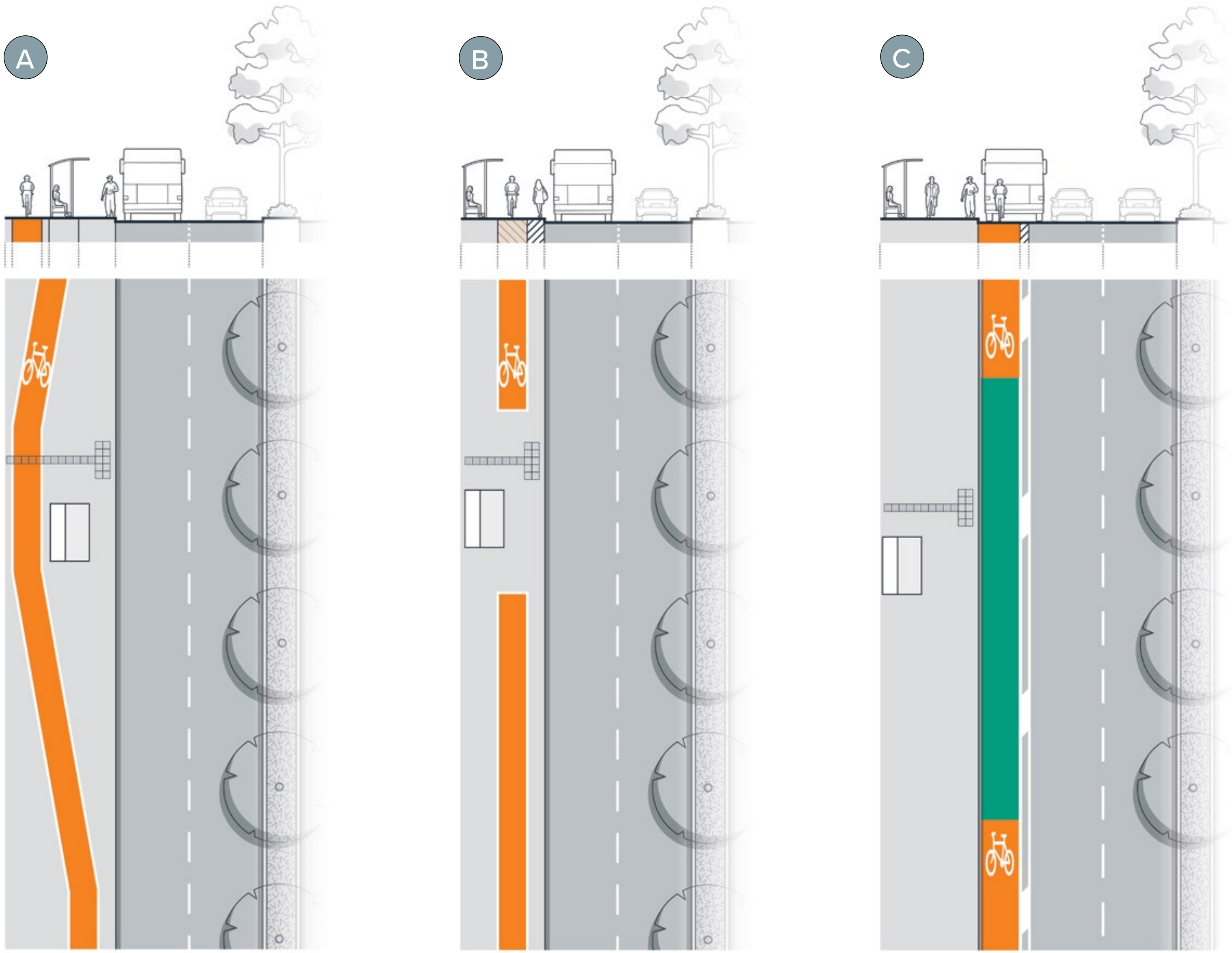


Figure 28. One-way cycle lanes at interfaces with bus stops and driveways

In locations where the cycle lane is interrupted by a bus waiting area, three options exist:

- Deviating the cycle lane behind the bus stop (as shown in Figure 28 A). This is a preferred solution. In this instance, the cycle lane is raised onto the footpath, effectively acting as a cycle path.
- Interrupting the cycle lane and creating a shared space within the bus waiting area (as shown in Figure 28 B). While this is not a preferred design response, it may be inevitable in areas with narrow footpaths. As in arrangement A, the cycle lane is raised onto the footpath, effectively acting as a cycle path.
- Continuing the cycle lane and identifying a conflict zone with green pavement marking (as shown in Figure 28 C).

8.4 Cycle paths and shared paths

Cycle paths are dedicated paths for cyclists. In South Australia, they are typically located off-road, adjacent to footpaths and roads or within open spaces. Unlike cycle lanes, cycle paths do not have the right of way when crossing side streets (see page 40 for further information). Therefore, continuity at side streets needs to be specifically considered (see chapter '9. Intersections').

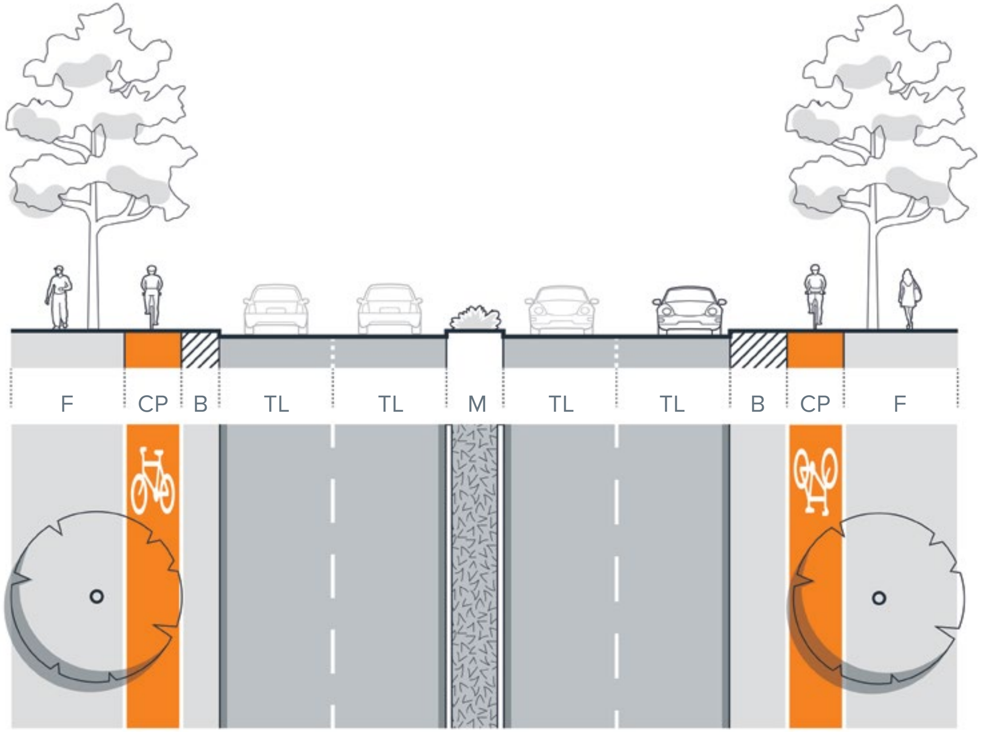
In this section, this Guide introduces four cycle path arrangements:

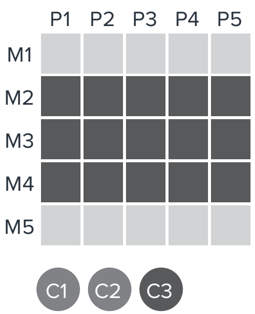
- **One-way cycle paths:** Typically installed along road alignments to offer direct routes for people wheeling while removing them from busy road corridors. One-way cycle paths are recommended in road corridors where car speeds are 50 km/h or more.
- **Two-way cycle paths** (off-road placement): This is preferred for facilities in open spaces where there is enough space for separate facilities for people walking and people wheeling.
- **Two-way on-road cycle paths:** Installed in road environments where one-way cycle paths cannot be accommodated due to constrained corridor width. This arrangement is not preferred due to conflicts at intersections and difficulty in connecting to one-way paths or lanes through intersections. As of the time of writing, there are no examples of two-way on-road cycle paths in South Australia, although this approach is common in Melbourne and Sydney.
- **Shared paths:** Require pedestrians and cyclists to share the same facility, leading to potential conflicts due to their variable speeds. This type of facility is common where corridor width is constrained and the numbers of people walking and wheeling are low. There are many examples of shared path facilities on South Australian greenways, such as sections of the Gawler and Marino Rocks Greenways.

Marino Rocks Greenway

One-way cycle paths

On roads with fast, high-volume traffic (50 km/h or above), on-road cycle lanes should be avoided. Instead, cycle paths can be installed within the footpath area. Although this type of facility is not preferred for C1 routes, it may be used for short sections if necessary to maintain route continuity.





Annotations:

F = Footpath	PL = Parking lane
CP = Cycle path	TL = Traffic lane
B = Buffer	M = Median

Figure 29. One-way cycle paths

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP – One-way cycle path width	2.4	3	2	1.2
B – Buffer width	1	1+	0.4	0.4

Table 21. Recommended dimensions (in metres) for one-way cycle paths

People wheeling using cycle paths are required to give way to traffic at side streets, resulting in their travel path being interrupted at each side street. Consequently, cycle paths within a footpath environment are not a preferred facility type for cycling routes C1 and C2. Additionally, physical separation from pedestrian paths by buffers or landscaping is recommended to prevent people from walking in a cycle path.

Semaphore Road, Semaphore

Two-way cycle paths

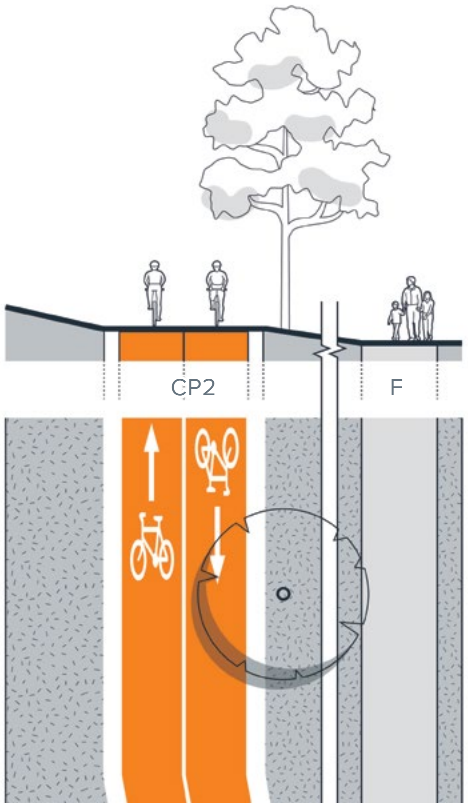
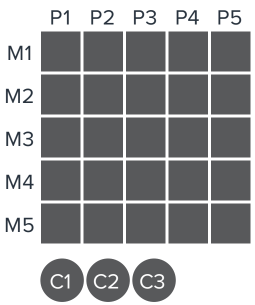


Figure 30. Two-way cycle paths



Cycle paths, separate from footpaths and traffic lanes, are a prevalent design approach in open space settings, integrated with railway or tram corridors, parallel to motorways or other structures, and running alongside bustling arterials. Designing for separation from people walking is an optimal outcome that effectively addresses conflicts arising from variances in travel speeds among different user groups.

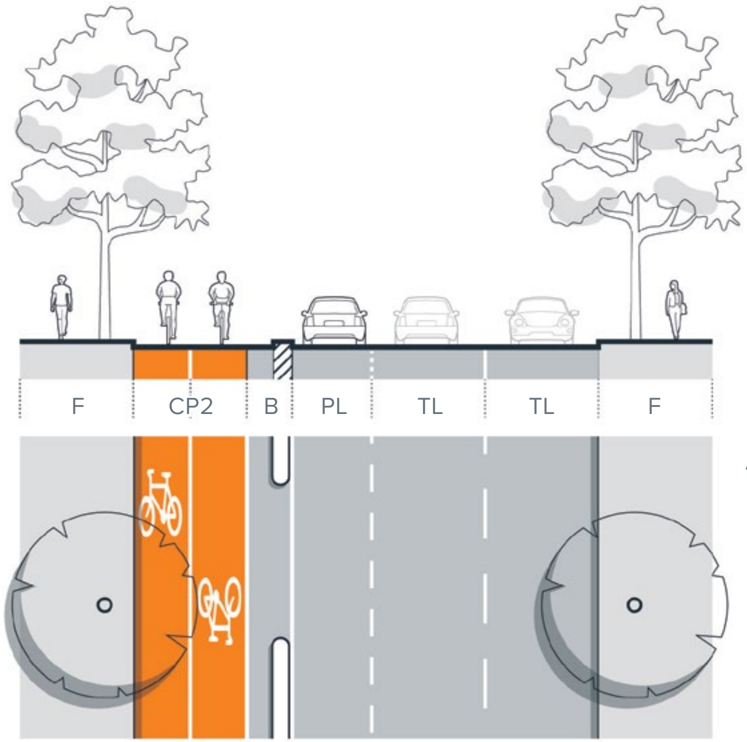
	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP2 – Two-way cycle path width	3.5	4	2.4	2

Table 22. Recommended dimensions (in metres) for two-way cycle paths

Design notes:

- **Elevation:** Within areas prone to flooding and to prevent loss of access during storm events and subsequent debris deposits, paths are typically elevated above the anticipated modeled flood depth. Elevated paths should also be provided when crossing tree roots to avoid damaging during excavation, loading and compression of soil within tree protection zones.
- **Geometry and clearances:** The location of shared paths typically outside of the urban environment allows for the achievement of ideal path geometry when compared with retrofitted paths within existing road corridors. The parameters set out in Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021) (AGRD 6A) should be readily achieved.
- **Fencing:** The requirements for fencing vertical drops, water bodies and other hazards are provided on AGRD 6A Section 5.5.3. Where it is necessary to install fencing alongside a path, and the fencing is within 0.5 metres of the path, the fencing should not feature elements that could trap or snag bicycle handlebars, such as widely spaced horizontal bars or low fencing with decorative spikes. Where an existing fence is located within 0.3 metres of the path, a horizontal deflection rail should be provided (refer to AGRD 6A, Section 5).
- **Lighting:** For paths remote from roads the level of lighting should be higher than is generally provided, particularly where there are personal security concerns.
- **Surface treatment:** The DIT Guide to Bikeway Pavement Design, Construction and Maintenance for South Australia (DIT, 2015) provides guidance on the selection and design of lightly trafficked road pavements. The use of unsealed and spray treatment pavements should be reserved for very low use paths or for heritage considerations. Feedback from bicycle user groups have identified block paver type pavements as offering a low level of rider comfort and should be avoided.
- **Conflict between people wheeling and walking:** Physical separation from people walking is important as they often wander into cycle paths unintentionally. To minimise conflicts between users traveling at different speeds, consider using landscaping (preferred) or kerbing between walking and cycle paths in addition to pavement marking.

Two-way on-road cycle paths



Annotations:

F = Footpath

BF = Bike facility

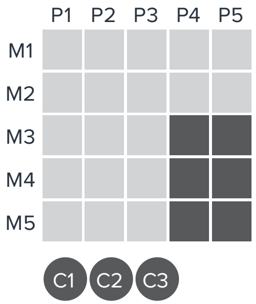
B = Buffer

PL = Parking lane

TL = Traffic lane

M = Median

Figure 31. Two-way on-road cycle paths



On-road cycle paths are a variant of cycle paths described on page 53. This approach is applicable only when establishing one-way cycle lanes on either side of the road or an off-road solution is not feasible. Despite its space-saving advantages, this design is not preferred due to increased conflicts between people wheeling in the contra-flow direction and cars turning at crossovers and intersections. Two-way on-road cycle paths are also unsuitable for streets with high Place status (P1, P2 and P3) due to risks associated with people crossing the street.

It is recommended to position two-way cycle paths on the side of the road with fewer intersecting side roads, crossovers, bus stops and areas of high parking turnover.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP2 – Two-way cycle path width	3	3+	2.4	2
B – Buffer width	1	1+	0.4	0
PL – Parking lane width	2.1	2.1	2	2

Table 23. Recommended dimensions (in metres) for two-way on-road cycle paths

Bourke Street Cycleway, Sydney

Shared paths

Shared paths cater for people walking and wheeling and require them to share the same space. Australian Road Rules require cyclists to give way to pedestrians. This rule ensures that pedestrians, who are generally more vulnerable, have the right of way over cyclists on shared paths.

To encourage considerate sharing, shared path pavement markings can be enhanced with pictorial decals that include 'share and care' messages.

It is important to consider the number of people walking and the speed of wheeled device users. With the increasing use of e-bikes, which can maintain speeds of up to 25 km/h for long periods, separating walking and cycle paths are the preferred option.

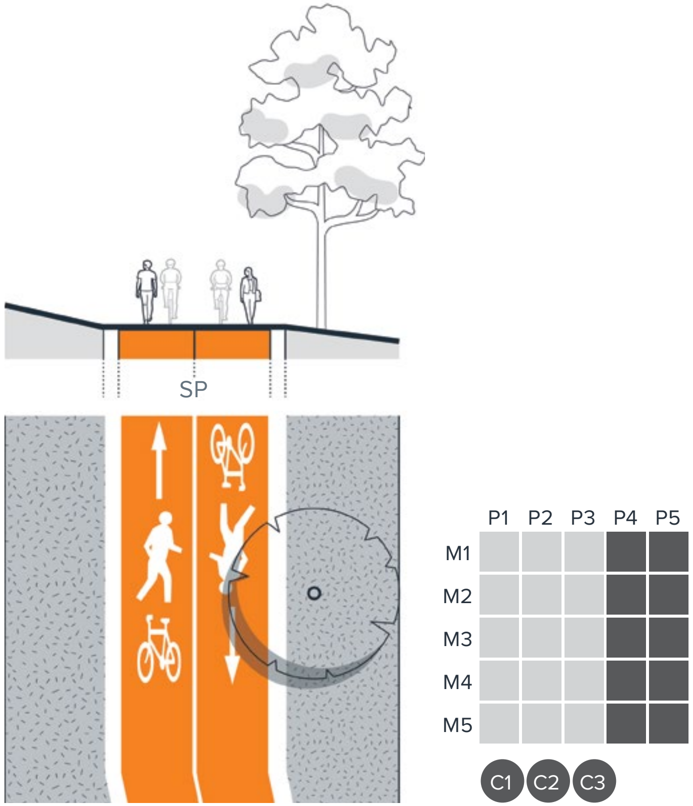


Figure 32. Shared paths

Gawler Greenway, Salisbury

	Desirable	Overtaking, high volume and C1 routes	Minimum	Isolated constrained locations
SP – Two-way shared path width	3	3+	2.5	2
Lateral clearance	1	1	0.5	0.3

Table 24. Recommended dimensions (in metres) for shared paths

Design notes:

- Refer to Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021) for guidance on the maximum number of people walking and wheeling that can be accommodated on a shared path.
- Refer to 'Two-way cycle paths' on page 53 for additional design notes.

Old Coach Road, Aldinga

Paths alongside M1 corridors

This section offers general notes specific to paths alongside strategic M1 corridors. Provision of active travel facilities alongside strategic routes is considered best practice, maximising the benefits of significant infrastructure investments.

- **Design parameters:** For cycling or shared paths situated along M1 transport corridors, it is important to recognise the strategic nature, often spanning significant distances. Due to the length of coverage, implementation costs can be high and usage volumes may be low (due to air and noise considerations), unless they pass through densely populated areas. To mitigate costs, it may be warranted to design these paths to 'minimum' rather than 'desirable' widths. For information on gradients, geometry and clearances, refer to the Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021) (AGRD 6A).
- **Fencing:** the requirements for fencing vertical drops, water bodies and other hazards are provided in ARGD 6A Section 5.5.3. Where it is necessary to install fencing alongside a path, and the fencing is within 0.5 metres of the path, the fencing should not feature elements that could trap or snag bicycle handlebars, such as widely spaced horizontal bars or low fencing with decorative spikes. Where an existing fence is located within 0.3 metres of the path, a horizontal deflection rail should be provided (refer to AGRD 6A, Section 5).
- **Lighting:** Paths situated away from roads should ideally have higher levels of lighting compared to standard provisions, especially in areas where personal security concerns may be present.
- **Surface treatment:** The DIT Guide to Bikeway Pavement Design, Construction and Maintenance for South Australia (DIT, 2015) offers guidance on selecting and designing lightly trafficked road pavements. Unsealed and spray treatment pavements are recommended only for very low use paths or heritage considerations. Feedback from bicycle user groups indicates that block paver type pavements provide low rider comfort and should be avoided.

Elevated paths are employed in flood-prone areas to maintain access during storms and prevent debris accumulation. They are typically raised above anticipated flood depths. Additionally, elevated paths may be necessary when crossing tree roots to prevent damage during excavation and soil compression within tree protection zones.

Overpass, Mike Turtur Bikeway

	Desirable	High volume	Minimum	Isolated
Off-road shared path				
Path width for a narrow land corridor	3	3	2.5	2
Path width for expected speeds of 30km/h or gradients of 7% plus	Not to be used			
Lateral clearance*	1	1	0.5	0.3
Off-road cycle and walking paths segregated by line marking only				
Path width for a narrow land corridor	Footpath: 1.5 Cycle path: 2.5	Footpath: 1.5 Cycle path: 2.5	Footpath: 1.5 Cycle path: 2	Footpath: 1 Cycle path: 2
Path width for expected speeds of 30km/h or gradients of 7% plus	Footpath: 1.5 Cycle path: 4	Footpath: 1.5 Cycle path: 3.5	Footpath: 1.5 Cycle path: 3	Footpath: 1 Cycle path: 2.5
Lateral clearance*	1	1	0.5	0.3
Off-road cycle and walking paths separated by a physical buffer				
Path width for expected speeds of 30km/h or gradients of 7% plus	Footpath: 2 Cycle path: 3.5	Footpath: 3 Cycle path: 4	Footpath: 1.5 Cycle path: 3	Footpath: 1 Cycle path: 2.5
Median	3	3	2	0
Lateral clearance*	1	1	0.5	0.3

Table 25. Paths adjacent M1 corridors – recommended dimensions (in metres)

Adopted from Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021)

*It is acknowledged that achieving the lateral clearance dimension is challenging due to the significant increase in infrastructure costs (bridge, tunnel, or other structures). However, if smooth vertical surfaces can be provided at the path edges, without encroachment by railings or handlebars, the lateral clearance requirement can be reduced.

8.5 Cycle facilities in low traffic environment

Local streets make up most of South Australia's road network. Calm local streets can significantly boost active travel. Globally, reduced car speeds have created safer, more comfortable environments for walking and wheeling while maintaining car access and movement.

Many Australian councils are transforming local streets by introducing facilities for walking and wheeling such as neighborhood greenways, active links, and roadway 'dieting' initiatives that create safer, active streets.

This section of the Guide introduces some of these initiatives.

Two-way local streets with sharrow markings

Two-way local streets that form a C3 cycle route and experience 85th percentile car speeds of 30 km/h or less create a safe road environment for all users. In such environments, people wheeling can be encouraged to take the lane, to avoid opening car doors.

Sharrow pavement markings can be used to identify local streets designated as cycle routes and to assist drivers in accepting the slower environment. These markings can be complemented with distinctive coloured pavement art or other street art elements to signal to all users that they are within a slower environment.

In local streets with higher speeds, traffic calming devices can achieve speeds of 30 km/h and less.

Traffic calming devices on cycle routes should avoid creating tight spots between people wheeling and cars. They should also minimise discomfort for cyclists. Ideally, a cycle bypass should be provided so cyclists can proceed without obstacles. To make room for the bypass, on-street parking will need to be removed. Cyclists should not have to turn more than 10 degrees to enter and exit the bypass, as sharper turns create a winding path that drivers find hard to predict.

