

# Street and movement network

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# Introduction

## Purpose of guideline

This guideline outlines the Urban Land Development Authority (ULDA) standards for the planning and design of street and movement networks within Urban Development Areas (UDAs). This guideline should be read in conjunction with the provisions of UDA development schemes, Interim Land Use Plans (ILUPs), and the other ULDA guidelines listed below.

- » Guideline no. 5 – Neighbourhood Planning and Design
- » Guideline no. 9 – Centres
- » Guideline no. 10 – Industry and Business Areas
- » Guideline no. 13 – Engineering Standards
- » Guideline no. 14 – Environment and Natural Resources Sustainability

This guideline contains specific street types for the three main land uses typically planned in UDAs: neighbourhoods, mixed use centres and industrial areas.

In consultation with the ULDA and other relevant parties, applicants may propose alternative solutions that differ from the standards set out in this guideline but achieve the relevant UDA-wide criteria or related provisions of ILUPs.



# Street network

## Street and movement network design standards

This guideline addresses only the UDA street network shown in Table 1. The highest order street in the UDA street network is the trunk connector. Below this the UDA street network comprises connector streets, access streets and lanes. The characteristics of these lower order streets and lanes vary depending on whether they are located in neighbourhoods, mixed-use centres or industrial areas.

**Table 1 UDA street network**

UDA street network		
Trunk connector		
Neighbourhood	Centre	Industrial
Neighbourhood connector street	Centre connector street	Industrial connector street
Neighbourhood access streets	Centre access street	Industrial access street
Rear lane	Centre lane	N/A

The UDA street network encourages interconnectivity between communities and neighbourhoods. A permeable street network enables all users to have access to the street network. Appendix A provides further information on the needs of street users and some basic planning and design considerations.

The detailed design considerations for each street or lane in the UDA street network are provided in the street types and specifications section of this guideline.

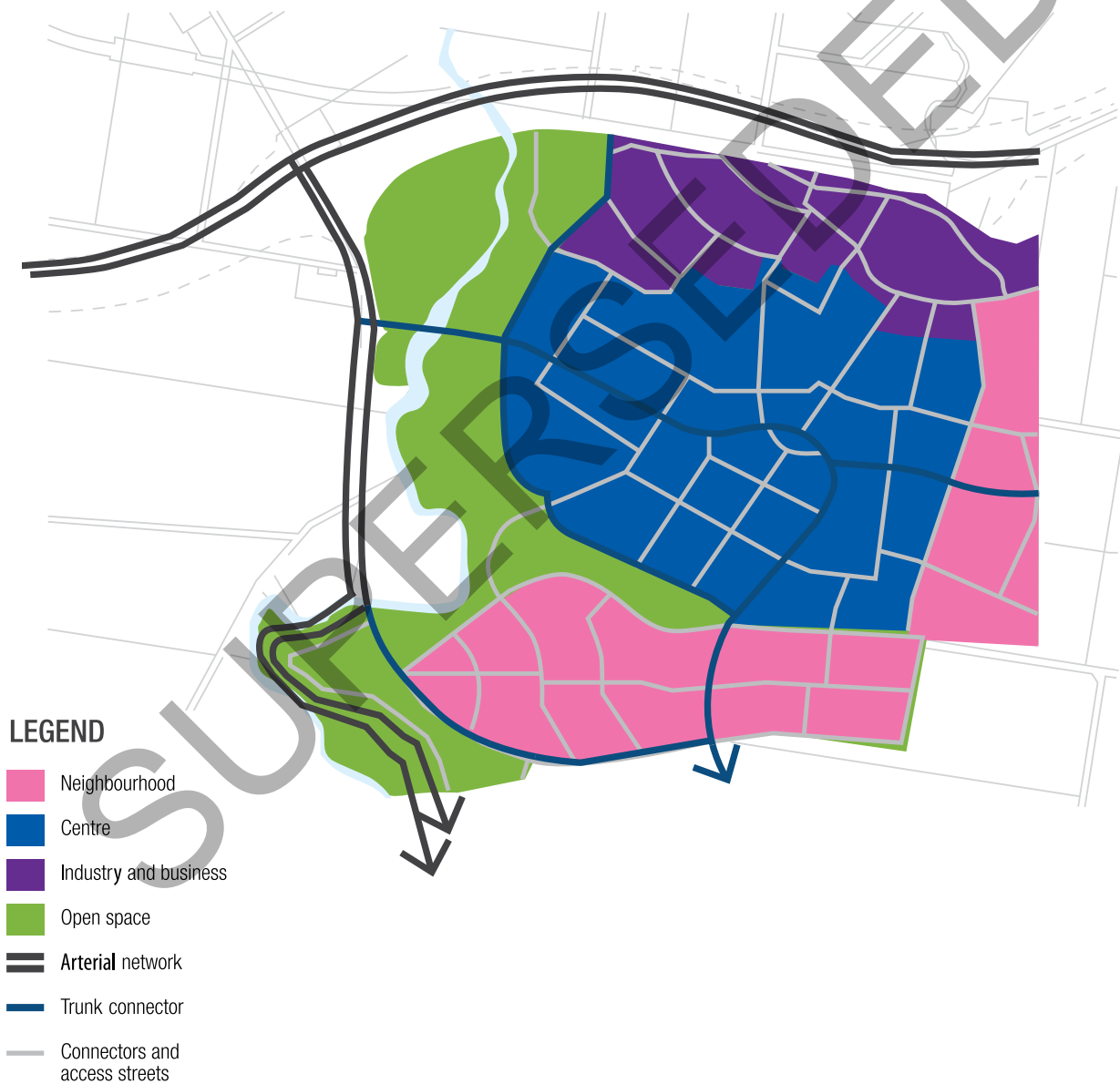
Table 2 presents the arterial road network. These roads are not addressed in this guideline. Table 2 provides the overall road hierarchy context for the UDA street network, and is provided for information only.