A variety of devices are available, one example being a Watts profile road hump with cycle bypasses (Figure 34). Other options include:

- **Sinusoidal road humps.** These provide a smoother ride for cyclists compared to conventional flat-top or round-top humps. The sinusoidal shape reduces the initial jolt experienced by cyclists, enhancing comfort.
- **Angled slow points.** These are kerb extensions on alternating sides of the road that narrow and angle the trafficable width. A cycle bypass should be provided for these.

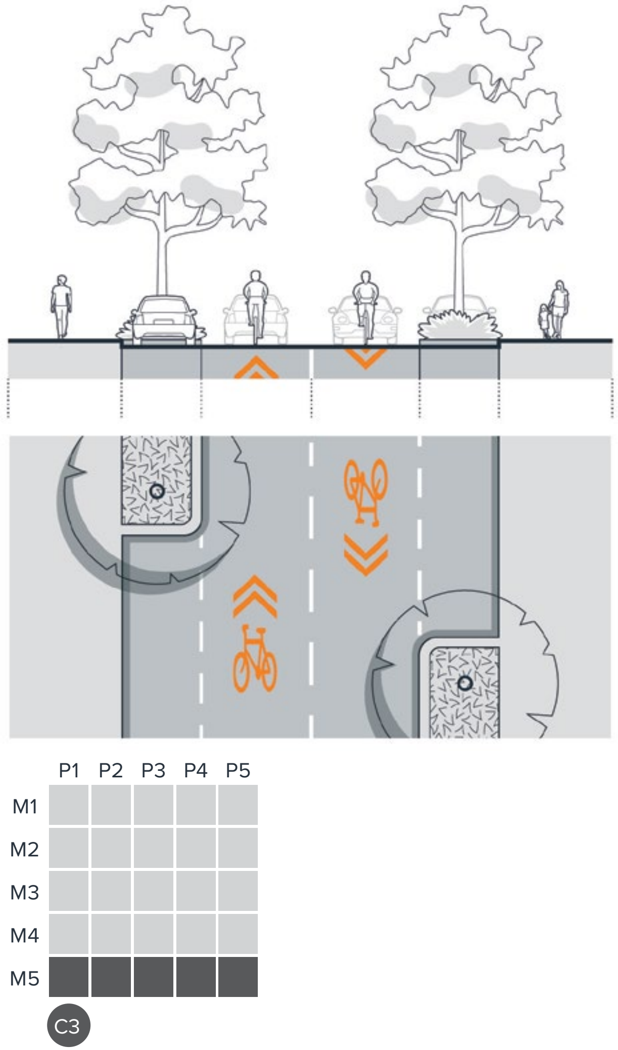


Figure 33. Sharrow markings on two-way local streets

- **Road cushions.** These allow motor vehicles to partially straddle a narrow raised section of the road. When using these, careful consideration is needed for the spacing, as cyclists will change their course to travel between them, potentially moving in front of following cars or close to parked cars in the dooring zone.
- **Raised pavement treatments.**

Design notes:

- Kerb extensions can reduce car speeds by providing side friction and enhance the route with incorporated landscaping.
- Refer to DIT Supplement to AS 1742.9 Manual of uniform traffic control devices Part 9: Bicycle facilities (DIT, 2024).
- Refer to DIT Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices Part 2 (DIT, 2024).

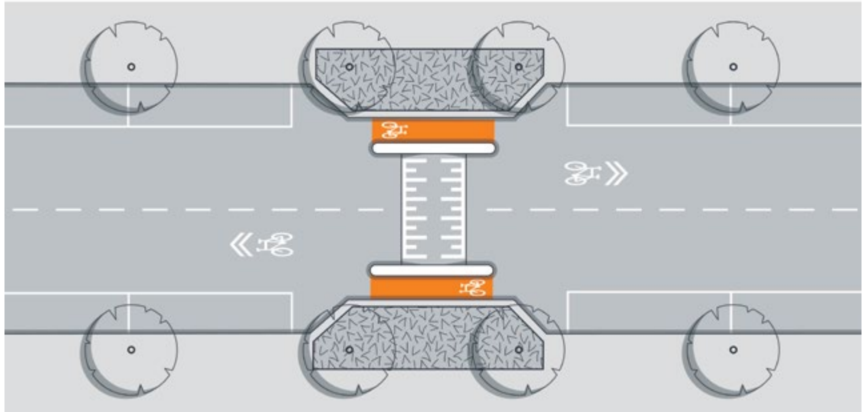
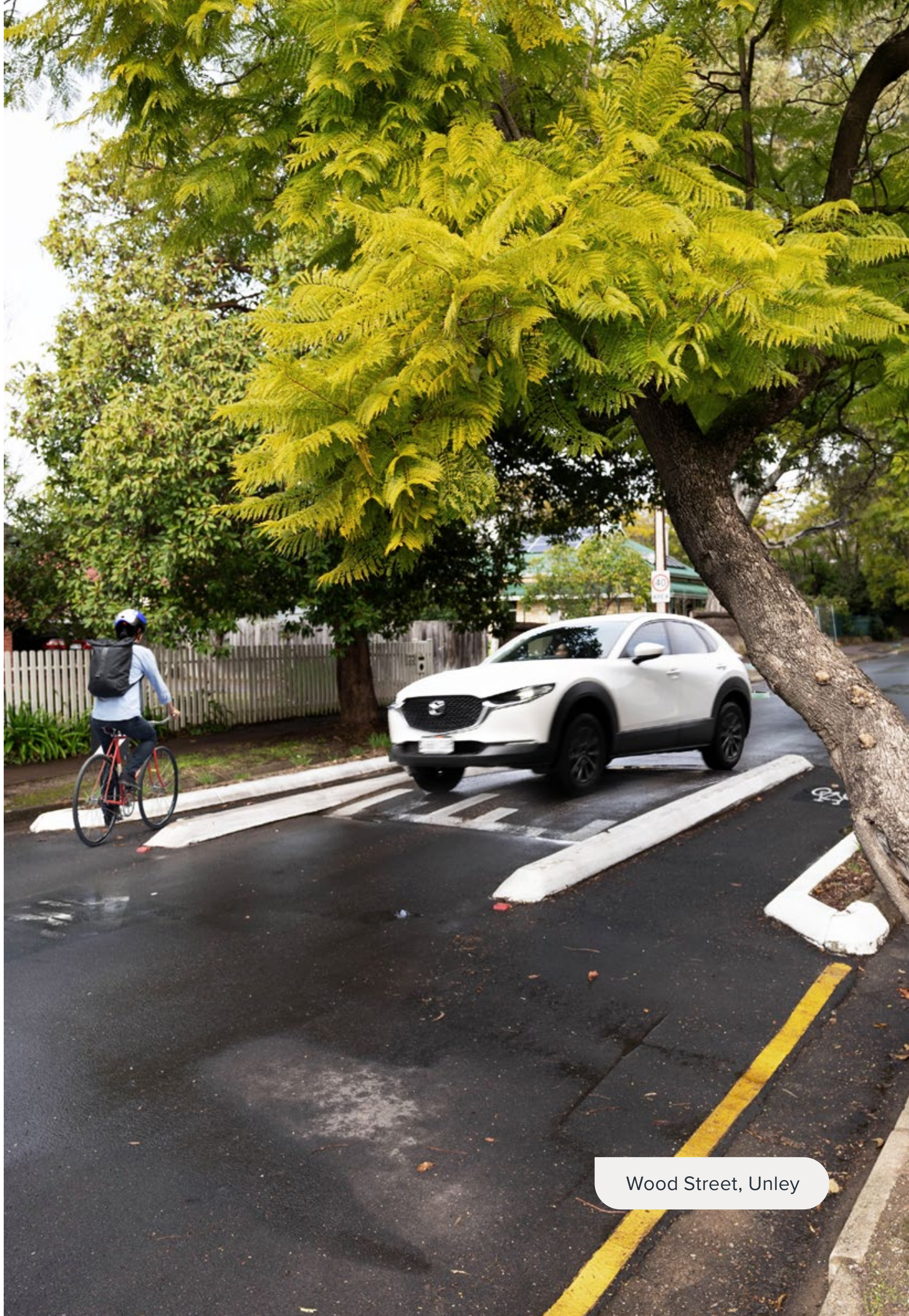


Figure 34. Watts profile speed hump with a cycle bypass



Wood Street, Unley

One-way local streets with contra-flow cycle movement

One-way local streets can become an interruption for people wheeling and limit the use of local streets for safe travel. The implementation of contra-flow facilities can provide shorter routes and may prevent people wheeling from using riskier route options.

The most common configuration of a cycle contra-flow in South Australia is an advisory contra-flow treatment that consists of sharrow pavement markings aligned in both the general traffic direction and the cycling direction. This treatment is only suitable in local streets that have daily car volumes of less than 500 vehicles and car speeds of less than 30 km/h.

For streets with higher car volumes and speeds, a separated cycle lane is needed for contra-flow cycling (Figure 36). This lane allows people to wheel opposite to the direction of car traffic on a one-way street, effectively converting it into a two-way street: one direction for cars and cyclists, and the other for cyclists only.

Where side streets intersect a one-way local street with contra-flow cycle movement the Bicycles (W6-7) sign should be used with Crossing Arrows (W8-23) to warn drivers that cyclists may be approaching from both directions. Bicycle Excepted (R9-3) signs are needed where one-way and no entry signs are present. Sharrows should be strategically placed for visibility to drivers emerging from the side streets. To improve visibility at these intersections, consider increasing no stopping restrictions from 10 metres to 15 metres.

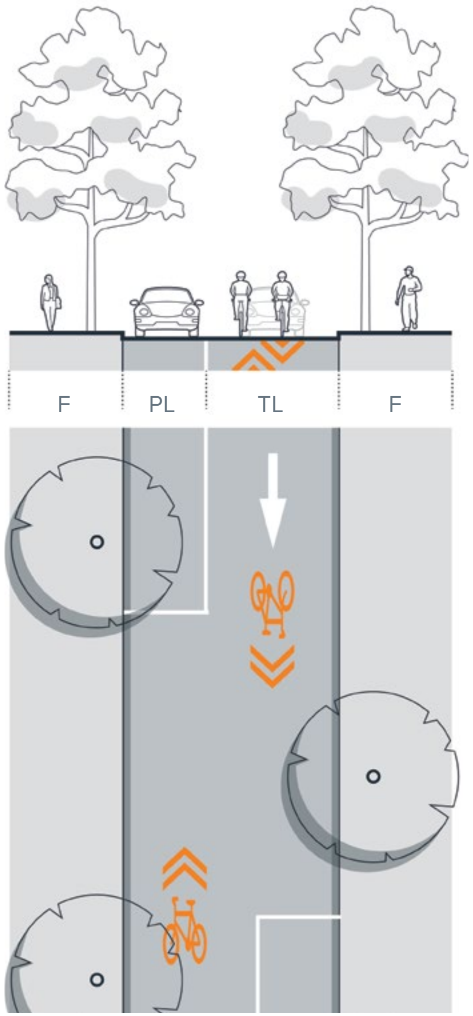


Figure 35. A one-way local street with contra-flow cycle movement marked by sharrows, in a low traffic volume and low speed environment

Annotations:

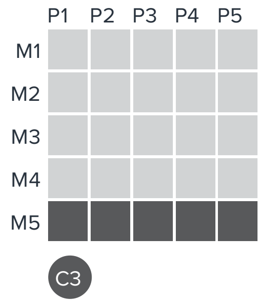
F = Footpath

CL = Cycle lane

PL = Parking lane

TL = Traffic lane

B = Buffer



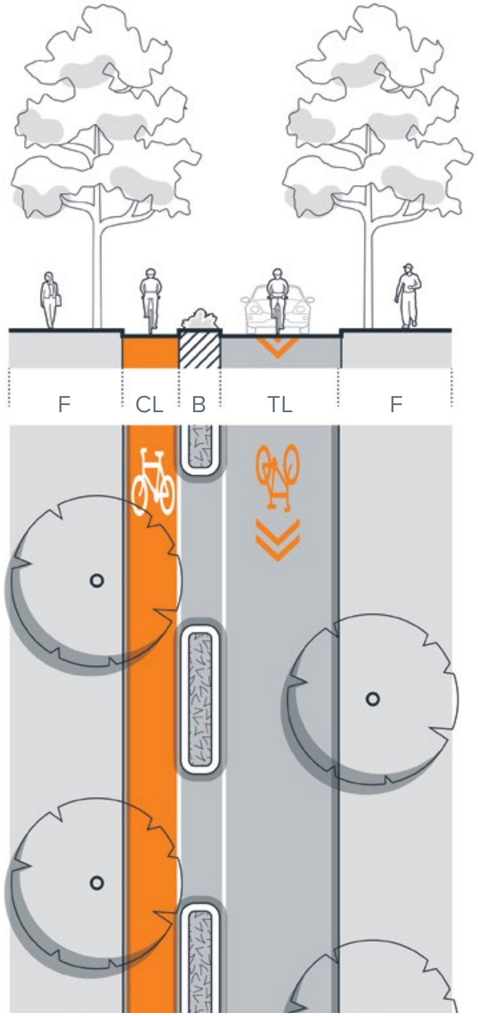


Figure 36. A one-way local street with a protected contra-flow cycle lane.

	Desirable	Overtaking or high volume	Minimum	Isolated constrained locations
CL – Cycle lane width	2.4	3	2	1.2
B – Buffer width	1	1+	0.4	0.4
TL – Traffic lane width	3	3	2.8	2.8

Table 26. Recommended dimensions (in metres) for one-way streets with contra-flow cycle movement

Design notes:

- At intersection entry and exit points, a separated cycle lane with a semi-mountable kerb profile must be provided.
- To assist in achieving slow speed vehicle movement for an advisory contra-flow within a narrow street (up to 5.5 metres) the on-street parking arrangement should be staggered to break up long street lengths.
- Kerb extensions can be used to provide side friction to reduce vehicle speeds and to provide green space to enhance the route.
- On-street parking can be provided within a road with a separated cycle lane contra-flow but should be located kerbside and not against the separation median.

Charlotte Street, Adelaide

Modal filters

Modal filters enhance safety and create a more comfortable road environment by limiting through-traffic and facilitating active travel modes through cul-de-sacs, ensuring uninterrupted network access and reducing travel distances. Design considerations should address potential conflicts at T-intersections, ensuring clear, unimpeded pathways for people walking and wheeling, and enhancing their visibility to drivers.

Various arrangements can be used, from quality streetscape designs with landscaped parklets to low-cost solutions using prefabricated plastic kerbing and flexi-posts to prevent car access. An example of a modal filter arrangement is shown in Figure 37.

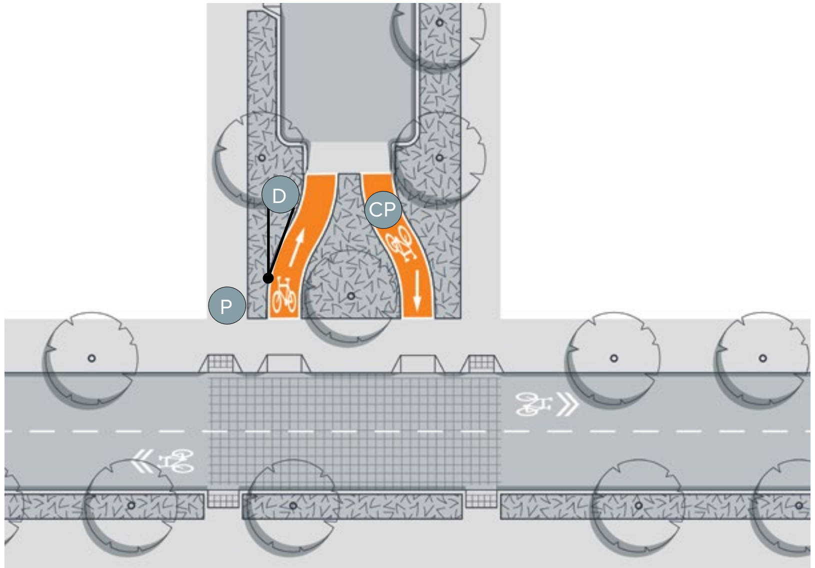


Figure 37. Modal filter

Design notes:

- Separate cycle lanes or paths and walking paths are to be provided.
- Distinctive green pavement can be used for the cycle lanes/paths.
- Where the modal filter connects to intersecting roads, consider using aesthetically distinctive coloured pavements, cycle right turn lanes and island refuges to enhance awareness, provide staged crossings and shelter cycle turning movements.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP – cycle path width	1.4	1.4	1.2	1
D – cycle path deflection	20^0	20^0	0^0	30^0
P – path width	To match approach path width	To match approach path width	1.5	1

Table 27. Recommended dimensions (in metres) for a modal filter

Fitzroy Terrace, Prospect

Integration of cycle paths

Where cycle routes transition between on-street and off-street facilities, cyclists often have to compete with drivers to position themselves advantageously for a right turn, which can be daunting for less confident users. To assist with this manoeuvre, a physically protected right-turn cycle lane should be provided. If road width or vehicle checks prevent using a raised median, potential conflict areas can be highlighted with aesthetically distinctive coloured pavements. Examples of such treatments are shown in Figure 38 and Figure 39.

Fullarton Road, Norwood

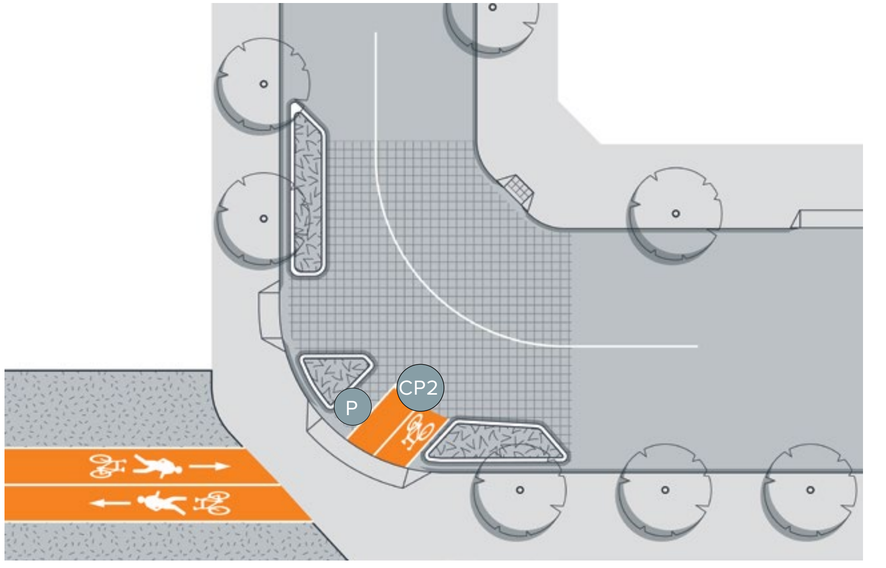


Figure 38. Integration of shared paths with local streets

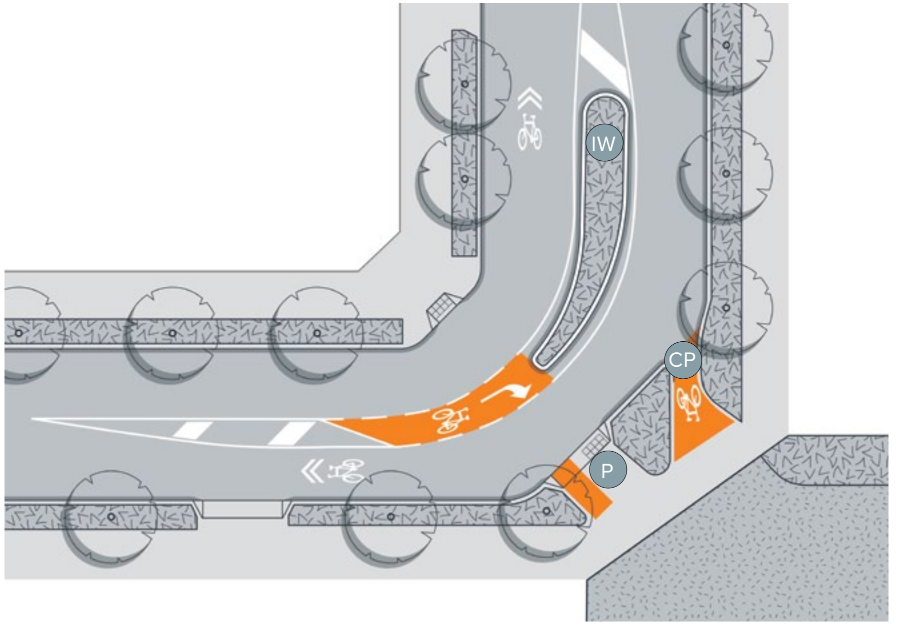


Figure 39. Integration of shared paths with local streets and the provision of a dedicated right turn lane for cyclists

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP – cycle path width	1.4	1.4	1.2	1
CP2 – two-way cycle path width	3	3	2.5	2
IW – island width	3	3	2	1.8
P – path width	To match approach path width	To match approach path width	1.5	1

Table 28. Recommended dimensions (in metres) for facilities integrating shared paths with local streets

Design notes:

- Separate cycle lanes/paths and walking paths are to be provided.
- Distinctive green pavement can be used for the cycle lanes/paths including the cycle right turn lane.
- Where possible use larger islands to provide landscaping, including trees.

9. Intersections

This chapter offers a collection of intersection design options for the cycle links, paths and local streets introduced in the previous chapter '8. Cycling facilities' on page 40.

> Intersection treatments for active travel should be integrated into overall cycling and walking infrastructure planning rather than implemented as isolated projects. These treatments must ensure continuity of cycling and walking facilities that are provided mid-block.

Designing intersections that accommodate all road users presents several challenges. One major issue is ensuring safety for all users, as intersections are common sites for conflicts between different modes of transportation. For pedestrians, challenges may include long wait times to cross, inadequate crossing signals, or insufficient space for them to wait safely. Cyclists face challenges such as unclear or inconsistent lane markings, blind spots for turning vehicles and a lack of dedicated cycling infrastructure.

Another challenge lies in prioritising active travel users within the intersection design. In many cases, intersections have been designed to optimise traffic flow for motor vehicles, leaving limited space and consideration for pedestrians and cyclists. This can result in designs that neglect the needs of these users, leading to unsafe or uncomfortable conditions. Effective intersection design for people walking and wheeling requires careful consideration of their needs against traffic flow conditions, clear signage and markings, and prioritises their safety above other considerations.

Optimising road designs to maximum vehicle size negatively impacts active travel options. Large vehicles require wide turning circles, resulting in wider corners and reduced space for cyclists and pedestrians. This increases the risk of conflicts between different modes of transportation. Designing for large vehicles should be limited to strategic freight routes and where there is a demonstrated need to accommodate high volumes of such vehicles. It is suggested that for local roads, often connecting to arterial roads, the AS2890 MRV vehicle template be used as the check vehicle, representing the majority of waste collection type vehicles, and the B99 as the design vehicle.

In intersection design, it is essential to balance the competing needs of different users through the strategic management of signal length, priority and the provision of dedicated turning movements. Once safety considerations are addressed as the first priority, the level of service provided to each mode of transportation should align with the hierarchy status assigned to those users within the network.

For further guidance refer to chapter '12. Key technical references' on page 112.

9.1 Intersection types

	Page reference	Signals	Figure references
Intersections with cycle lane facilities			
Signalised intersections			
• Signalised intersection	page 68	Signalised	Figure 40, Figure 41
• Signalised protected intersection	page 70	Signalised	Figure 42
• Options for left turn	page 71	Signalised	Figure 44
Unsignalised intersections			
• Unsignalised T-intersection with green pavement marking	page 72	Unsignalised	Figure 45
• Unsignalised T-intersection connecting cycle paths to cycle lanes	page 73	Unsignalised	Figure 46, Figure 47
Intersections with cycle path facilities			
Signalised intersections			
• Signalised intersection with two-way cycle paths on arterial road	page 75	Signalised	Figure 48, Figure 49
• Signalised T-intersection with a raised platform at side street	page 76	Signalised	Figure 50
• Raised signalised intersection in slower speed environments	page 77	Signalised	Figure 51
Unsignalised intersections			
• Unsignalised T-intersection with give-way signs	page 78	Unsignalised	Figure 52
• Unsignalised intersection with a wombat crossing and a two-way cycle path	page 79	Unsignalised	Figure 53
Intersections with no dedicated cycle facilities			
• Unsignalised intersection	page 80	Unsignalised	Figure 54
• Roundabouts	page 82	Unsignalised	Figure 56, Figure 57, Figure 58, Figure 59
Grade separated crossings			
• Overpasses	page 87	NA	
• Underpasses	page 88	NA	Figure 60

Table 29. Index of intersection types included in the Guide

9.2 Intersections with cycle lane facilities

Signalised intersection

This design approach is applicable to signalised intersections, including signalised T-intersections, with cycle lanes. Two intersection arrangements are included:

- Figure 40 includes a left-turn slip road that may help mitigate any decrease in intersection efficiency caused by implementing controlled right turn movements. To enhance pedestrian accessibility, a wombat crossing is included at the left-turn slip lane.
- Figure 41 excludes a left-turn slip lane, which is a recommended arrangement for all street types, particularly for those with higher Place status.

The elimination of slip lanes should be selected based on the operating requirements of the intersection and the numbers of people walking and wheeling in an area.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CL – cycle lane width	To match approach width	To match approach width	1.5	1.2
B – buffer width	To match approach width	To match approach width	0.4	0.3

Table 30. Recommended dimensions (in metres) for a signalised intersection

Note that a similar design approach can also be implemented in instances where the north-south road does not have cycling lanes.

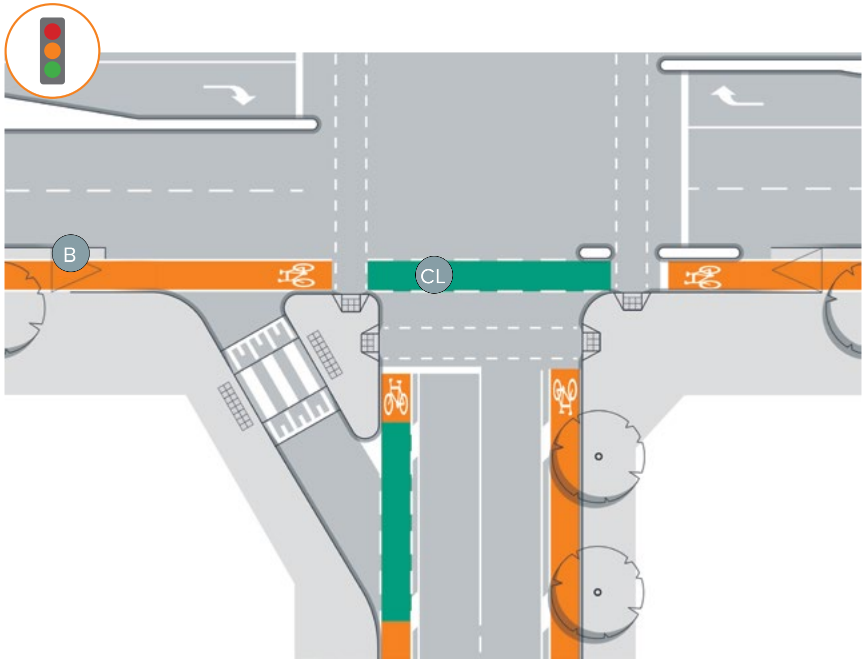


Figure 40. Signalised intersection with a left slip lane

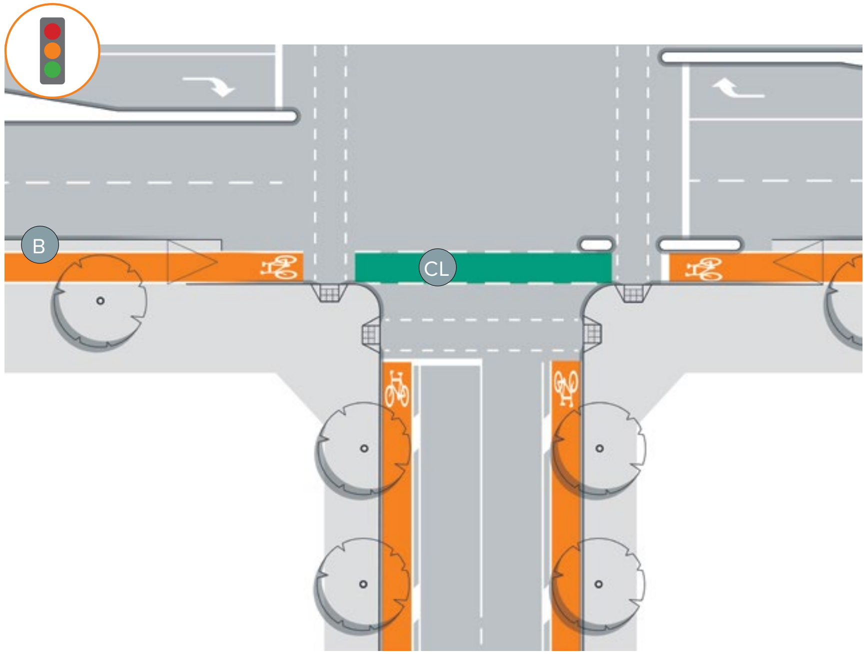


Figure 41. Signalised intersection with no left turn slip lane

The design approach offers limited physical protection for cyclists navigating the intersection, particularly with filtered vehicle right turns. To enhance safety, right-turn filter movements should not be permitted where a dedicated right lane is available. Adjustments to the signal equipment will be necessary to manage right-turn movements effectively.

To improve cyclist protection from left-turning traffic, corner medians are recommended. The installation of corner medians improves the approach angle of the driver.

For cycling routes (C1, C2 and C3) with multiple intersections, implementing a green wave signal effect for cyclists is advisable. This may require the installation of cycling detectors in bike lanes to optimise movement efficiency. Synchronised signal timing minimises riding effort, reduces delays and promotes cycling as a viable alternative to private motor vehicles.

Design notes:

- Apply green-coloured surfacing to emphasise a conflict area where vehicles intersect with the cycle lane. The boundaries of this surfacing should be determined by the turn paths of the design vehicle.
- Decrease corner radii to effectively decrease the turning speeds of motorists while ensuring the design vehicle can make turns from the arterial road without having to split lanes.
- To eliminate conflicts, consider the possibility of removing filtered right-turning movements for motorists.


Hart Street, Semaphore

Signalised protected intersection

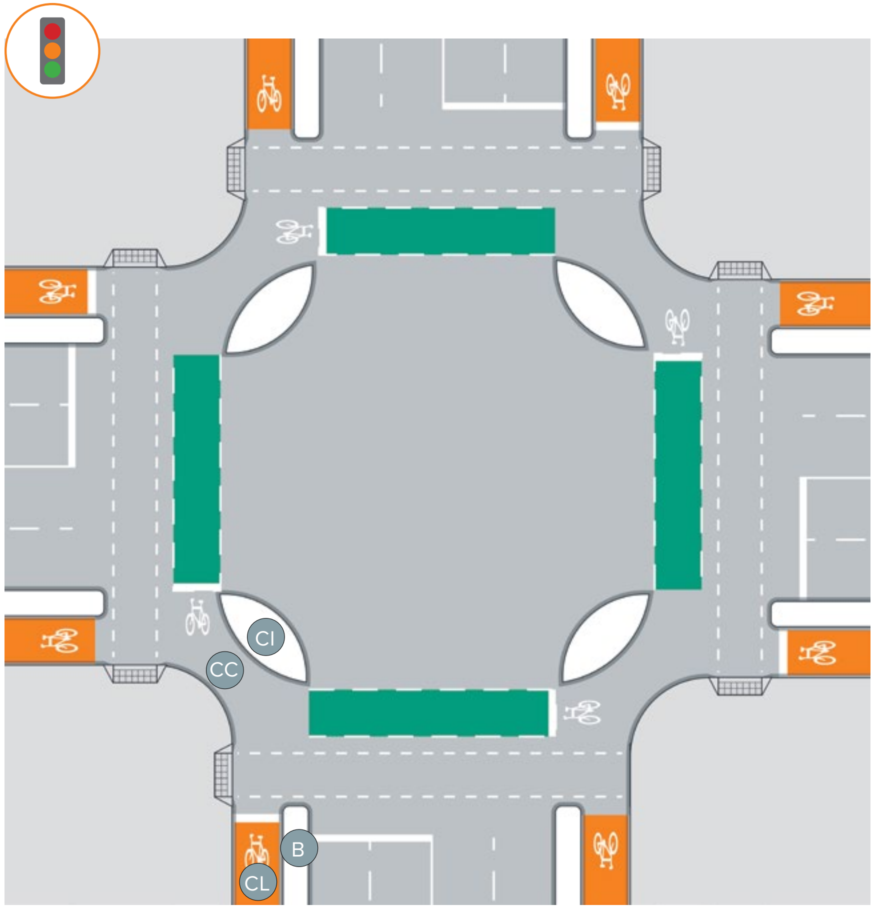


Figure 42. Signalised protected intersection

Where two intersecting one-way cycle lanes meet, a signalised protected intersection will enhance safety and create a comfortable riding environment, particularly for cyclists turning right. The right turn is performed in two stages aligned with concurrent traffic flow similar to a conventional hook turn, with the turn completed over two signal phases. Within this signalised protected intersection, motor vehicles are segregated from cyclists through kerbed islands, ensuring cyclists are prominently positioned within the sightline of turning vehicles, thus establishing a safer environment.

Additional corner medians define a protected area for cyclists waiting for the subsequent signal phase to complete the right turn. The protected area positions the cyclist prominently within the frontal or central vision of a driver at the stop line or approaching the intersection wanting to turn left.

The additional corner median will effectively reduce the speed of motorists turning left, improving safety for cyclists who are continuing straight through the intersection. The protected area will need to accommodate standing cyclists while allowing a through cyclist to pass.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CL – cycle lane width	To match approach width	To match approach width	1.5	1.2
CC – cycle lane width at corner	2.5	3	2	2
B – buffer width	To match approach width	To match approach width	0.5	0.3
CI – corner island width	1	1	1	1

Table 31. Recommended dimensions (in metres) for a signalised protected intersection

Options for left turn

There is an inherent conflict between cars turning left and cyclists continuing straight at intersections, as cars must cross the path of a cyclist. Figure 43 shows a common arrangement that is not ideal for cyclists. The cycle lane is squeezed between traffic lanes and intersected by left turning cars, resulting in residual conflicts and elevated risks for cyclists. The best solution is to extend the cycle lane to the stop line, protecting it from cars with buffers, as shown in the three previous intersection arrangements in Figure 40, Figure 41 and Figure 42.

In cases where there are space limitations for the installation of a cycle lane leading to the intersection, it is recommended to direct people wheeling safely across the road via a signalised crossing, as shown in Figure 44.

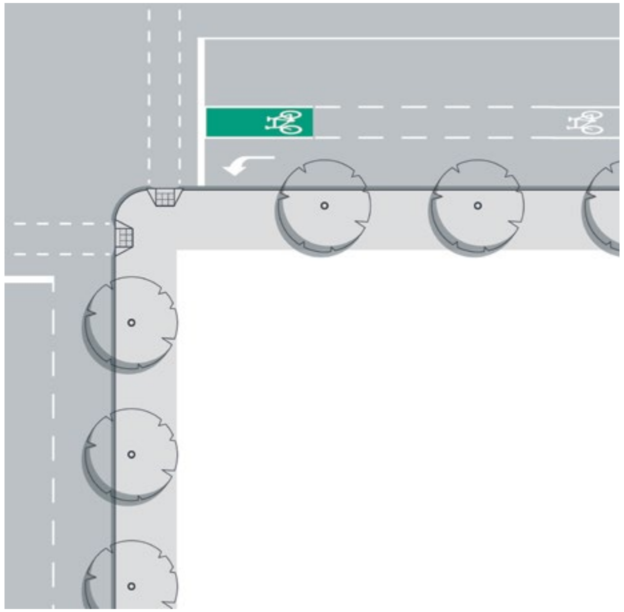


Figure 43. Traditional left turn arrangement at intersections

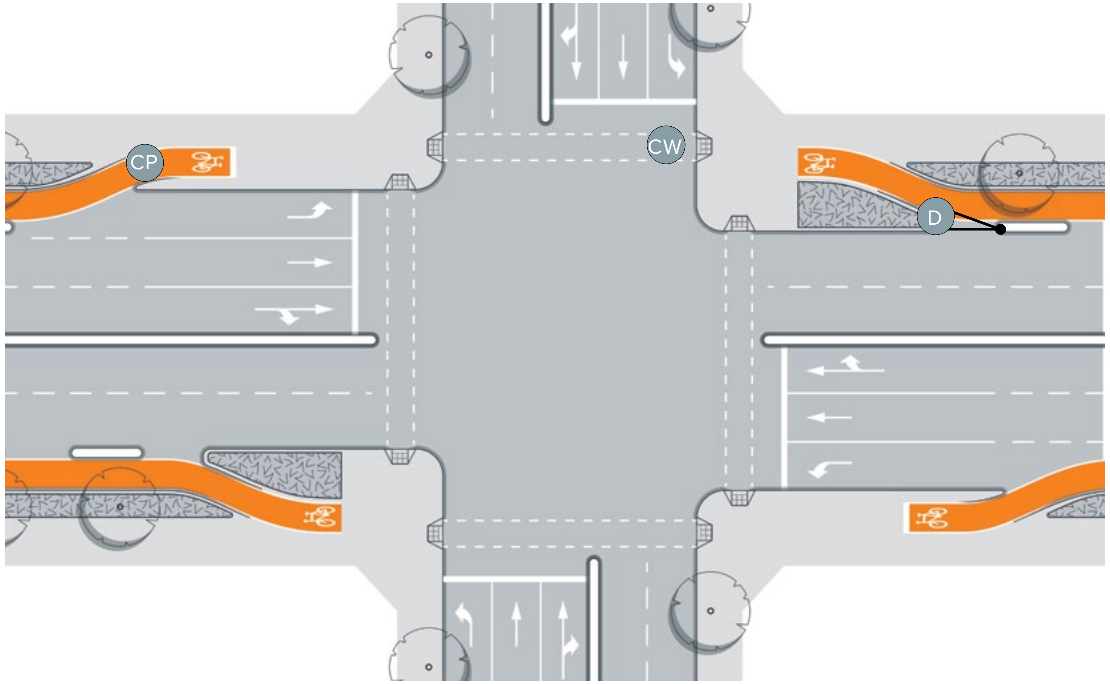


Figure 44. Connecting cycle lanes through PACs at busy arterial intersections

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP – cycle path width	1.4	1.4	1.2	1
D – cycle path deflection	20⁰	20⁰	0⁰	30⁰
CW – crossing width	3	5	2.4	2.4

Table 32. Recommended dimensions (in metres) for a signalised protected intersection

Design notes:

- Kerb ramps should have a maximum gradient of 1:12 with 1:20 preferred.
- The paving of the shared area should be distinct from the footpath paving to clearly indicate that this space is shared.
- Bicycle and pedestrian lanterns should be used for the crossings.

Unsignalised T-intersection with green pavement marking

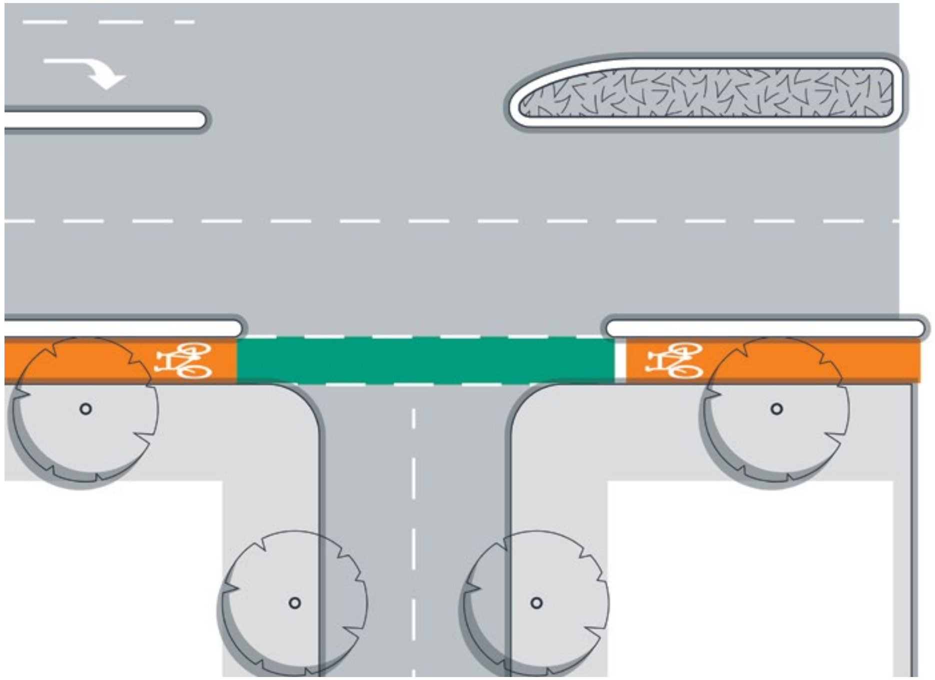


Figure 45. Unsignalised T-intersection with green pavement marking

This approach is suitable for unsignalised T-intersections where an arterial road with a cycle lane intersects with a collector or local road. In the case of a stepped cycle lane design, the raised cycle lane should be lowered to road level at the intersection. This treatment offers minimal protection for people wheeling and walking so should only be considered in areas with limited vehicle-turning volumes and minimal pedestrian traffic. The feasibility of eliminating conflicting motor vehicle-turning movements, particularly right turns from the arterial road, may be assessed.

Design notes:

- Green pavement marking is to be installed at the intersections with side roads to highlight the conflict area and a continuous path of travel for people wheeling, with the extents defined by the turning paths of the design vehicle.
- A separation buffer reduces motorists' turning speeds before the conflict position.

Unsignalised T-intersection connecting cycle paths to cycle lanes

In creating an interconnected active travel network it is essential to make it easy for cyclists to cross roads and connect to local cycling facilities. This may occur in places without existing signalised intersections or the budget to install them.

A low-cost way to connect cycle facilities at T-intersections is to use mid-block devices such as wombat crossings, zebra crossings and median island refuges, creating multi-stage crossings. The design should consider how each device works and their combined impact, such as large vehicle turns, sight distances for vehicles waiting at crossings, and conflicts between different active travel modes on paths or cycle lanes.

The two figures below illustrate these solutions: Figure 46 shows a refuge island across a collector road, while Figure 47 demonstrates a use of PAC across an arterial road.

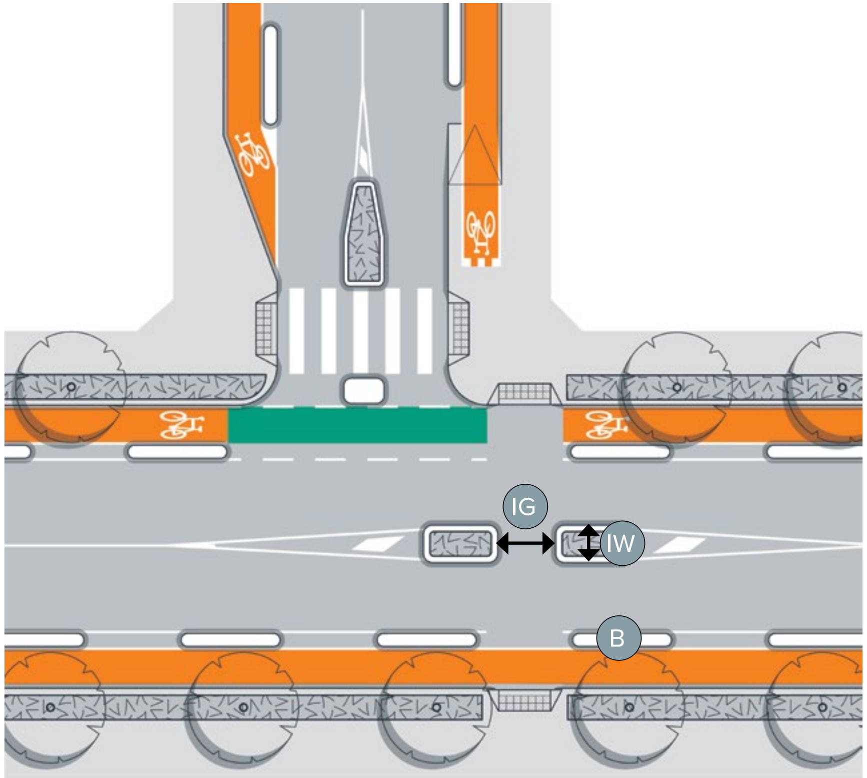


Figure 46. Unsignalised T-intersection connecting cycle lanes on a collector road with cycle paths

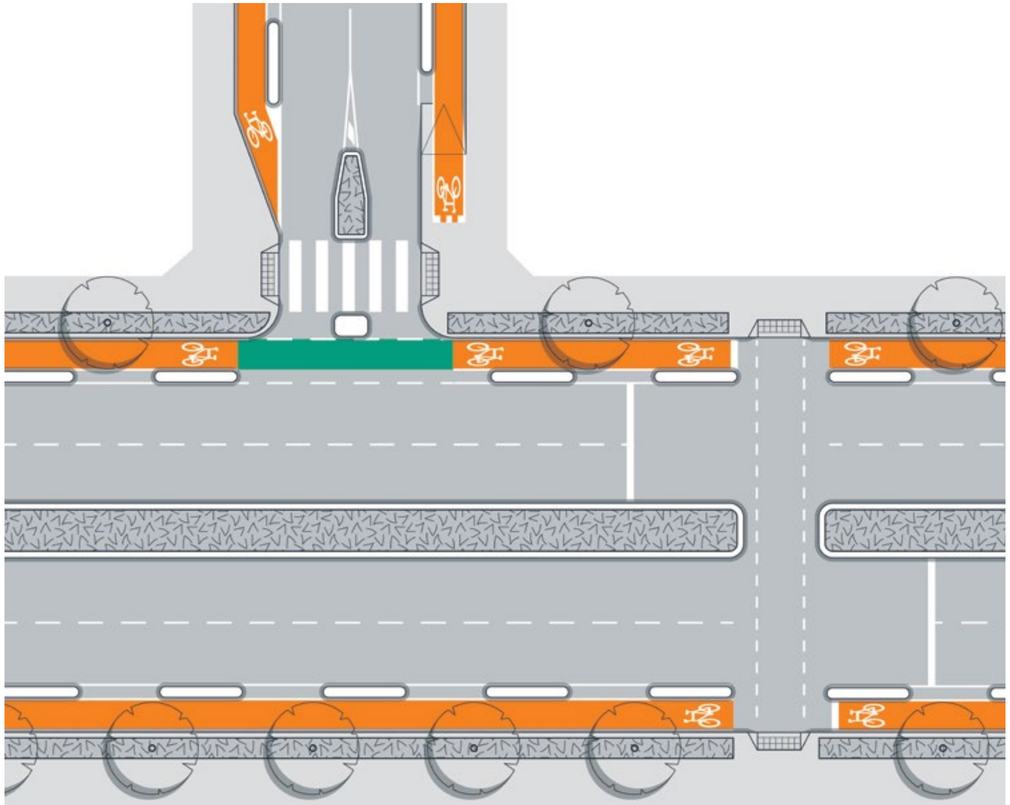


Figure 47. Unsignalised T-intersection with a PAC connecting cycle lanes on an arterial road with cycle paths

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
IW – island width	3	4	2	1.8
IG – island gap (crossing width)	3	6	2.5	2.1
B – buffer width	2	3	0.5	0.5

Table 33. Recommended dimensions (in metres) for an unsignalised T-intersection connecting cycle lanes and cycle paths

Design notes:

- Refer to DIT Supplement to AS 1742.10 Manual of uniform traffic control devices Part 10: Pedestrian control and protection (DIT, 2024), including the guidance on assessing two-way traffic volumes and the level of difficulty to cross the road.
- The constrained width of 1.8 metres for a refuge island can be considered in areas with anticipated low cyclist numbers only when achieving a wider width is cost-prohibitive (for example, if substantial road widening works are required).
- The width of the buffer will affect how pedestrians or cyclists cross the cycle lane to reach the refuge island. A wider buffer will encourage crossing in stages, while a narrower buffer will encourage a single-stage crossing. Buffer widths between 0.5 and 1.7 metres should not be used as they do not provide adequate space for people walking and wheeling waiting to cross.
- Consider providing a car-length setback from the crossing at side roads to allow cars to wait without blocking the cycle lane when giving way to people crossing at a zebra crossing.

9.3 Intersections with cycle path facilities

Signalised intersection with two-way cycle paths on arterial road

Figure 48 and Figure 49 show intersection designs for a two-way cycle path at a signalised intersection. Pedestrian facilities must be maintained or newly installed on all legs of the intersection to prioritise pedestrian safety and accessibility.

The signal phasing must include a dedicated phase exclusively for cycling movements, during which all other transportation modes, including pedestrians, are stopped. Given the current cycling volumes experienced in South Australia, allowing conflicting cycling movements to occur within a single phase is considered acceptable. However, in cases where there is a very high volume of conflicting cycling movements or factors leading to high-speed cycling (such as steep approach gradients), additional dedicated cycle phases may be necessary to effectively separate the different cycling movements.

Where located within high Place status locations (P1, P2 or P3) the signal phasing must be designed to reduce waiting times for people walking and wheeling with additional delays for motorists accepted.

The implementation of dedicated cycle movement and walking phases effectively eliminates conflicts with motor vehicles. Therefore, additional safety measures such as a raised path for cyclists are deemed unnecessary.

If the right turning signal phase for cyclists is not included, a hook turn, shown in Figure 48, can aid right-turning cyclists.

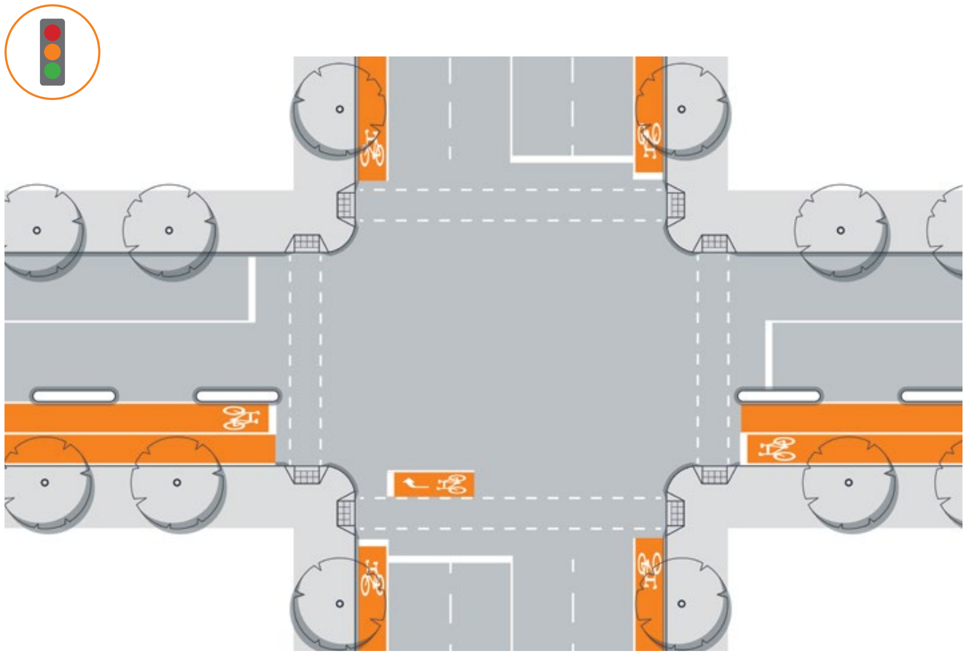


Figure 48. Two-way cycle paths on a collector road at a signalised intersection

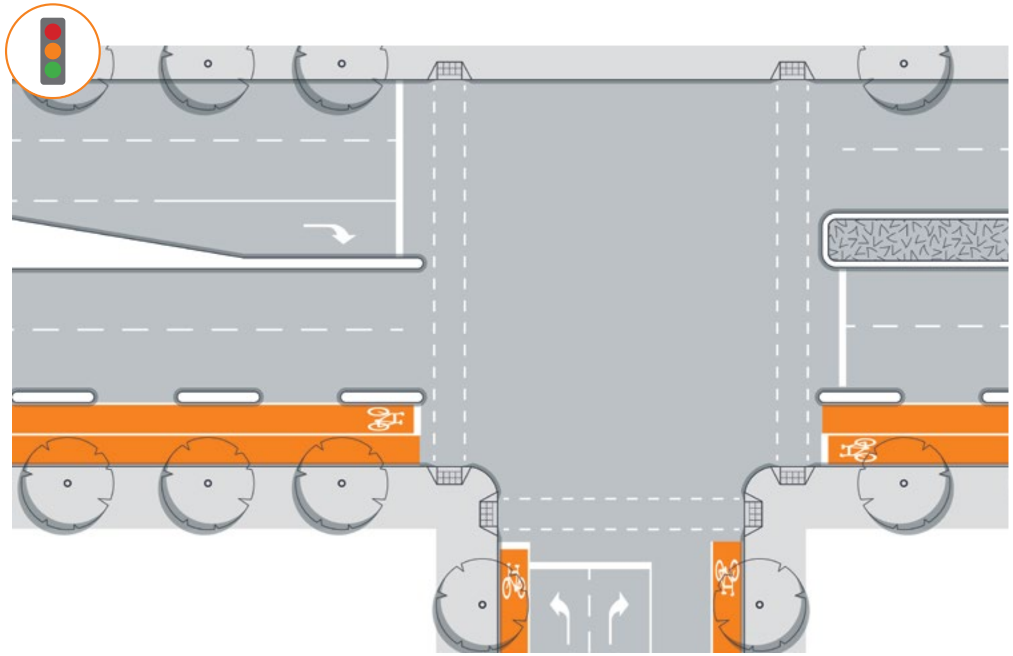


Figure 49. Two-way cycle paths on an arterial road at a signalised T-intersection

Signalised T-intersection with a raised platform at side street

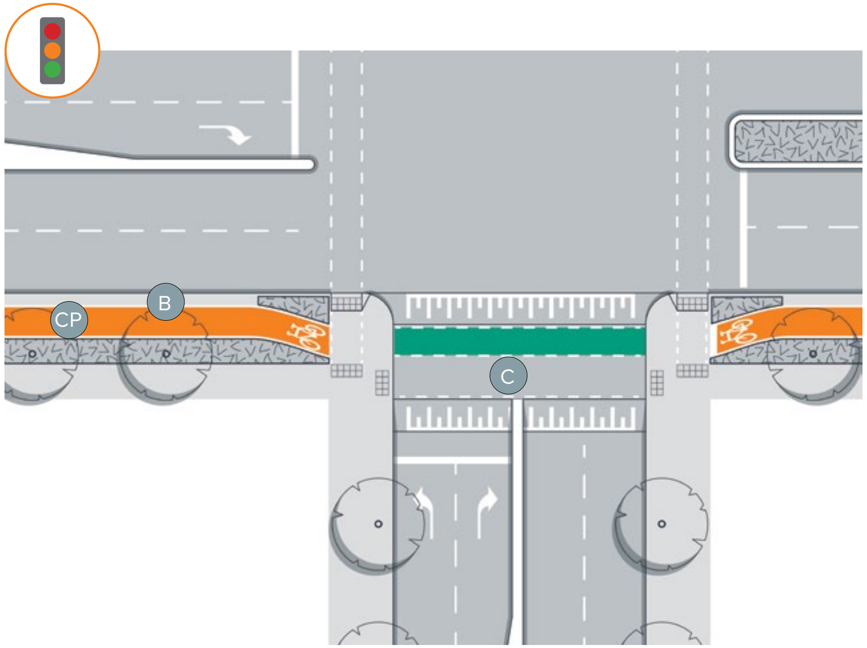


Figure 50. Signalised T-intersection with a raised platform at side street

This approach is applicable at signalised intersections where an arterial or collector road intersects with another arterial with a separated cycle path. The geometric layout of a T-intersection naturally leads to slower traffic movements on the minor arm of the intersection. These reduced speeds facilitate the possibility of raising the carriageway across the minor arm.

For the enhanced safety of active travel users, the cycle paths and footpaths are elevated across the minor arm of the intersection, while the existing left turn slip lanes are removed. This facilitates seamless movement for people walking and wheeling without a vertical deflection.

This treatment makes it safer for people walking and wheeling to cross the side street by slowing traffic with a raised platform. To improve safety, right-turn filter movements should not be permitted where a right lane is available. Adjustments to the signal equipment will be necessary to manage the right turn movement effectively.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP – cycle path width	To match approach width	To match approach width	1.5	1.2
B – buffer width	To match approach width	To match approach width	0.4	0.3
C – crossing width	Sum of bicycle and path width	Sum of bicycle and path width	3	2.4

Table 34. Recommended dimensions (in metres) for a signalised T-intersection with a raised platform at side street

Design notes:

- Minor arm vehicle movements are slowed by the vertical deflection of a raised carriageway in advance of the conflict point with people walking or wheeling.
- Major arm vehicle movements do not negotiate any vertical deflection.
- Decrease corner radii to effectively decrease the turning speeds of motorists while still ensuring that the design vehicle can make turns from the arterial road without needing to split lanes.
- To eliminate conflicts, consider the possibility of removing filtered right turning movements for motorists.

Raised signalised intersection in slower speed environments

The intersection design of signalised intersections located in activity centres characterised by typical travel speeds of 30 km/h and posted speed limits of 40 km/h or lower should prioritise the safe and convenient crossing movements of people walking and wheeling.

To achieve this and accommodate all crossing movements, a raised platform should extend across the intersection. Implementing a scramble crossing arrangement will offer the highest level of service for non-motorised movements. Scramble crossings enhance protection by temporally separating motorised and non-motorised users, halting all vehicular movements to allow crossing without the potential for conflict.

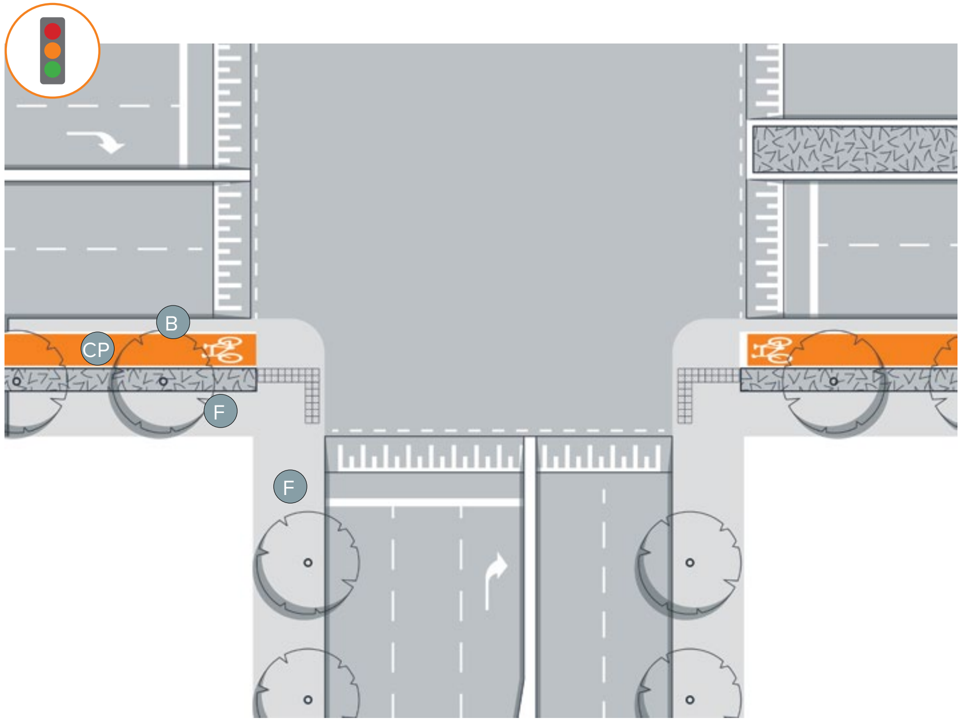


Figure 51. Raised signalised intersection in slower speed environments

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
CP – cycle path width	To match approach width	To match approach width	1.5	1.2
B – buffer width	To match approach width	To match approach width	0.4	0.3
F – footpath width	To match approach width	To match approach width	1.8	1.2

Table 35. Recommended dimensions (in metres) for a raised signalised intersection in slower speed environments

Design notes:

- Reduce corner radii to effectively reduce the turning speeds of motorists.
- Modifications to the drainage infrastructure will be required.
- Refer to the DIT Operational Instruction 14.1 Scramble Pedestrian Crossings (DIT, 2019).
- Refer to Austroads Research Report AP-R642-20 Effectiveness and Implementation of Raised Safety Platforms (Austroads, 2020).

Unsignalised T-intersection with give-way signs

A raised crossing with give-way signs is the preferred treatment for intersections where a collector or local road intersects an arterial road with a one-way cycle path. This design creates a continuous path across the intersection, prioritising people walking and wheeling over motor vehicles. An alternative is to install a wombat crossing instead of the give-way treatment, for a greater level of visibility of people walking and wheeling. The design is the preferred solution for a four-way intersection, while a T-intersection treatment can be designed as either.

This treatment can also enhance safety for separated cycle lanes at road level.

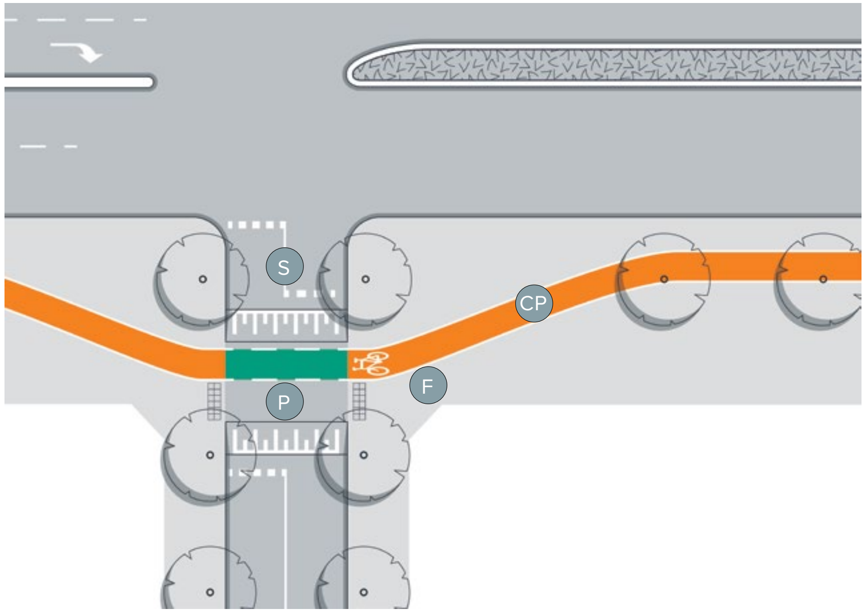


Figure 52. Unsignalised T-intersection with a give-way signs

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
S – setback length	5 to 7	5 to 7	1.5	1.2
CP – cycle path width	1.8	2.4	1.2	1.2
F – footpath width	2	3+	1.8	1.2
P – platform length	8	8	6	6

Table 36. Recommended dimensions (in metres) for an unsignalised T-intersection with give-way signs

Design notes:

- Reduce corner radii to effectively reduce the turning speeds of motorists while ensuring that the design vehicle can make turns from the arterial road without needing to split lanes.
- Explore the potential of removing motorists' turning movements, particularly right turns from the arterial road.
- Modifications to the drainage infrastructure maybe required.
- Refer to the DIT Supplement to AS 1742.10 Manual of uniform traffic control devices Part 10: Pedestrian control and protection (DIT, 2024).

Unsignalised intersection with a wombat crossing and a two-way cycle path

This treatment is suitable for intersections where a low-volume collector or local road intersects with an arterial road with a two-way cycle path. Implementing a wombat crossing for a two-way cycle path at a T-intersection offers a superior level of service for pedestrians and cyclists while also slowing down intersecting traffic. Wombat crossings are the most effective choice, but if drainage and cost constraints are significant considerations a zebra crossing may be considered.

In addition to prioritising pedestrians on the footpath and cyclists, a zebra or wombat crossing maximises the visibility and safety of a two-way crossing movement. This treatment is essential for locations where a two-way bicycle path intersects a local or collector road. Four-way intersections should use wombat crossings due to the increased number of conflicting movements compared to T-intersections.

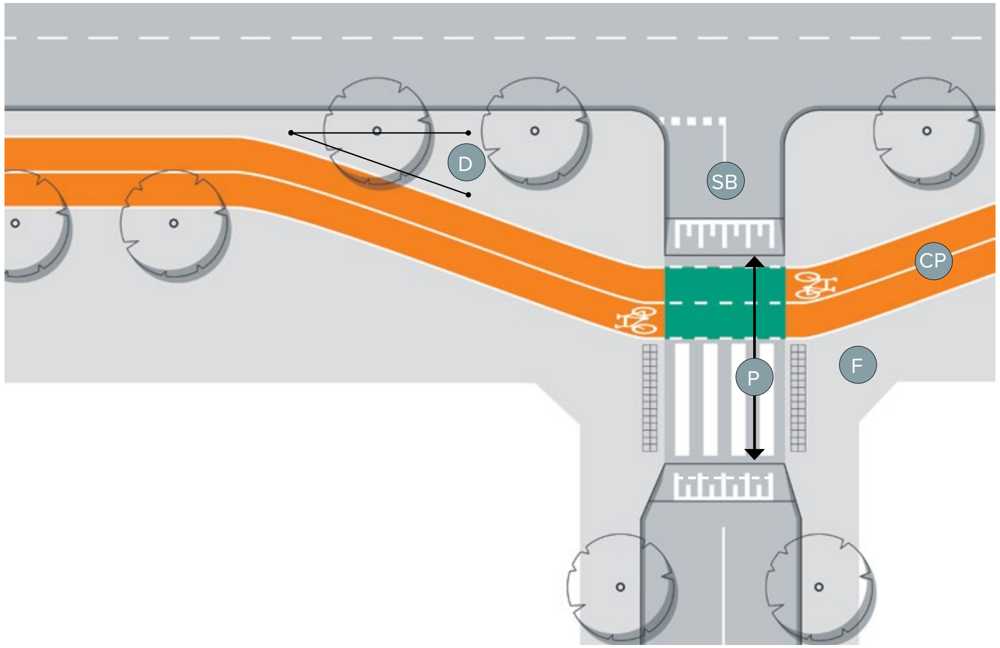


Figure 53. Unsignalised intersection or T-intersection with a wombat crossing and a two-way cycle path

No structures exceeding 0.9 metres in height should be placed between the cycle path and the road to ensure mutual visibility. This precaution is crucial as drivers may not anticipate encountering two-way cycle traffic when turning from the main road. Additionally, kerb build-outs should be implemented to decrease turning speeds for vehicles and allow waiting motor vehicles to wait outside the carriageway whenever feasible.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
SB – setback length	5 to 7	5 to 7	1.5	1.2
CP – cycle path width	3	3+	2.4	2
F – footpath width	2	3	1.8	1.2
P – platform length	8	8	6.6	6.6
D – cycle path deflection	10^0	5^0	10^0	20^0

Table 37. Recommended dimensions (in metres) for an unsignalised intersection with a wombat crossing and a two-way cycle path

9.4 Intersections with no dedicated cycle facilities

Unsignalised intersection

At intersections where local roads intersect, traditional intersections can be modified to enhance driver awareness of the intersection and of people walking and wheeling. Drivers may overlook cyclists who can be obscured behind typical street objects such as stobie poles and large tree trunks.

To address this issue:

- Patterned surfacing can be employed to highlight intersecting cycle routes, while lengthened No Stopping restrictions can improve sighting opportunities.
- A raised platform at the intersection will reduce car speeds.

Furthermore, kerb extensions can reduce pedestrian and cyclist crossing distances and enhance intervisibility. Although achieving crossing sight distance as defined by Austroads can be challenging in urban environments, efforts should be made to approach this standard wherever possible.

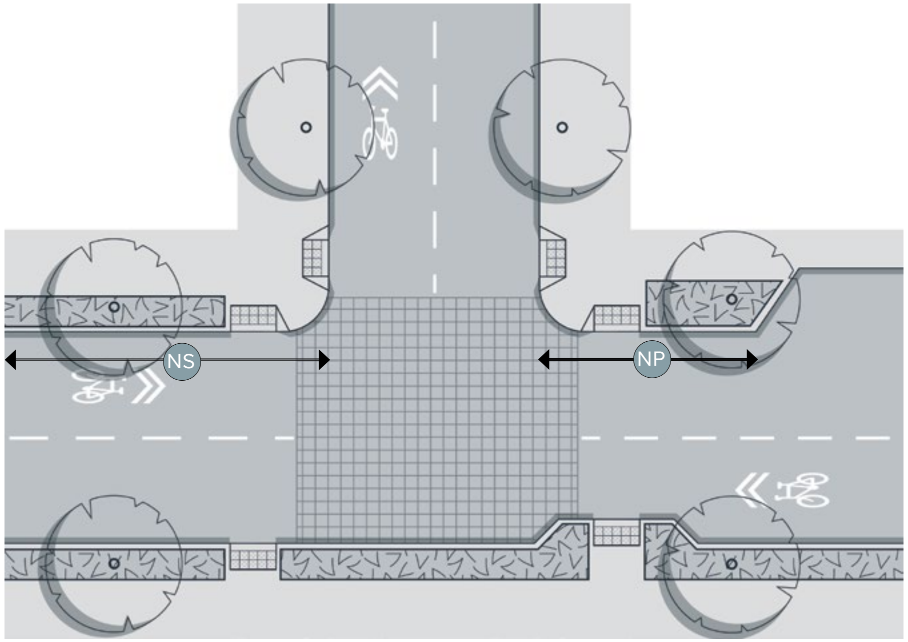


Figure 54. Unsignalised T-intersection with patterned surfacing

Beulah Road, Norwood

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
NS – No stopping	15	15	10	10
NP – No stopping with indented parking	10	10	10	10

Table 38. Width recommendations (in metres) for an unsignalised intersection

Design notes:

- Refer to DIT Code of Technical Requirements (DIT, 2024) for further information.
- Speed on approach: Local roads that form part of a designated wcycle route will have an ideal operating speed of 30 km/h.
- Sight distance: Achieve the stopping sight distance by using kerb extensions that match or exceed the width of adjacent parking lanes.
- For the sight distance requirements refer to Section 3.3 of Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (Austroads, 2017) and Section 8.2.2 of Guide to Road Design Part 4: Intersections and Crossings - General (Austroads, 2017).
- Crossing distance: To improve crossing opportunity the crossing distance can be reduced by installing kerb extensions.
- Stormwater: Water table culvert/tread plate or the use of additional side entry pits are common drainage solutions where kerb extensions are used.
- Landscaping: Consider installing rain gardens within the verge or, if used, within the kerb extensions to reduce stormwater runoff and use low height (less than 0.9m) planting.

Roundabouts

Roundabouts are frequently installed at intersections where local streets intersect with collector roads for two reasons:

- Roundabouts are more time-efficient in managing traffic flow compared to controlled intersections.
- Roundabouts reduce vehicle speeds on local streets in all directions, compared to unsignalised intersections.

Although they are successful in managing vehicle flow and reducing traffic speeds, studies suggest that roundabouts experience elevated crash rates because:

- Motorists often lack clarity regarding the rules when navigating roundabouts, failing to give way or indicate.
- Cyclists often face challenges navigating roundabouts due to decreased visibility for motorists and the tendency of some drivers overtaking cyclists within the roundabout instead of travelling behind them.
- Roundabouts pose increased complexity for pedestrians, as they are directed farther from their intended path.
- The visibility of pedestrians is reduced, raising safety concerns, especially since vehicles typically accelerate away from roundabouts.

The risks for people walking and wheeling are higher at multi-lane roundabouts with high vehicle speeds compared to low-speed single-lane roundabouts.

Asset renewal projects in South Australia have revealed that renewing a typical local urban roundabout in a like-for-like manner may be as costly as a complete redesign. Consequently, this section presents potential redesign solutions that may improve outcomes.

Typical roundabout design in Australia (Figure 55) prioritises minimising vehicle delay through the geometry of entry and exit curves. Adjusting the roundabout's geometry towards a more radial or compact design (Figure 56) can lower approach and exit speeds, improving conditions for pedestrians and cyclists and reducing safety risks.

Redesigning a tangential roundabout to create a radial one involves narrowing the entry points to the roundabout and adjusting the overall shape and angles to slow down cars as they enter and move through the roundabout, reducing speed and enhancing safety.

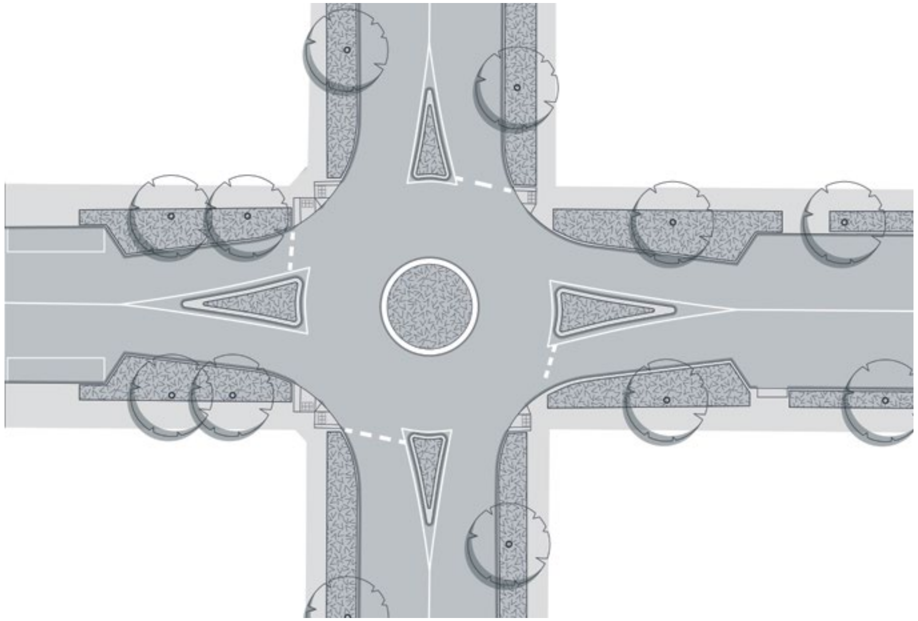


Figure 55. Traditional tangential roundabout

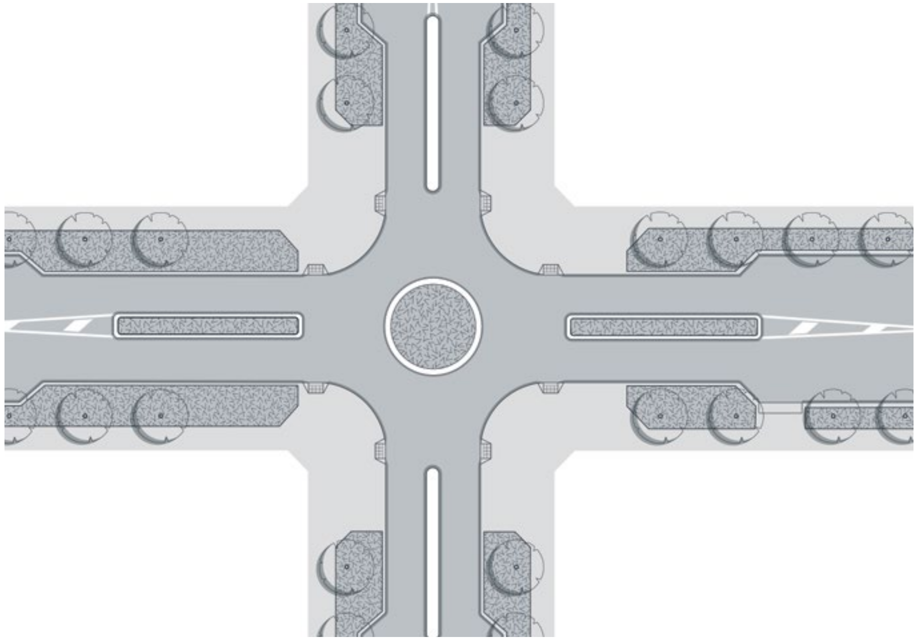


Figure 56. Radial or compact roundabout

Other redesign possibilities for improving the street environment at roundabouts include:

- Reducing the number of circulating lanes
- Implementing pedestrian crossing points on all legs of the roundabout
- Establishing pedestrian and cycling priority for crossing roundabout arms
- Installing raised platforms at roundabout exit points to enhance vehicle positioning and visibility of pedestrian crossings
- Incorporating sharrow signage to indicate lane sharing with cyclists

Any modifications to roundabouts should ensure that heavy vehicles can navigate them, often achieved by incorporating mountable elements within the roundabout design.

This section presents several redesign suggestions. Of these, 'intersection with island treatments and raised crossings' offers the best outcomes for all road users.

Further guidance:

- Guide to Road Design Part 4B: Roundabouts (Austroads, 2023).
- Technical note 136: Providing for cyclists at roundabouts (Department of Transport and Main Roads, Queensland, 2015).

St Peters Street, St Peters

Intersection with island treatments and raised crossings

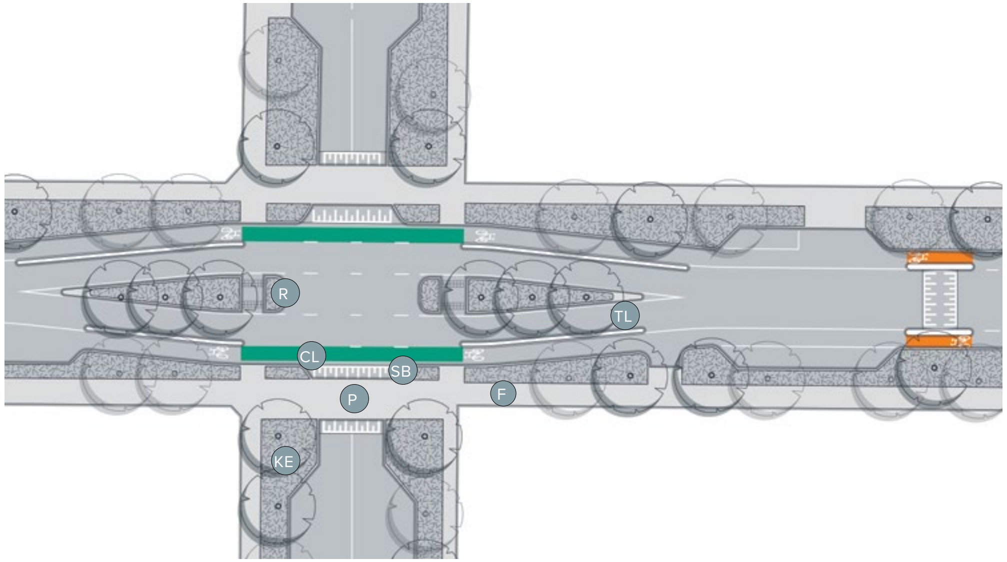


Figure 57. Intersection with island treatments and raised crossings

The roundabout redesign shown in Figure 57 is appropriate where a local road intersects with a collector road. The large footprint of an existing roundabout allows for the installation of wide pedestrian islands and complementary kerb extensions, creating expansive landscaped areas and improved crossing facilities while slowing car speeds. A continuous path is established across the intersecting local road, giving priority to people walking and wheeling over cars. To achieve this continuous path, raised crossings with give-way signs are used (see DIT Supplement to AS 1742.10 Manual of uniform traffic control devices Part 10: Pedestrian control and protection (DIT, 2024).

Traffic calming measures should be installed on either side of the intersection to achieve greater speed reduction than the previous roundabout design. The resulting slower traffic environment eliminates the need to store a waiting vehicle outside of the collector road.

Design notes:

- Allows for a continuous path of travel for people walking and wheeling.
- Reduces cars' turning speeds before the conflict position.
- Reduces corner radii to further slow car turning speeds while still allowing for the design vehicle.
- Use fully mountable kerb separators on the approach to the intersection to separate people wheeling from general traffic.
- Modifications to the drainage infrastructure maybe required.
- Give way signage to be installed and adjacent footpath paving material to be continued across the intersection (refer to DIT Supplement to AS 1742.10 Manual of uniform traffic control devices Part 10: Pedestrian control and protection, Appendix F (DIT, 2024)).

	Desirable	**Overtaking, high volume**	**Minimum**	**Isolated constrained locations**
SB – setback width	1.5	1.5	1.5	1.2
CL – cycle lane width	1.8	1.8	1.5	1.2
F – footpath width	2	3 plus	1.8	1
P – platform width	Match footpath width	Match footpath width	3.6	3.6
R – refuge island width	3	4	3	2.5
KE – kerb extension width	2.5	2.5	2	2
TL – traffic lane width	2.8	2.8	2.8	2.7

Table 39. Recommended dimensions (in metres) for an intersection with island treatments

Roundabout with zebra or wombat crossings

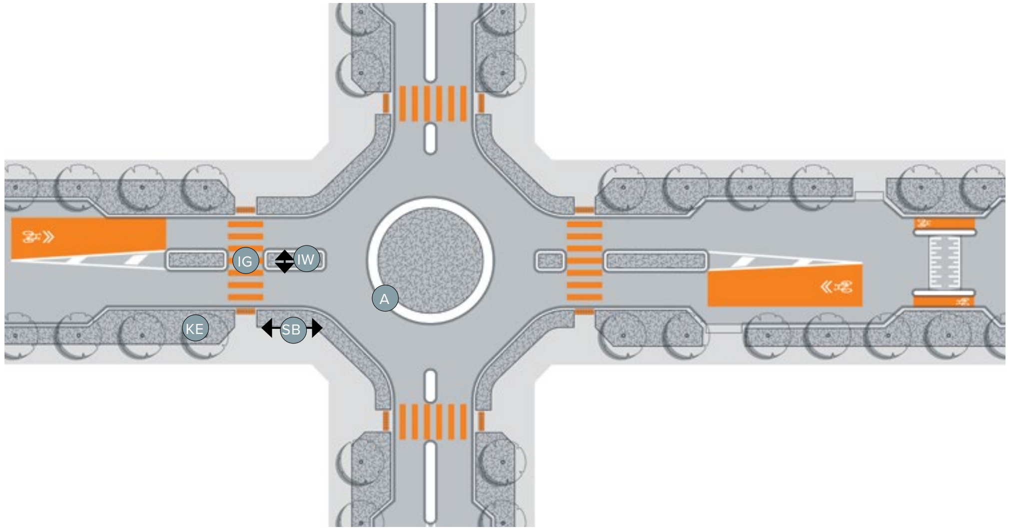


Figure 58. Roundabout with zebra or wombat crossings

Where a roundabout must remain, it should be converted to a radial roundabout with wombat or zebra crossings to reduce car speeds and provide priority for people walking.

Traffic calming measures should be installed on either side of the roundabout to reduce the speed differential between cyclists and cars, allowing cyclists to ‘take the lane’ on the approach to the roundabout. Asphalt printed patterns can create a ‘bicycle awareness zone’ where cyclists start to ‘take the lane’, just after the traffic calming device and in advance of the roundabout.

The slower speed approach and heightened driver awareness at roundabouts may allow for shorter zebra stripes (subject to DIT approval) to highlight pedestrian priority crossings.

	Desirable	Overtaking, high volume	Minimum	Isolated constrained locations
SB – zebra setback from circulating traffic	7	7	3	3
A – mountable annulus widening	1	1	1	1
IG – island refuge gap (crossing width)	Match footpath approach	Match footpath approach	2.1	2.1
IW – island refuge width	2	3	1	0.5
KE – kerb extension width	2.5	2.5	2	2

Table 40. Recommended dimensions (in metres) for a roundabout with zebra or wombat crossings

Roundabout with informal pedestrian crossings

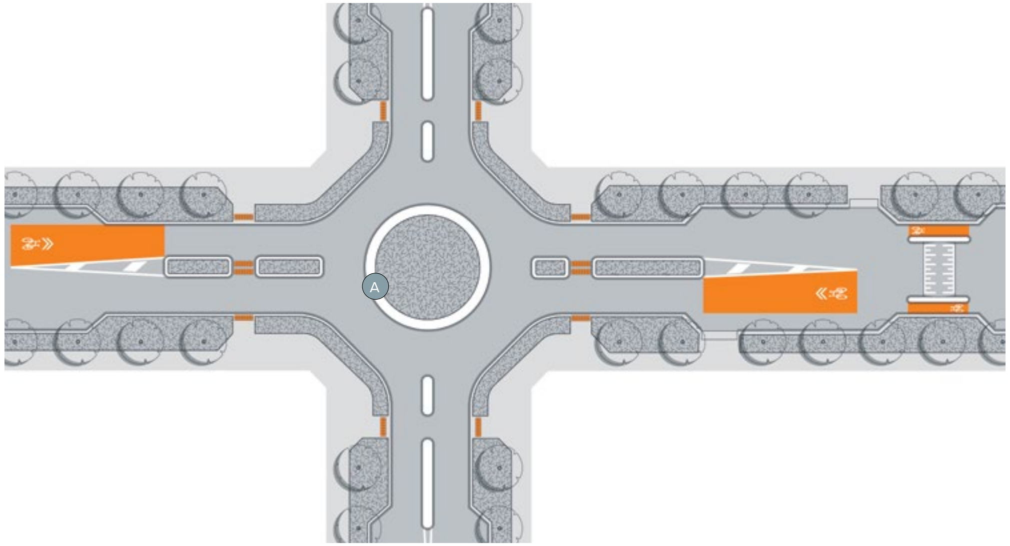


Figure 59. Roundabout with informal pedestrian crossings

The roundabout treatment shown in Figure 59 is the minimum requirement for accommodating people walking and wheeling. To reduce vehicle speeds negotiating the annulus, it should be widened by adding a one-metre wide fully mountable ring on the outside of the annulus, exceeding standard roundabout design requirements. An informal two-stage crossing, using island refuges and adjacent kerb extensions, increases crossing opportunities, reduces the road width to be crossed and improves visibility of people walking and cycling to drivers.

Similar to a roundabout with zebra crossings, the ability of cyclists to 'take the lane' should be enhanced by reducing motor vehicle speeds with traffic calming devices on the approach to the roundabout and by installing a Bicycle Awareness Zone (BAZ).

	Desirable	**Overtaking, high volume**	**Minimum**	**Isolated constrained locations**
A – annulus widening mountable	1	1	1	1
R – Island refuge gap	Match footpath approach	Match footpath approach	2.1	2.1
R – island refuge width	2	3	2	1.8
KE – kerb extension	2.5	2.5	2	2

Table 41. Recommended dimensions (in metres) for a roundabout with informal pedestrian crossings

9.5 Grade separated crossings

Strategic corridors, particularly rail corridors, that cannot be crossed at grade necessitate grade-separated crossings. However, grade separation presents inherent drawbacks compared to at-grade crossings. Longer travel distances, along with the inclusion of ramps or steps, increase physical exertion and may discourage active travel. Therefore, for new major infrastructure projects, grade separation should be considered only as a last resort. At-grade crossings should be the preferred solution and should heavily influence the design outcome of such projects.

Access to grade-separated facilities may result in steeper path gradients, but they should not exceed 1:15 and must adhere to the landing requirements of AS 1428.1 to ensure inclusivity. In constrained locations, stairs should be avoided. Instead, vertical or inclined lifts that can accommodate the predicted volume of path users, including a minimum of two cyclists standing next to their bicycles, should be provided.

Overpasses

Overpasses or bridges dedicated to active transport users must offer a minimum usable clear width of three metres, accounting for fencing, barriers and other structural elements. This clear width should be expanded to match the width of connecting paths if they are wider.

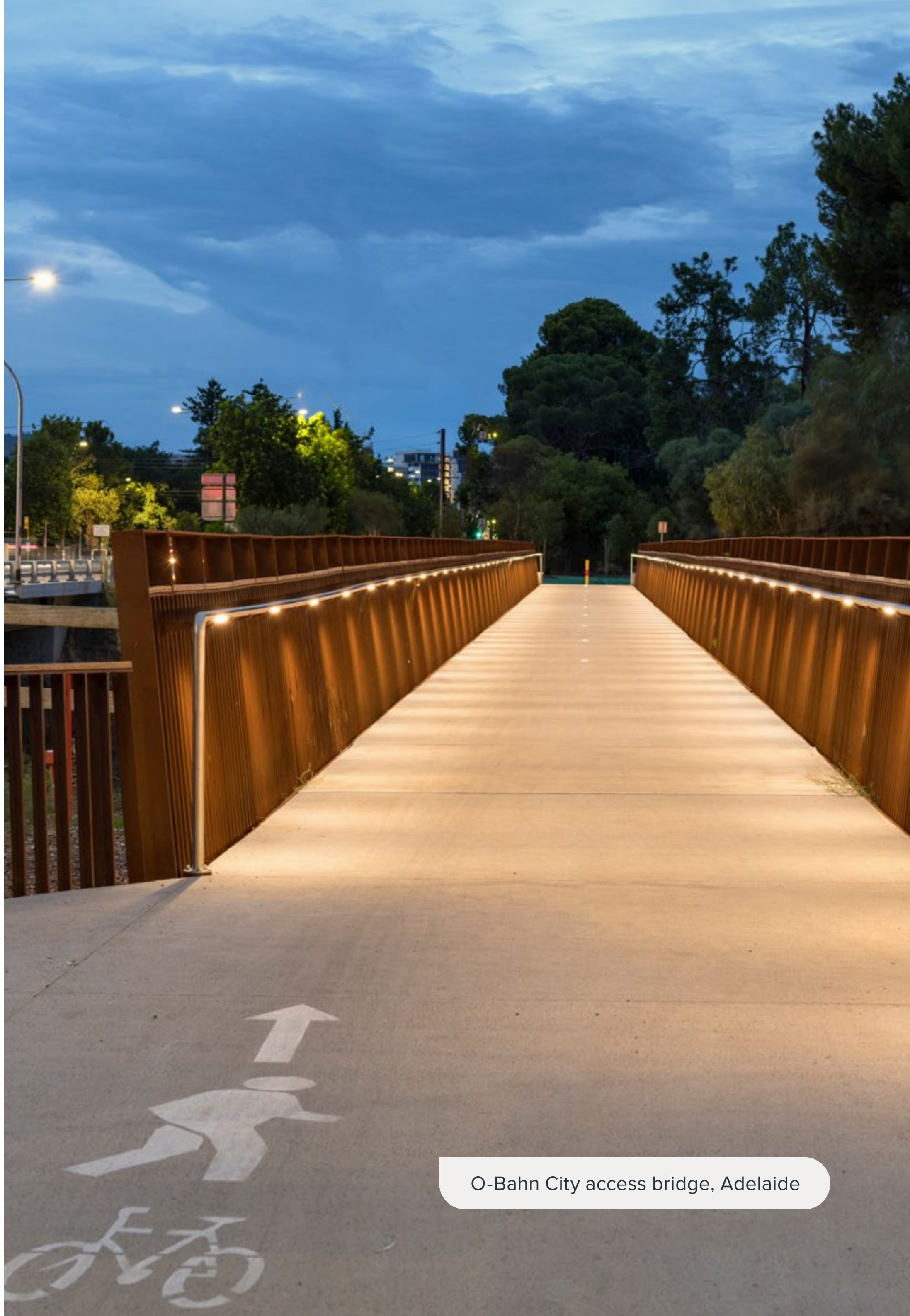
Approach paths linking to bridges (and underpasses) should ensure sufficient stopping sight distance for cyclists to view the entire width of the bridge deck before entering. Elevated bridge parapets, fencing, and barriers often obstruct a cyclist's line of sight, increasing the potential for conflicts with other users at entry points. Sight distances must be maintained throughout the structure. Guidance on flared bicycle rail terminals for bridges can be found in Section 5.5.3 of Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021).

Bridge deck surfacing must be smooth and non-slip, especially at expansion joints. Design solutions leading to even small areas of polished metal surfacing, short gaps or vertical changes should be avoided.

To mitigate the risk of anti-social behaviour, protection screens or anti-climb devices should be installed as per AS 5100.1 - 16.4.

Bridges accommodating both road or rail traffic and cycle lanes or paths must adhere to the same design standards as the connecting lanes or paths. Compromising design parameters to balance costs or other constraints should be avoided, especially when alternatives such as reducing motor vehicle lane widths or adjusting road design speeds are feasible.

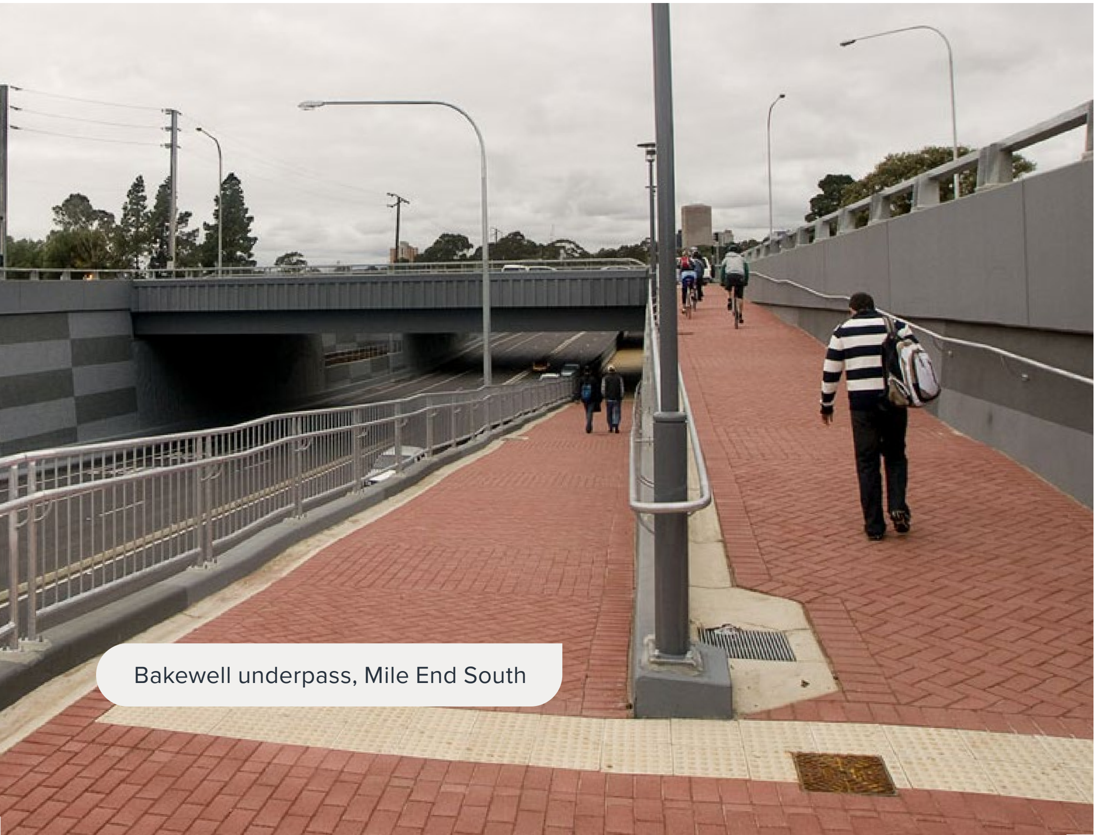
Fences along bridges must maintain a minimum height of 1.8 metres to prevent cyclists from being thrown from their bicycles in the event of a collision with the fence.



O-Bahn City access bridge, Adelaide

Path design should minimise barriers or fencing, as they can pose hazards for path users, especially cyclists. Efforts should be made to avoid creating hazards such as vertical drops, steep batters or downhill grades leading to sharp turns. Ideally, soft landscaped areas should be incorporated to separate path users from potential hazards.

In constrained areas, any necessary barriers or fencing should be installed according to guidelines outlined in Section 5.5.3 of the Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021).



Bakewell underpass, Mile End South

Underpasses

High traffic volumes on strategic routes and major arterials can often lead to prolonged waiting times at signalised crossings, increasing the likelihood of risky crossing behaviors such as disregarding crossing signals. In such situations, an underpass may serve as an alternative, providing improved travel time to active travel users. However, underpasses inherently lack passive surveillance and can feel unwelcoming due to their enclosed nature. They also present limitations in incorporating green infrastructure and natural lighting, which can contribute to a less inviting atmosphere. Moreover, underpasses typically require higher maintenance and consume more power compared to other crossing options.

For existing signalised crossings on high-volume roads, implementing a combination of a new underpass alongside an at-grade signalised pedestrian crossing may offer the most effective crossing solution.

Guidance on underpass design can be accessed through the following documents:

- Master Specification ST-SD-D1 Design of Structures (DIT, 2022).
- Guide to Road Design Part 6A: Paths for Walking and Cycling (Austroads, 2021).
- Pedestrian underpass design guideline (Transport for NSW, 2023).

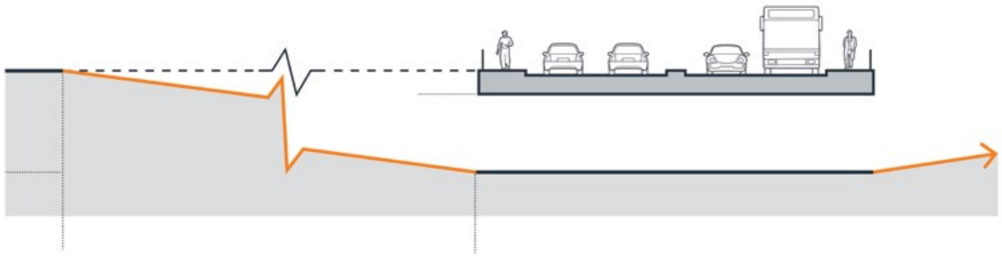
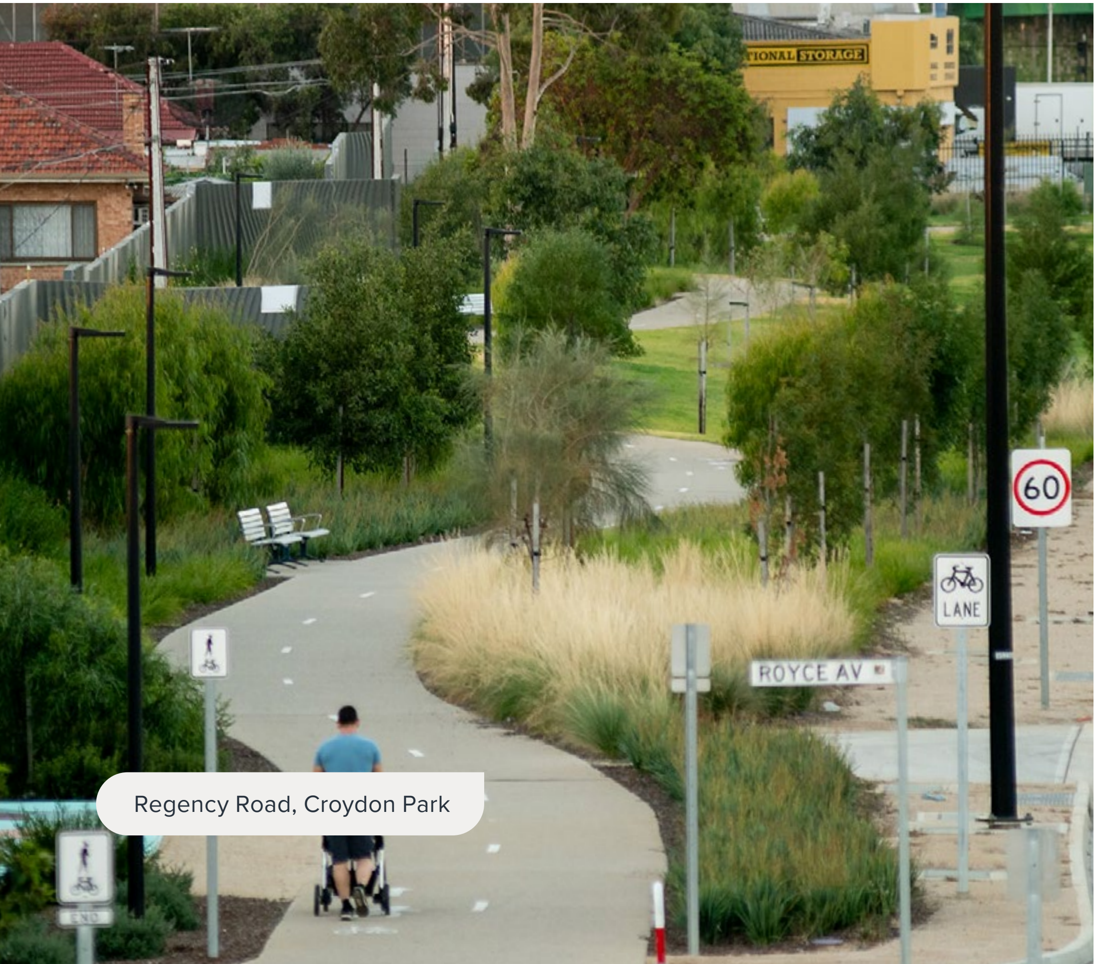


Figure 60. Underpass

10. Greening

The following sections contain information that should be considered when designing green infrastructure along active travel corridors, to help deliver good design outcomes for the community and the environment:

- **Contextual considerations:** Addresses the existing and future context in the early stages of planning green infrastructure.
- **Green infrastructure types**: Provides information on various forms of green infrastructure and how they can be integrated with active travel infrastructure.
- **Sustainability and plant health:** Offers guidance on maintaining healthy and robust green infrastructure, ensuring thoughtful design that supports water systems and ecosystems.



Regency Road, Croydon Park

10.1 Strategic drivers

Green Adelaide is developing an Urban Greening Strategy for Metropolitan Adelaide that will focus on increasing canopy cover, reducing hard surfaces, meeting the urban green cover target of the 30-Year Plan for Greater Adelaide and prioritising areas that are the most vulnerable to heat.

DIT has a significant role to play in achieving this canopy cover target for metropolitan Adelaide. It has committed to identifying and pursuing feasible opportunities to expand green infrastructure on public land, focusing on priority areas identified by Green Adelaide, that provide for active travel and new infrastructure projects.

DIT's Green Infrastructure Commitment (2021) includes the following focus areas and commitments:

- **Increase urban canopy cover:** By 2045 DIT will deliver a 20% increase in canopy cover on departmental managed land (measured from the 2018/19 baseline).
- **Liveability (including amenity, health and wellbeing)**: Provide shade trees to improve amenity for pedestrians, cyclists and public transport customers, targeting ≥50% canopy cover over footpaths and bikeways.
- **Water sensitive urban design (WSUD):** Implement WSUD on infrastructure projects to achieve the state WSUD policy performance targets for water quality, peak flow and flood risk.
- **Biodiversity sensitive urban design (BSUD):**
  - Minimise impacts to existing natural ecosystems to maintain ecological value and preferentially retain mature trees including regulated and significant trees.
  - Identify and pursue opportunities to improve biodiversity, fauna habitat and connectivity through landscape design and species selection.
  - Minimum 50% of new landscape plantings need to be local native species suited to local conditions.

10.2 Contextual considerations

Existing tree retention

When designing active travel infrastructure, it is preferable to first seek to retain existing vegetation where possible, especially healthy and mature canopy trees. Sometimes this may require slight deviations or splitting of cycling paths or shared paths around a significant tree. A deviation of 10 degrees to the path of travel is preferred.

For trees that are being considered for retention, an arborist should assess any that have health or structural issues that could result in limb drop or may fall in extreme weather. The arborist should also establish the tree protection zone (TPZ) for trees to be retained. The TPZs can be used to help inform:

- The placement of new trees so that they do not compete with existing trees.
- The application of construction techniques that reduce root zone disturbance such as above-grade pavements.
- The extent of permeable pavements to aid water infiltration.

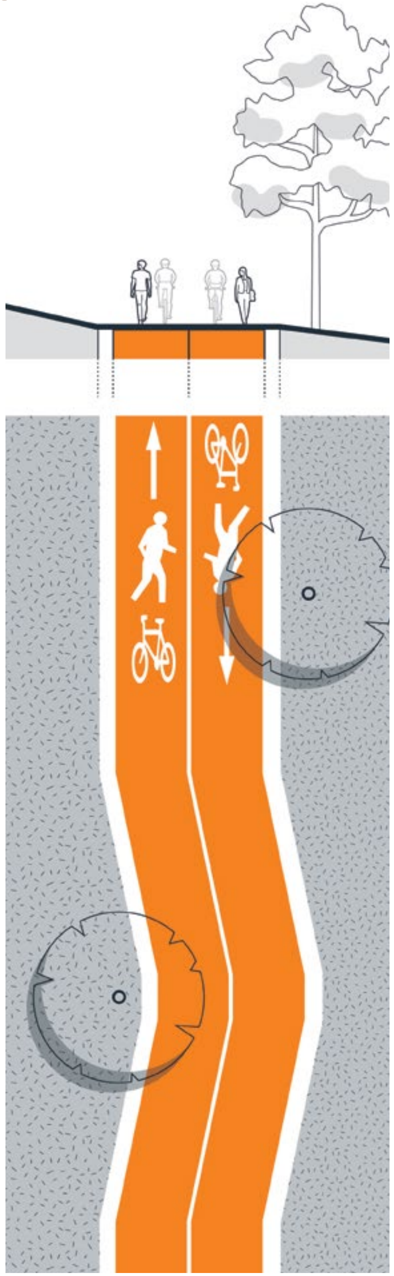


Figure 61. Deviation of a shared path around a significant tree

Utility assets

Utility assets are often a key constraint when determining the potential locations for greening. Particularly for new trees, it is essential to first check if there are any assets in the vicinity of the project area through services such as Before-You-Dig (www.byda.com.au) or a comprehensive site survey.

Each of the asset owners have specific guidelines for what can be planted over or under their assets and what offsets and height limits apply. The latest versions of these guidelines should be consulted in each project.

Some broad considerations for common assets are provided below.

Water assets

(Source: Tree Planting Guide, 2021, SA Water)

- There are different tree planting requirements for water mains/connections as opposed to sewer mains/connections, with the latter being more restricted.
- Preventive measures such as root protection barriers or tree pit liners may be considered to allow more flexibility in the design than what is generally permitted, subject to approval from SA Water.
- Two schedules of pre-approved trees are available from SA Water. This can help make the design process faster and easier.

High pressure gas pipelines

(Source: Site planning + landscape national guidelines, September 2020, APA)

- Planting is limited by both the extent of the easement as well as the location of the gas pipeline itself.
- Small shrubs, ground cover and grasses can generally be installed in any location on APA easements.
- Small trees and medium to large shrub planting may be considered within the easement, subject to appropriate offsets from the asset.

Overhead power lines

(Source: Trees and powerlines, July 2016, Office of the Technical Regulator, SA)

- Overhead power lines may be consolidated underground in some cases to allow for the planting of larger tree species where feasible.
- The Power Line Environment Committee (PLEC) provides some funding for undergrounding projects that benefit local communities. Applications are assessed by a PLEC committee for funding across South Australia.
- Where powerlines must remain overhead, the following information about the site and assets is needed to determine the appropriate buffers and offsets:
  - Whether the site is in a defined bushfire risk area
  - The voltage of the powerline
  - Whether the conductor is insulated or not
  - The span, or distance, between stobie poles or transmission towers
  - The location of vegetation in relation to the closest stobie pole.

10.3 Green infrastructure types

Treatment types overview

Trees

Trees provide a significant impact and should be given a high priority in greening efforts. However, sufficient width is needed to allow for the necessary soil volume and to provide the appropriate offsets from active travel and vehicular travel paths. This is discussed in detail in the section 'Trees' on page 94.

Larger shrubs

Larger shrubs, particularly those that are close to or exceed eye level, are not often advisable, unless they are planted immediately adjacent to a solid boundary such as a fence or wall, have a generous lateral set back from the path/lane, and have a longitudinal setback from any intersections at least to the same distance as that required for trees. They must not obstruct view lines, particularly when near a curve in the path or any intersection. Additional design notes which apply to larger shrubs are provided in the section 'Garden beds' on page 96.

Understorey plants

Understorey plants up to 0.5 metres can be used in almost all situations where planting is viable. They are not generally recommended in spaces narrower than 0.6 metres unless a high level of maintenance can be provided in the long term and the species have a very narrow growth habit.

Understorey plants up to one metre are relatively versatile, but careful species selection and potentially a higher level of maintenance may be required in more constrained locations. However, they are generally not recommended for use in the road reserve and may only be considered in relatively wide areas where they will not block important sight lines for any road users. Additional design notes for understorey plants are provided in the section 'Garden beds' on page 96.

Climbers

Climbers may provide vertical greening in constrained settings where trees are not viable. Further information is provided in the section 'Climbers' on page 97.

Planter boxes

Planter boxes can be an effective greening solution in constrained settings where other forms of greening are not viable. Further information is provided in the section 'Planter boxes' on page 98.

Lawn

Lawn is best used in relatively wide, continuous spaces to allow for ease and efficiency of mowing. It is often not worthwhile using lawn in narrow strips of less than one metre, unless it is a tapering part of a larger area. When within a road reserve (e.g., on a buffer), the lawn area must be wide enough that the road does not need to be closed during mowing.

Aggregates

Examples of aggregates include gravel mulch, decomposed granite and granitic sand. They are often affordable and water-permeable solutions where space is narrow, greening is not viable or the space may need to be traversed occasionally. For example, it may be used to provide breaks in planting for pedestrian access.

Avoid aggregates that may result in loss of control for cyclists or a slipping hazard for pedestrians if accidentally spread over the path. The finished level should be approximately 50 mm below the top of the kerb or adjacent surface to reduce the incidence of aggregate spread. If using gravel mulch, a diameter of less than 20 mm is preferable.

Pavement

While greening should be the first priority, pavement may be an appropriate solution where space is narrow, greening is not viable or there is a need for a space to be easily and regularly traversed. Consider using permeable pavement as an option to reduce stormwater run-off and provide passive irrigation to trees. Refer to the section 'Water Sensitive Urban Design' on page 102 for further details.

Space constraints

Achieving the DIT Green Infrastructure Commitment targets along active travel paths may be challenging due to space constraints and technical, safety and maintenance requirements. Cross-discipline collaboration and innovative design solutions are necessary to ensure the road and/or active travel corridor supports the inclusion of trees and understorey planting.

The available space for planting is a significant determinant of what types of greening can be considered, as shown in Table 42.

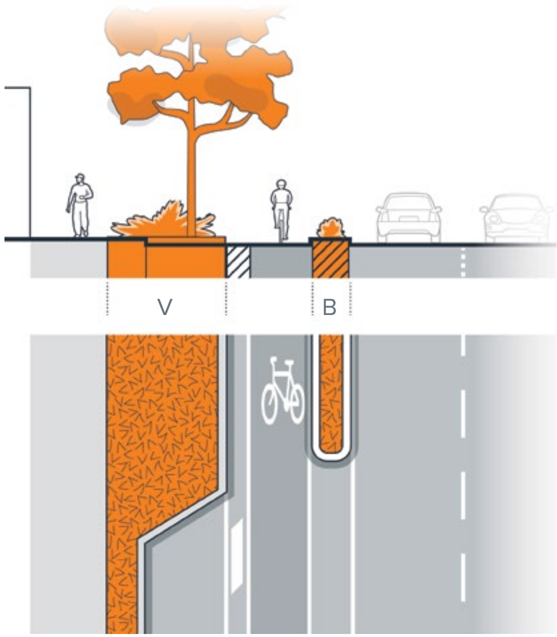


Figure 62. Green spaces in verge and median island

Treatments	Available width							
	V – Verges, kerb extensions and other green spaces not in road reserves				B – Buffers separating cycle lanes or paths and other green spaces in road reserves			
	< 0.6m	0.6 to 1m	1m to 2m	2m +	< 0.6m	0.6 to 1.4m	1.4m to 2m	2m +
Trees	Not recommended	Permitted in some circumstances	Recommended	Recommended	Not recommended	Not recommended	Permitted in some circumstances	Recommended
Small understorey plants up to 0.5 metres mature height and width	Permitted in some circumstances	Recommended	Recommended	Recommended	Not recommended	Recommended	Recommended	Recommended
Other understorey planting up to 1 metre mature height	Not recommended	Permitted in some circumstances	Recommended	Recommended	Not recommended	Not recommended	Permitted in some circumstances	Permitted in some circumstances
Larger shrubs	Not recommended	Not recommended	Permitted in some circumstances	Recommended	Not recommended	Not recommended	Not recommended	Not recommended
Climbers with vertical support	Not recommended	Recommended	Recommended	Recommended	Not recommended	Not recommended	Not recommended	Not recommended
Planter boxes	Recommended	Recommended	Recommended	Recommended	Not recommended	Permitted in some circumstances	Permitted in some circumstances	Permitted in some circumstances
Lawn	Not recommended	Permitted in some circumstances	Recommended	Recommended	Not recommended	Not recommended	Not recommended	Recommended
Aggregates	Permitted in some circumstances	Recommended	Recommended	Permitted in some circumstances	Permitted in some circumstances	Recommended	Recommended	Permitted in some circumstances
Paved, including permeable pavement	Recommended	Recommended	Recommended	Permitted in some circumstances	Recommended	Recommended	Recommended	Permitted in some circumstances

Table 42. Green infrastructure options in relation to space constraints

Legend

- **Recommended**
- **Permitted in some circumstances**
- **Not recommended**

Trees

Existing guidance on locating trees in relation to transport infrastructure is largely focused on vehicular traffic or is very broad in relation to cycling infrastructure.

The Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling (2021), recommends that in most cases, a lateral clearance of at least one metre should be provided between the edge of any path for cycling and any obstacle which, if struck, may result in cyclists losing control or being injured. However this should be increased in higher bicycle speed environments (e.g., over 20 km/h). Conversely, this offset could be reduced to 0.5 metres or even 0.3 metres at an absolute minimum in other circumstances.

DIT's Operational Instruction 19.8 Trees in Medians and Roadsides in the Urban Environment (OI 19.8) provides detailed guidance on lateral and longitudinal tree offsets in relation to vehicle carriageways. Notably, the minimum lateral offset from the kerb is 0.6 metres in most cases. However it does not address bicycle lanes.

Design notes:

- Pruning of trees should be carried out to maintain the required vegetation clearances.
- In most cases, tree canopies should not hang lower than 4.6 metres over vehicle carriageways. However this may vary in some circumstances such as for nominated oversize vehicle routes. Refer to DIT's Vegetation Removal Policy for more detailed guidance.
- Ensure tree canopies do not significantly obstruct existing or future lighting. Be mindful of placement in an existing streetscape or coordinate with lighting designer for more extensive redevelopments.

Placement of trees around active travel facilities

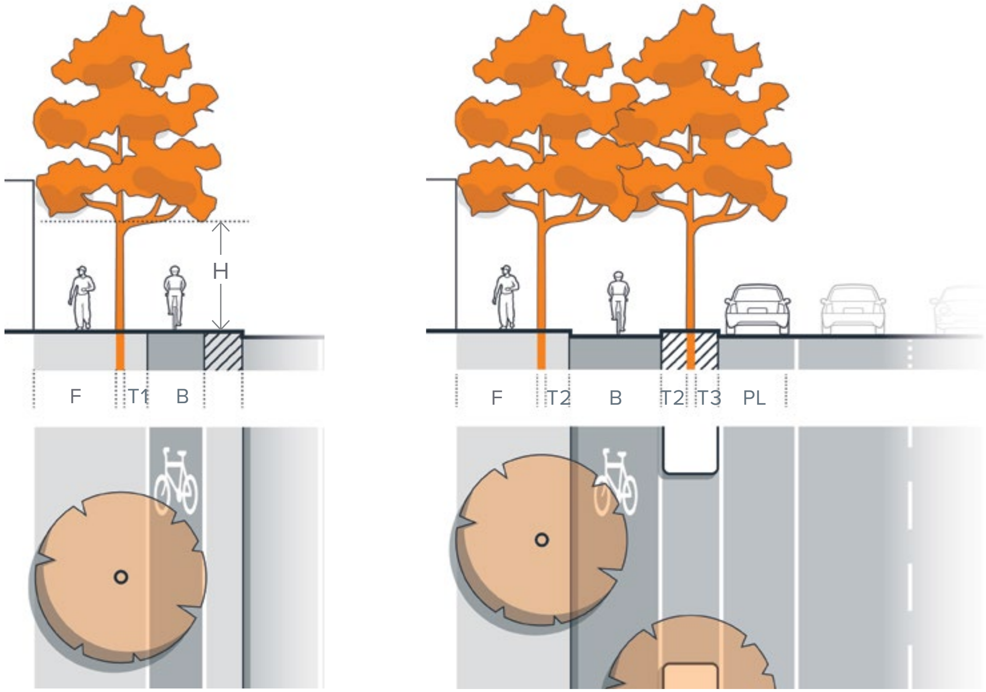


Figure 63. Placement of trees around active travel facilities

Design notes:

- The recommended offset measurements are taken from the face of tree trunk at maturity, not the centre of the trunk. This needs to be considered when developing a tree planting plan.
- Refer to DIT Operational Instruction 19.8 for longitudinal offsets of trees from intersections involving cycle lanes or paths, and vehicles. Lateral offsets provided in this document are also relevant, but are primarily focused on the placement of trees next to vehicle lanes. Additional guidance which relates more specifically to active travel paths is provided further in this section.
- Ensure that trees are located to avoid being hit by car doors. For example, consider placing trees between parking bays where possible.
- Where a cycle lane or path curves, any trees should be located with more generous offsets than usual, taking into account the lines of sight.
- Tree pits should generally be a minimum one metre wide.
- In locations where the footpath is constrained, it is advisable to use a treatment for tree pits which is flush with the adjacent footpath, easily traversible and does not present a trip hazard. For example resin-bonded aggregate or tree grates with small openings may be appropriate.

		Minimum at plant maturity	**Desirable**	**Overtaking, high volume cycling environment**
H	Tree canopy height clearance - over pedestrians or cyclists.	2.2	2.5	2.5
HT	Tree canopy height clearance - over vehicle carriageway	Usually 4.6 - refer to DIT's Vegetation Removal Policy		N/A
F	Footpath width adjacent to tree	1	Refer to Walking Links chapter	N/A
T1	Tree offset from bicycle path/lane at-grade	0.6	1	2
T2	Tree offset from bicycle path/lane, separated by a kerb	0.6	0.6	1
T3	Tree offset from buffer edge with vehicle lane adjacent	Usually 0.6 - refer to OI 19.8		N/A

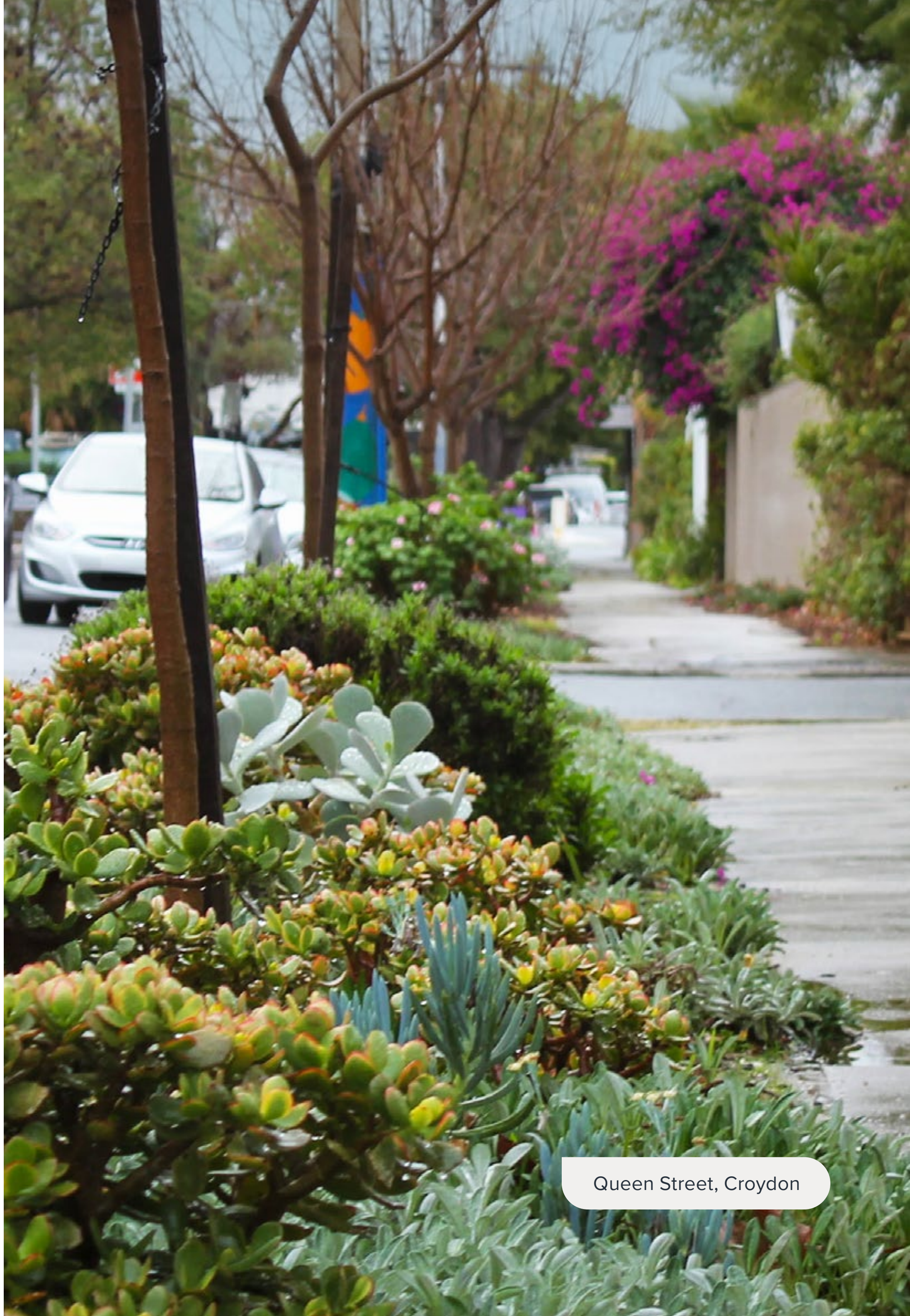
Table 43. Width considerations (in metres) for planting trees

Garden beds

The following guidance relates to any garden beds that may be planted near active travel infrastructure. This may include but is not limited to verges, kerb extensions, buffers/medians and Water Sensitive Urban Design garden beds.

Design notes:

- Select planting of an appropriate width and habit to fit the available planting space, so that pruning is not necessary to ensure they do not encroach on paths/lanes and safe sightlines are maintained.
- Smaller plants at higher densities, or closer spacings, that are set well back from the kerb or garden edge, are better than fewer large plants.
- Avoid locating species that have spikes, thorns or are prickly immediately adjacent to active travel facilities.
- Avoid perennial type plants (e.g., indigenous everlastings) as they require regular pruning to remove dead stems.
- Be mindful of sightlines on curved cycle lanes or paths.
- Garden beds with tufting plants or shrubs can be used to help guide pedestrian and cyclist movement, for example by encouraging pedestrians to use designated crossings rather than crossing at less safe locations along the road.
- For kerb extensions, 45 degree corners are preferred, but this can be increased to 90 degrees. Flush kerbs or semi-mountable kerbs may be used in lower traffic level environments.
- Where immediately adjacent to parking, an easily traversable surface such as pavement or lawn is recommended.
- If shrubs or tufting plants are to be used near parking areas, it is recommended that these are planted in locations that do not obstruct access to cars parked immediately adjacent, e.g., in between parking bays, or allow minimum one metre longitudinal offset, with regular breaks to allow people to get through to the footpath.



Queen Street, Croydon

Climbers

Climbers growing along verandahs, walls and fences are an iconic feature of many streets in South Australia. They have the benefit of requiring less space than many large trees, so may be an appropriate solution where limited space is available.

However they have some disadvantages compared to trees or garden beds. They often require more labour-intensive maintenance, especially during the establishment phase, and require an initial and ongoing commitment by the building or asset owners to appropriately build and maintain the support structures. These factors need to be weighed up with the advantages of climbers in each circumstance.

Design notes (adapted from the Unley Road Public Realm Design Guidelines, City of Unley, 2021):

- The same offsets from active travel paths apply to climbers as they do to trees.
- Plant climbers into appropriate conditions, with paving adjusted to suit and finished around the base of vine with quarry sand (lightly compacted).
- For verandahs, install wire traces on selected building posts and across fascia to stabilise the vines and train their growth.
- Support structures such as wire traces, arbours or trellises must be designed to hold the mature weight of climbers.
- Maintain, prune and train climbers to ensure that the appropriate form is established and encouraged.
- Maintain sight lines and safety for vehicles and pedestrians.


The Parade, Norwood

Planter boxes

Planter boxes are a low-impact and reasonably low-cost way of implementing greening with minimal disturbance to a site. They can be placed along active travel paths to provide shade and increase biodiversity in areas of hardstand, where soil is scarce or where underground or overhead services prohibit in-ground planting.

However, planter boxes have some disadvantages compared to garden beds, often requiring more labour-intensive maintenance and watering, and larger planter boxes such as those required for trees can somewhat limit visibility and potentially give the space a more cluttered or closed-in appearance. These factors need to be weighed up with the advantages in each circumstance.

Permanent planter boxes may be appropriate in some cases, such as where space restrictions will not be resolved in the foreseeable future. But more often, planter boxes are best used as a temporary solution for greening before a more comprehensive redesign of an area.

Design notes:

- The same offsets from active travel paths apply to planter boxes as they do to trees.
- Implement in continuous groups where appropriate, to create an immediate visual and environmental impact to the active travel path and its surroundings and to ensure a tidy appearance.
- Consider using a consistent planter box design and planting palette for each street or path.
- Planter boxes are best placed in locations where irrigation is available and/or adjacent to businesses or residents who will be committed to regularly watering the plants.
- Planter boxes are not to be used as physical separators between bike paths/ lanes and the traffic, unless they are a temporary measure and located in a low speed environment. They must be designed to minimise safety risks if hit by a vehicle (e.g. using materials such as metal or plastic that will bend and not shatter and a large and solid design which will absorb much of the impact).
- Use fixings that allow for the future relocation of planter boxes.
- Choose low-level plants that have compact or trailing forms (not spreading), create minimal plant litter and have dense foliage. At maturity, the cumulative height of the plants and planter box should not exceed the limits recommended for other plants.
- Any trees should be small species and only used when sufficient soil volume can be provided within the planter box and where they will not impact sightlines. As a rough guide, provide at least 0.6 cubic metres of soil per square metre of canopy projection.
- Trees should be placed to avoid interference with other street elements such as building awnings, signage and traffic signals.
- Ensure that appropriate access can be provided for machinery and associated heavy vehicles to load/unload planter boxes to site.

Freemason's Lane, Adelaide

Species selection

General guidance for all plants

Most local councils will have a recommended plant list and/or tree strategy that will assist in selecting plant species that are well adapted to the local growing conditions and character. Along with this, the following key points should be considered when selecting any plant species for active travel projects:

- **Physical constraints**: The size and growth habit of plants at maturity should be appropriate matches for the physical constraints of the space. These may include the width of the planted area, the available soil volume, vertical obstructions such as awnings or power lines and underground obstructions such as utilities and TPZs of existing trees.
- **Local character**: Plants should be selected to complement the existing vegetation which is to be retained (e.g. continuing the same species of tree for avenue plantings), or for large-scale transformations, the plant aesthetics should be in alignment with the future vision of the project area.
- **Local environment:** Plants should be well suited to the local microclimate, the amount of sunlight available throughout the day and year, and the local soil type.
- **Provenance and ecology**: Native species should be prioritised, particularly those that are indigenous to the local area and can improve biodiversity and support native fauna. For example plants may provide food, habitat or nesting resources for wildlife. Native plant species should make up at least 50% of the overall planting palette unless:
  - Native plantings are not fit for purpose (e.g. due to changes in local growing conditions that cannot be restored), or
  - The local council has prescribed a non-native palette for a specific character area.
- **Maintenance**: Plant species should be selected to suit the frequency and degree of ongoing maintenance that can be provided over the life of the plants. They should also be located with appropriate offsets from paths, fence lines and other relevant assets to enable access and minimise maintenance requirements.
- **Water requirements**: Plants should be drought tolerant and generally have low to moderate water requirements at maturity, depending on the type of irrigation which will be available. See below for more detail on irrigation.
- **Health and safety:** Avoid species that pose an allergy risk, cause skin irritation or scratches, or present slip or trip hazards.
- **Procurement:** Consider commercial availability of proposed plant species and whether alternative procurement methods are required for less common species to avoid substitutions.

Guidance for trees

Trees planted adjacent to active travel paths should:

- Have a growth habit that can provide shade and wind protection to the path where space allows.
- Have clean trunks and a raised canopy to safely clear pedestrians, cyclists and vehicles and maintain sightlines.
- Preferably not require significant formative pruning over the first years of establishment.
- Not pose a slipping hazard by dropping significant quantities of leaf litter, berries, nuts or bark.
- Not have suckers or an invasive root system that is likely to pose a risk of lifting the adjacent pavement.

Tree species should also be selected to reinforce the local street hierarchy and character. Most local councils will have a streetscape or street tree strategy which will provide direction on the desired framework or structure, and preferred spacings. But in most cases it is desirable to:

- Plant continuous avenue of trees with consistent spacings along most streets, with a single species selected for each street.
- Aim for a diversity of tree species across the broader network of streets. This is advantageous in terms of:
  - Biodiversity
  - Wayfinding by creating distinct identities for each street type
  - Mitigating the risk of broad-scale tree loss in the event of a disease or pest causing damage or destruction to a particular species.
- Maximise the tree canopy coverage for the space available.
- Only use small trees on narrower, minor streets where space is constrained.

Sustainability and plant health

Optimising tree health and form

Good tree health and form is promoted through:

- Selecting quality advanced tree stock exhibiting good growth and form, meeting Australian Standard (AS) 2303:2018.
- Adequately preparing of tree pits (or continuous tree trenches where possible), with sufficient soil volume and quality for the selected species.
- Providing root control barriers or tree pit liners, to help prevent tree roots from growing into problematic areas such as near utility assets and close to the surface of trafficable paved areas.
- Avoiding compaction around the base of the trees, for example by providing structural soils or structural tree cells where compaction is likely to occur such as in urbanised environments.
- Using stakes and ties (rather than tree guards) during the establishment phase if appropriate.
- Providing adequate irrigation, particularly during the establishment phase.

Such measures will help to ensure trees are long-lived and have large, attractive canopies, and help avoid future problems such as roots damaging or warping adjacent pavements if they struggle to receive adequate water and nutrients.

Irrigation

Automatic irrigation systems

Landscaping within the buffer and verge along active travel corridors will perform best when watered with an automatic irrigation system, due to the hot, hostile road environment. Even native plants with low water requirements will require frequent watering during the establishment period to ensure their survival. Recycled water should be used wherever it is available and access to this resource should be planned for during design development.

Subsurface irrigation is preferred for water efficiency. Sprinkler systems should only be used immediately adjacent to active travel paths if other systems are not viable. If required, they should be designed to avoid spillage or spraying onto paths, particularly during high traffic times.

Passive irrigation

Passive irrigation is a form of Water Sensitive Urban Design (WSUD) and it may include such features as permeable pavement or directing run-off from adjacent hard surfaces into planted areas (refer to the section 'Water Sensitive Urban Design' on page 102 for further detail).

While it is a positive addition to any design due to the environmental and water efficiency benefits, it is especially important to provide passive irrigation when an automatic irrigation system cannot be provided.

Manual watering

Manual watering of landscaping by water cart is generally not preferred, but it may be required in some circumstances, particularly along controlled access roads, in regional locations, or as a temporary measure during the early establishment phase for plants that will otherwise be reliant on passive irrigation. It is labour-intensive and this should be factored into the ongoing costs of the project.

Maintenance access

Shared paths are often used as a safer off-road access route for landscape maintenance vehicles. Shared path width and pavement design should ensure light vehicles and water carts can be accommodated, but unauthorised vehicles are prevented from entering the facility, for example through use of bollards or other design elements.

Laneway off John Street, Salisbury

Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) is an approach to urban planning and design that integrates responsible and efficient management of the total water cycle into the urban development process.

Providing WSUD measures along active travel corridors helps to protect the receiving water quality of rivers, creeks and marine environments by removing pollutants and re-integrating water back into the urban landscape to create new microclimates. It can also help irrigate landscape areas and support plant growth in a sustainable manner.

WSUD treatments should be implemented wherever they are deemed appropriate to achieve the State WSUD policy performance targets for water quality, peak flow and flood risk, enhance placemaking, liveability, improve visual amenity, provide urban heat island mitigation, or to create natural corridors to improve ecosystem services.

WSUD measures include:

- **Infiltration**: Absorbing stormwater through the ground and into the soil, allowing plants to be passively irrigated in the process, for example by using permeable pavement or surface mulches.
- **Bioretention:** Collecting water run-off in a vegetated area before slowly releasing the water into the stormwater system or soil below.
- **Biofiltration**: Similar to bioretention, but also filters out particles and other pollutants before the water is released or potentially stored for re-use. This may be achieved using specially selected plants and porous media (e.g., sand).
- **Using recycled water:** To irrigate plants as an alternative to mains water.
- **Other water efficient landscaping methods**: These may include irrigation systems that minimise water wastage and selecting plant species with low water needs.

Specific design features that can be used for WSUD are described below, along with initial considerations. For further technical detail, refer to resources produced by Water Sensitive SA, particularly the Technical manual for water-sensitive urban design in Greater Adelaide.

Contextual considerations

The potential size and design of WSUD treatments are strongly influenced by the following attributes of the project site, which must be investigated at the outset:

- **Connectivity to the stormwater system**
  Having the option of connecting to the stormwater system means any collected water can be discharged through this system instead of relying on the permeability of the soil. This means comparatively larger volumes of water can be collected, subject to the capacity of the stormwater system.
- **Permeability of the local soil**
  Where the local soil has high permeability, water can soak through quicker, reducing the reliance on or necessity for a stormwater system connection to discharge any collected water. It may also increase the potential volume of water that can be safely collected. Soil with low permeability will be reliant on a stormwater system connection to discharge any collected water and it may also limit the effectiveness of permeable pavements.
- **Expected volumes of stormwater**
  Urban stormwater professionals should be engaged to conduct MUSIC modelling (Model for Urban Stormwater Improvement Conceptualisation), which simulates rainfall and pollution generation in the context of the local catchment area. This modelling is used to determine the appropriate size and design of WSUD garden beds.

Permeable paving

Permeable paving enables hard surfaces to perform a water quality improvement, quantity reduction and cooling function.

Subsurface soil structure systems, such as structural vaults or cells, are encouraged for the footpath pavements for tree planting zones that are conducive to root growth under pavements and are engineered to structurally support pavements. Selection of permeable paving should be mindful of maintenance regimes, longevity and aesthetics.

Design notes:

- Consider permeable paving in lieu of traditional impervious surfaces for footpaths, cycle lanes, parking bays, driveways and some roads with low vehicle traffic volumes and few or no heavy vehicles.
- Locate areas of permeable paving adjacent to street tree planting to maximise passive irrigation of tree root zones, and to encourage spread and growth.
- Use subsurface structural soils to support pavements.

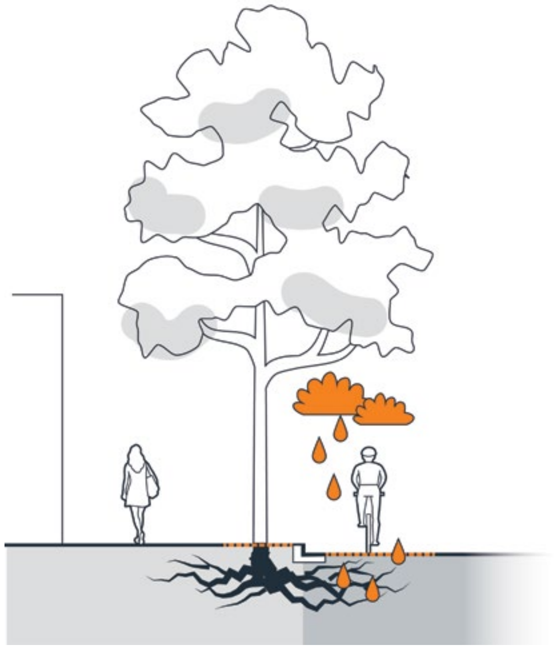


Figure 64. Permeable paving water flow

Holland Street, Thebarton

Kerb inlets

Kerb inlet systems capture water runoff from the road to water tree root zones in adjacent verges. They passively irrigate street trees and divert stormwater from the minor system network to reduce peak flows.

Inlet devices are cast into concrete kerbs to divert storm water from the road to soil in the verge or kerb extension. Water exits the kerb and gutter drainage system through a slotted face plate mounted in the kerb, and then flows via a PVC pipe into a leaky well constructed in the verge until the limit of the well and the infiltration capacity of its surrounding soil are reached. Inlets can accommodate a variety of different soakage devices and infiltration designs including pits, trenches, or shallow infiltration distribution systems.

Design notes:

- Provide continuous water table (gutter) where water volume entering the planted area needs to be limited, for example where there is no connection to the stormwater system.
- For roads with speed limits of 60 km/h or higher, it is preferable to avoid having slotted kerbs immediately adjacent to the vehicle lane where they may be hit at high speed. Instead, consider alternatives such as grated inlet or a continuous water table.

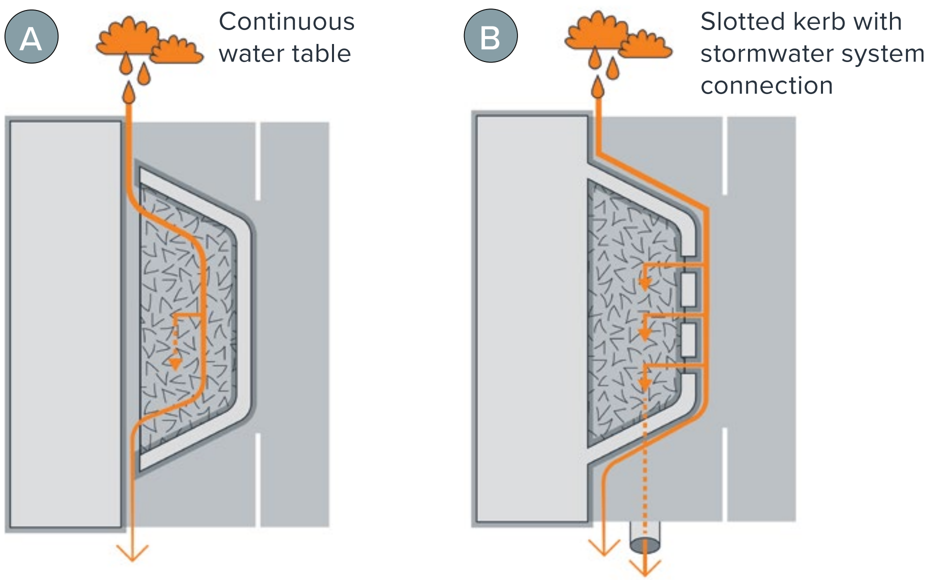


Figure 65. Water flow through kerb inlets

Biofiltration and swales

Water biofiltration is the process of improving water quality by filtering water through biologically influenced media. Stormwater biofiltration systems are known as biofilters, bioretention systems and raingardens.

A typical biofiltration system consists of a vegetated swale or basin overlaying a porous filter medium (usually soil-based) with a drainage pipe at the bottom. Stormwater is diverted from a kerb or pipe into the biofiltration system, where it flows through dense vegetation and temporarily ponds on the surface before slowly filtering down through the filter media.

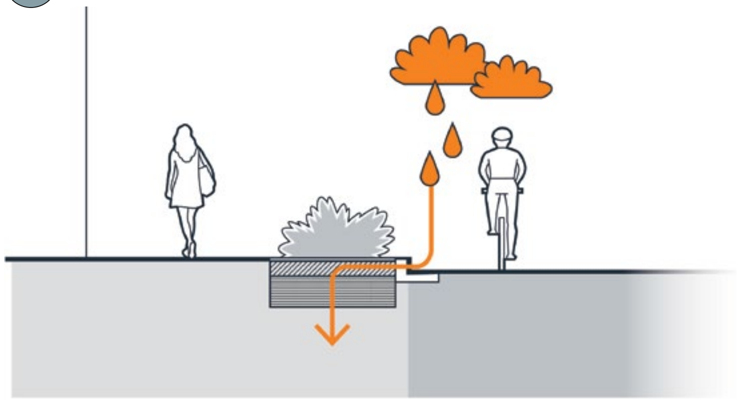
Biofiltration systems are used to improve stormwater quality, but if planted thoughtfully with a diverse range of plants can also improve biodiversity and support the growth of street trees along active travel corridors.

Swales carry water and are designed as shallow, open, planted channels to convey runoff and remove pollutants. Swales slow water flow and trap sediments to improve water quality.

Design notes:

- Swales and raingardens should be provided as alternatives to a piped drainage system where space and grade is available along active travel corridors.
- Ensure sub-surface drainage systems can be easily maintained.
- Ensure inlet zones can accommodate first flush flows and pollutant loads and can be easily maintained.

A Biofiltration system



B Biofiltration system with a drainage pipe

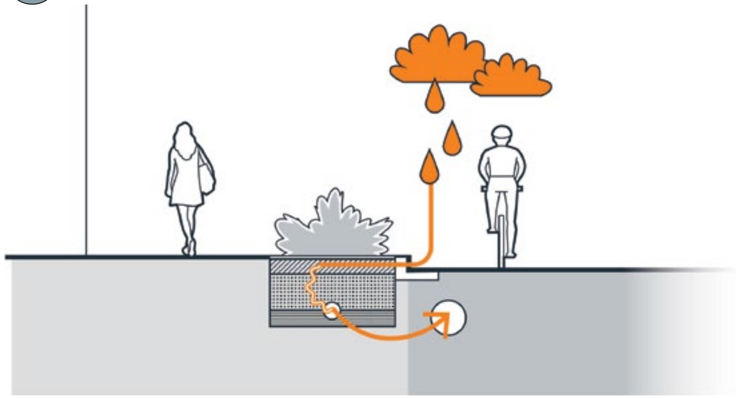


Figure 66. Stormwater biofiltration system

Biodiversity Sensitive Urban Design

Biodiversity Sensitive Urban Design (BSUD) aims to create urban areas that deliver on-site benefits to native species and ecosystems through the provision of essential habitat and food resources.

Provision of green infrastructure along and adjacent to active travel paths can provide ecological connectivity by allowing species to move through a landscape. Improving ecological connectivity is particularly important in urban environments where species may face increasing levels of habitat fragmentation.

Adelaide supports remarkably diverse plant and animal life and unique ecological communities. The city also faces substantial challenges, including urban heat, which can be potentially mitigated through urban greening. Biodiverse greening has the potential to deliver even greater benefits to the people of Adelaide, through enhanced health benefits, generating a unique sense of place and supporting native species, including some that are rare and threatened. But intentional strategies will be required – it is possible to fill a city with trees yet deliver little benefit for biodiversity.

Biodiversity objectives should be identified early in the planning and design process for active travel infrastructure. Designs should be developed and evaluated for synergistic benefits to biodiversity and other socio-economic (e.g. recreation) and environmental (e.g. integrated water management) needs.

Design considerations:

- BSUD is underpinned by five principles that assist urban professionals to this knowledge and thinking into urban design (Garrard et al. 2018):
  - **Enhance habitat and resources**: Design to meet the food, water and habitat needs of target species and ecosystems.
  - **Improve connectivity to encourage dispersal**: Design to facilitate the movement of target species through the landscape.
  - **Reduce threats and disturbances**: Design to mitigate the threats presented by an urban environment, such as noise and light pollution, vehicle strike and feral predators.
  - **Enable natural ecological processes**: Design to maximise ecosystem services and facilitate, where possible, natural processes.
  - **Facilitate positive human–nature interactions**: Design to enhance human connection to and experiences in nature and minimise any potential ecosystem disservices.

11. Shared streets

11.1 The concept of shared streets

'Shared streets' is an alternative to conventional street design approaches that removes or minimises street features that control users, with the aim of creating a more flexible and interactive environment.

> The core concept of shared streets is to integrate rather than segregate road and street users by creating an informal slow street environment where space is negotiated rather than taken for granted.

Shared streets achieve integration of users by minimising or completely removing traditional street controlling features, including:

- Kerbs
- Road markings
- Guard railings and bollards
- Signs
- Formal crossing points
- Delineation of spaces that may otherwise separate users.

The degree to which controlling features are removed varies according to the local context and the specific objectives of the street design. Streets with all controlling features removed are often referred to as 'naked' streets.

Another characteristic of shared streets is that they feature elements such as greenery and landscaping, street and pavement art, benches, on-street dining and café seating that foster and enhance social interaction.

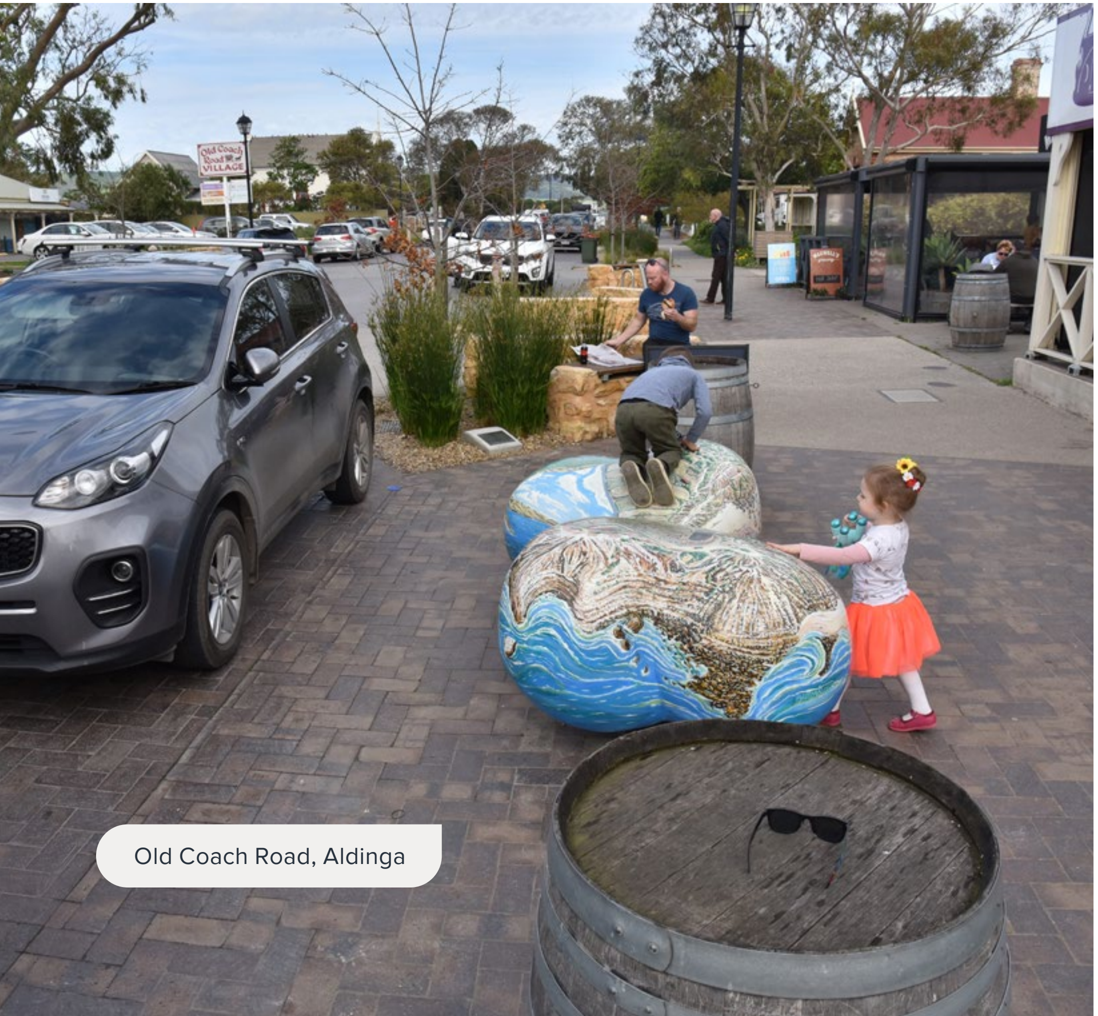
The concept of shared streets, where street users coexist without the traditional separation of sidewalks, is not new. Historically, many narrow alleyways around the world operated as shared spaces due to their insufficient width for separate footpaths. In the past 50 years, the concept has gained prominence with transformative street design projects across Europe, the US, New Zealand and Australia. One of the pioneering examples of shared streets was The Netherlands' 'woonerf', which began in the 1970s with the aim of reducing car speeds and creating people-focused residential areas. This idea was later adopted and adapted in various forms around the world.
In many instances, the implementation of shared street treatments includes granting pedestrians the legal right of way.

John Street, Salisbury

Shared street projects are particularly effective for streets with low traffic volumes, where a redesign aims to:

- Reduce car speeds and volume
- Increase the number of people walking and wheeling and how long they stay
- Increase the safety and perception of safety for people walking and wheeling
- Encourage social interaction and opportunities for street events.

Shared streets often surpass traditional street designs in locations that prioritise spatial flexibility, and aim to enhance destination appeal and social interaction.



Old Coach Road, Aldinga

11.2 Design considerations for shared streets

Shared street designs are implemented worldwide in two primary contexts:

- **Commercial shared streets**, to create vibrant public spaces that encourage on-street activity and extended stays by incorporating opportunities to dine, play and interact with public art and cultural displays
- **Residential shared streets**, to extend the use of street space for neighbourly interaction and children's play.

For both residential and commercial shared streets, consideration may be given to including:

- Gateway treatments that signal entry into shared spaces, such as tactile warning strips, grade changes, and varied paving textures and colours
- Kerbless level surfaces to make crossing the street easy at any location
- Universal accessibility
- Permeable pavers, rain gardens, trees and landscaping
- Vertical and horizontal deflections to slow vehicles, for example, through lengths of constrained widths, typically ranging from 2.8 metres to 3 metres between tall vertical elements, creating slow points
- Designation of zones for parking and landscaping to create chicanes and guide movement through a street
- Sufficient lighting for safety, security and comfortable social interaction
- Stormwater drainage lines through the street centre or in a meandering pattern to encourage pedestrian use
- Movable street furniture, such as planters and seating, to adapt the street for different uses throughout the day
- Signage to indicate the shared use of the street
- Public and community art, history and heritage interpretive features.

For commercial shared streets, additional design considerations include:

- Clear paths for delivery vehicles
- Designated loading areas and restricting loading times to periods when streets are least busy
- Collaborating with local businesses to extend their activities onto the streets, such as through on-street dining and merchandise displays
- Keeping parking and loading areas to a minimum.

Redesigning streets into shared level surface environments typically necessitates the removal of upright kerbs and modifications to the drainage infrastructure. A commonly adopted solution involves raising the road pavement to align with the existing footpath and establishing an invert near the centre of the road. This approach minimises the depth of excavation required, thus reducing the impact on existing underground infrastructure.

A challenge for shared streets is accommodating large waste collection and loading vehicles. This can be addressed by using smaller vehicles or shifting waste collection outside the areas of constrained width or access. Despite these limitations, the enhanced streetscape often boosts trading turnover, such that the benefits outweigh concerns about commercial vehicle operations and parking.
A long-standing concern with the shared street approach is the navigation challenge it poses for visually impaired users who may rely on kerbs, surface material changes, tactile pavers and clear path delineation to move safely through streets. To design shared streets for easy navigation, shared street spaces can be divided into the following zones with identifiable detectable changes in surface colours and textures:

- **Comfort zone**: Area for safe movement of people walking only that is clear, straight, and free of obstructions.
- **Circulation zone**: Shared path for movement of people walking, people wheeling and cars.
- **Furniture zone**: Area where benches, outdoor dining seating, utility poles and landscaping are placed.

Bentham Street, Adelaide

Outside Australia, different legal mechanisms exist to facilitate the sharing of street environments with speeds up to 30 km/h while giving users equal priority for using these spaces or giving pedestrians right-of-way. Based on available mechanisms and established practice In South Australia, two types of shared streets have emerged:

- **10 km/h shared zones:** Marked with a 10 km/h shared zone speed limit sign, prioritising people walking.
- **Shared or kerbless streets:** Informal kerbless environments often featuring level paving surfaces while maintaining conventional right of way, typically in low-speed areas.

Gibson Street, Bowden

10 km/h shared zones

In South Australia, the design and legal operation of a 'shared zone' has been tied to the adoption of a 10 km/h speed limit, with design requirements set out in the Speed Limit Guideline for South Australia (DIT, 2023). The key requirement for a shared zone is that the design should ensure that drivers cannot proceed significantly faster than walking pace. Other requirements include:

- Length of the zone not to be greater than 160 metres
- Clearly defined vehicle path
- Demonstrating pedestrian priority through design
- Eliminating or minimising car parking in a shared zone and installing parking control signs.

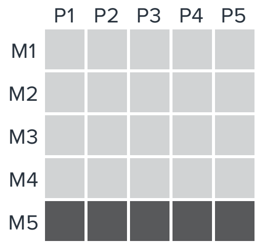


Figure 67. Street types appropriate for 10 km/h shared zones

Street types that could be designed to align with shared zone requirements are M5 street types - that is, streets with local car movement only. In the City of Adelaide, several streets have been redesigned as shared zones that carry M5P2 or M5P3 designations, including Bank Street and Gawler Place (adjacent Rundle Mall). Shared zones are also appropriate in high-density residential precincts.

Shared or kerbless streets

In locations where car movement cannot be slowed to walking pace, ruling out the implementation of a 10 km/h shared zone, removing some street control elements may encourage people-focused outcomes. This approach is often used in low-traffic areas (M3, M4, and M5 in regional or rural settings, and M4 and M5 in urban contexts, as shown in Figure 68). It typically features kerbless level surfaces, landscaping, street art and on-street activities. To ensure the safety of street users in these environments, low car speeds need to be implemented through street features outlined earlier.

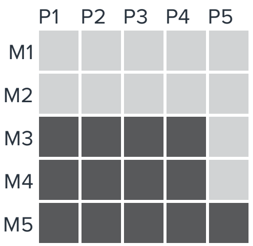


Figure 68. Street types appropriate for shared kerbless streets

Examples of shared kerbless streets that are not signed or operated as shared zones include:

- Bentham Street (Adelaide) – 20 km/h posted speed limit
- John Street (Salisbury) – 20 km/h posted speed limit
- Bowden precinct (Bowden) – 40 km/h posted speed limit
- Sixth Street (Murray Bridge) – 50 km/h posted speed limit
- Holland Street (Thebarton) – 50 km/h posted speed limit.

Further information:

- Section 5.4.2 of the Speed Limit Guideline for South Australia (DIT, 2023).
- Section 7.5.6 of the Guide to Traffic Management Part 8: Local Area Traffic Management (Austroads, 2016).
- Section B.2.13 of Integrating Safe System with Movement and Place for Vulnerable Road Users, section B.2.13 (Austroads, 2020).
- Global Street Design Guide (Global Designing Cities Initiative, 2016).
- Accessible shared streets: Notable practices and considerations for accommodating pedestrians with vision disabilities (US Department of Transportation, 2017)

Sixth Street, Murray Bridge

12. Key technical references

This section lists key references that offer technical insights for designing facilities for people walking and wheeling, as well as green infrastructure. The relevance of these documents to the chapters of this Guide is indicated in the right-hand columns. In addition to the technical guidance prepared by the Department for Infrastructure and Transport, Austroads and Standards Australia, which should be consulted when designing active travel facilities and green infrastructure, documents from other publishers providing valuable best practice perspectives are included in the final table.

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
Austroads	2023	Guide to Road Design Part 4: Intersections and Crossings: General			●	●	●		
Austroads	2023	Guide to Road Design Part 4A: Unsignalised and Signalised Intersections			●	●	●		
Austroads	2023	Guide to Road Design Part 4B: Roundabouts					●		
Austroads	2023	Guide to Road Design Part 4C: Interchanges			●	●	●		
Austroads	2021	Guide to Road Design Part 3: Geometric Design			●	●			
Austroads	2021	Guide to Road Design Part 6A: Paths for Walking and Cycling		●	●	●	●	●	
Austroads	2020	Guide to Traffic Management Part 13: Safe Systems Approach to Transport Management	●				●		
Austroads	2020	Guide to Traffic Management Part 4: Network Management Stategies	●						
Austroads	2020	Guide to Traffic Management Part 7: Activity Centre Transport Management			●	●			
Austroads	2020	Integrating Safe System with Movement and Place for Vulnerable Road Users	●		●	●	●		●
Austroads	2019	Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings			●	●	●		
Austroads	2017	Cycling Aspects of Austroads Guides		●	●	●	●		
Austroads	2017	Safe System Infrastructure on Mixed Use Arterials, Technical Report AP-T330-17			●	●	●		
Austroads	2016	Guide to Traffic Management Part 8: Local Area Traffic Management			●	●	●		

Table 44. Key Austroads references

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
Standards Australia	2024	AS 2303:2018 Tree stock for landscape use						●	
Standards Australia	2024	DR AS 1742.10 Manual of uniform traffic control devices Part 10: Pedestrian control and protection			●				
Standards Australia	2018	AS 1742.9 Manual of uniform traffic control devices Part 9: Bicycle facilities				●			
Standards Australia	2009	AS 1428.1 Design for access and mobility Part 1: General requirements for access – New building work			●				
Standards Australia	2009	AS 1742.13 Manual of uniform traffic control devices Part 13: Local Area Traffic Management			●	●			

Table 45. List of key Standards Australia references

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
DIT	2024	Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices Part 2: Code of Technical Requirements					●		
DIT	2024	Pavement Marking Manual			●	●	●		
DIT	2024	Supplement to AS 1742.10 Manual of uniform traffic control devices Part 10: Pedestrian control and protection			●				
DIT	2024	Supplement to AS 1742.9 Manual of uniform traffic control devices Part 9: Bicycle facilities				●			
DIT	2023	Operational Instruction 19.8: Trees in medians and roadsides in the urban environment						●	
DIT	2023	Standard Drawing Pedestrian Actuated Crossing Signals Dual Carriageway / Raised Median > 3m S-4018 Sheet 9			●				
DIT	2023	Standard Drawing Pedestrian Actuated Crossing Signals Median up to 3m - Solid or Painted S-4018 Sheet 8							
DIT	2023	Standard Drawing Pedestrian Actuated Crossing Signals No Median S-4018 Sheet 7			●				
DIT	2023	Standard Drawing Road Design Standard Kerb Ramps for Signalised Locations S-4074 Sheet 7			●				

Table 46. List of key Department for Infrastructure and Transport references (continues on next page)

Table continues from the previous page:

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
DIT	2023	Standard Drawing Road Design Standard Median cut out specifications for signalised intersections S-4075 Sheet 5			●				
DIT	2023	Standard Drawing Road Design Standard Pedestrian / Cyclist Kerb Ramps S-4074 Sheet 6			●	●			
DIT	2023	Standard Drawing Road Design Standard Pedestrian Walkthrough / Refuge / Kerb extension S-4075 Sheet 4			●				
DIT	2023	Traffic Management Operational Instruction 19.8 Trees in Medians and Roadsides in the Urban Environment						●	
DIT	2023	Traffic Management Publication Speed Limit Guideline for South Australia							●
DIT	2023	Traffic Management Traffic Signal Standard Signal Timings - TS001					●		
DIT	2022	Master Specification PR-PF-D1 Designing for Accessibility			●				
DIT	2022	Master Specification RD-GM-D1 Road Design			●	●	●		
DIT	2022	Master Specification PR-LS-C2 Planting						●	
DIT	2021	Green Infrastructure Commitment						●	
DIT	2020	Standard Drawing Road Design Standard 2 Stage Pedestrian Actuated Crossing S-4075 Sheet 2			●				
DIT	2019	Traffic Management Operational Instruction 14.1 Scramble Pedestrian Crossings			●		●		
DIT	2020	Vegetation Removal Policy						●	
DIT	2015	Standard Drawing Advisory Bicycle Pavement Symbol Treatments (Sharrows) S-7349 Sheet 1				●			
DIT	2015	Standard Drawing Advisory Bicycle Pavement Symbol Treatments (Sharrows) S-7349 Sheet 2				●			
DIT	2015	Guide to Bikeway Pavement Design, Construction and Maintenance for South Australia				●			
DIT	2004	Standard Drawing Traffic Signal Faces Aiming of Lantern Distances S-4538 Sheet 1					●		

Table 46. List of key Department for Infrastructure and Transport references

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
City of Unley	2022	Walking and Cycling Plan 2022-2027			●	●		●	
SA Water	2021	Tree Planting Guide						●	
City of West Torrens	2021	Public Realm Design Manual						●	
City of Marion	2016	City of Marion Streetscapes Design Guidelines						●	
Office of the Technical Regulator, SA	2016	Trees and powerlines						●	
Intermethod	2015	Contra-flow cycling facilities in Little Sturt Street, City of Adelaide: Evaluation of perceptions				●			
The University of Adelaide	2014	Going Against the Flow: Contra-flow Bicycle Lane Evaluation within the City of Adelaide				●			
Boujenko, N.; Morris, P; Jones, P.; for Active Living Coalition	2012	Streets for People: Compendium for South Australian Practice	●		●	●	●	●	●
Water Sensitive SA	2010	Technical manual for water sensitive urban design in Greater Adelaide						●	

Table 47. List of key other South Australian references

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
Transport for New South Wales	2024	NSW Guide to Walkable Public Space Ideas for open spaces, streets and public facilities			●			●	
VicRoads	2022	Supplement to AGRD Part 6A: Paths for Walking and Cycling			●	●			
Queensland Department of Transport and Main Roads	2021	Road Planning and Design Manual: Volume 3, Supplement to Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections					●		
Transport for New South Wales	2020	Cycle Design Toolbox Designing for cycling and micromobility		●		●			
Transport for New South Wales	2020	Walking Space Guide Towards Pedestrian Comfort and Safety	●		●			●	
APA	2020	Site planning + landscape national guidelines						●	
Australasian Transport Research Forum	2018	Walking speeds for timing of pedestrian walk and clearance intervals			●		●		
Garrard, G.E.; Williams, N.S.; Mata, L.; Thomas, J.; Bekessy, S.A	2018	Biodiversity sensitive urban design (in *Conservation Letters,* 11, e12411)						●	
VicRoads	2016	Traffic Engineering Manual Volume 3 Design Guidance for strategically important cycling corridors				●	●		
VicRoads	2016	Traffic Engineering Manual Volume 3 Guidance on Bicycle and Pedestrian Treatments at Roundabouts			●	●	●		
VicRoads	2016	Traffic Engineering Manual Volume 3 Guidance on Treating Bicycle Car Dooring Collisions				●	●		
VicRoads	2016	Traffic Engineering Manual Volume 3 Guidance on Treating Pedestrian and Turning Vehicle Conflicts at Signalised Intersections			●		●		
Queensland Department of Transport and Main Roads	2015	Technical Note 136: Providing for Cyclists at Roundabouts				●	●		
VicRoads	2015	Supplement to Australian Standard AS 1742.9:2000 Manual of uniform traffic control devices Part 9: Bicycle facilities				●			

Table 48. List of key other Australian references

Publisher	Year	Title	Movement and Place	Basic dimensions	Walking facilities	Cycling facilities	Intersections	Greening	Shared streets
National Transport Authority, Ireland	2023	Cycle Design Manual		●		●	●		
Department for Transport, UK	2020	Cycle Infrastructure Design, Local Transport Note 1/20	●	●					
Iacofano, D; Malhotra, M; Routledge, USA	2019	Streets Reconsidered: Inclusive Design for the Public Realm			●			●	●
Transport for London, UK	2019	Pedestrian Comfort Guidance for London		●	●		●		
National Association of City Transportation Officials (NACTO), USA	2019	Urban Bikeway Design Guide				●	●		
Elliott, J; Lohse, K; Toole, J; Lockwood, I; Barlow, J; Bentzen, B; Porter, C; U.S Department of Transportation Federal Highway Administration USA	2019	Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities							●
National Association of City Transportation Officials (NACTO), USA	2017	Urban Street Stormwater Guide						●	
National Association of City Transportation Officials (NACTO), USA	2016	Global Street Design Guide		●	●	●	●		●
CROW, Netherlands	2016	Design Manual for Bicycle Traffic		●		●	●		
National Association of City Transportation Officials (NACTO), USA	2013	Urban Street Design Guide			●	●	●		●
Gehl, J; Island Press	2010	Cities for People		●	●	●		●	
Jones, P; Boujenko, N; Marshall, S; Local Transport Today, UK	2007	Link and Place: A Guide to Street Planning and Design	●						

Table 49. List of international references

Government of South Australia

Department for Infrastructure and Transport

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