**Table 2 Arterial road network**

Arterial road network	Reference
Freeway	As per Austroads classification and not specifically addressed in this guideline. Standards for these higher order roads are referred to in ULDA Guideline 13: Engineering standards.
Primary arterial	
Secondary arterial	

Figure 1 shows the overall street network, presenting the interaction between the arterial road network and the ULDA street network to which this guideline applies. This figure classifies the UDA street and movement network into trunk connectors, connectors, access streets and lanes for neighbourhoods, centres and industrial areas.

**Figure 1 Street network diagram**





## Trunk connectors

Trunk connectors provide connections between neighbourhoods and other key activity areas and can include bus and cycling routes. Trunk connectors generally pass between rather than through neighbourhoods. Direct property access from this street type is limited as trunk connectors typically carry high volumes of traffic.

The function of a trunk connector is demonstrated in Figure 2.

## Neighbourhood street network

Figure 2 displays the neighbourhood street network, which correlates with ULDA *Guideline no. 5 Neighbourhood Planning and Design*. The neighbourhood street network consists of:

- » Neighbourhood connector streets – provide connections to neighbourhood destinations and typically include bus and cycling routes.
- » Neighbourhood access streets – provide high levels of connectivity within neighbourhoods and provide direct access to properties.
- » Neighbourhood lanes – provide direct property access, usually within high density developments or to the back of residential properties.

Figure 2 Neighbourhood street network diagram



Neighbourhood street networks should be designed to achieve the following requirements:

- » Networks should form a highly connected, legible and permeable grid pattern to provide choices in routes and mode of movement
- » Networks should promote safe traffic and transport movements and provide direct pedestrian and cyclist access to centres, focal points and transit opportunities
- » Street network design should minimise culs-de-sac, and where they are used:
  - Limit their length so the end point is visible from the access point to prevent drivers inadvertently turning into a dead-end
  - Ensure turning heads are capable of accommodating a three point turn by a medium-rigid vehicle (e.g. garbage and fire trucks)
  - Ensure street design provides pedestrian and cyclist connections through to other streets or to pedestrian/cycle paths
- » Ensure driveways are kept to a minimum width to maintain footpath connectivity
- » Use rear laneways to minimise driveways on higher order roads and main streets.
- » Footpaths should:
  - be provided on at least one side of all but the lowest order streets and lanes, particularly any street that provides a through route for pedestrian and cyclists
  - be provided on both sides of trunk connector streets, streets providing access to centres and other key destinations, and all streets where the adjoining residential density is 30 dwellings per hectare or greater
  - generally be a minimum of 1.5 metres wide to allow pedestrians, including those with mobility difficulties or prams, to walk two abreast or comfortably pass each other (a reduced width of 1.2 metres may be acceptable where pedestrian volumes are low).

A street network requires efficient and effective intersection design to provide network connectivity. General intersection requirements are:

- » Minimise the use of roundabouts, particularly within neighbourhoods
- » Ensure intersection design indicates the presence of the intersection on all approaches
- » Use tight kerb radii at intersections to shorten pedestrian crossing distances and reduce vehicle speeds.

Refer to Section: Street types and specifications for neighbourhood street network specifications.



## Centre street network

Figure 3 shows an indicative centre street network, ULDA *Guideline no. 9 Centres* should be consulted for further information about centre planning and design. As shown, the centre street network consists of:

- » Centre connector streets – provide limited direct property access, and support a high level of pedestrian and cycle activity
- » Centre access streets – provide direct property access to commercial centre activities, while supporting a high level of pedestrian and cycle activity
- » Centre lanes – provide access to the rear of buildings, mainly for loading and delivery vehicles.

Complete Streets (2010) defines centre streets as accommodating activity vital for the surrounding community, including a combination of retail, business, employment, school, leisure and related activity. Centre connector streets can be highly active streets, both during the day and at night.

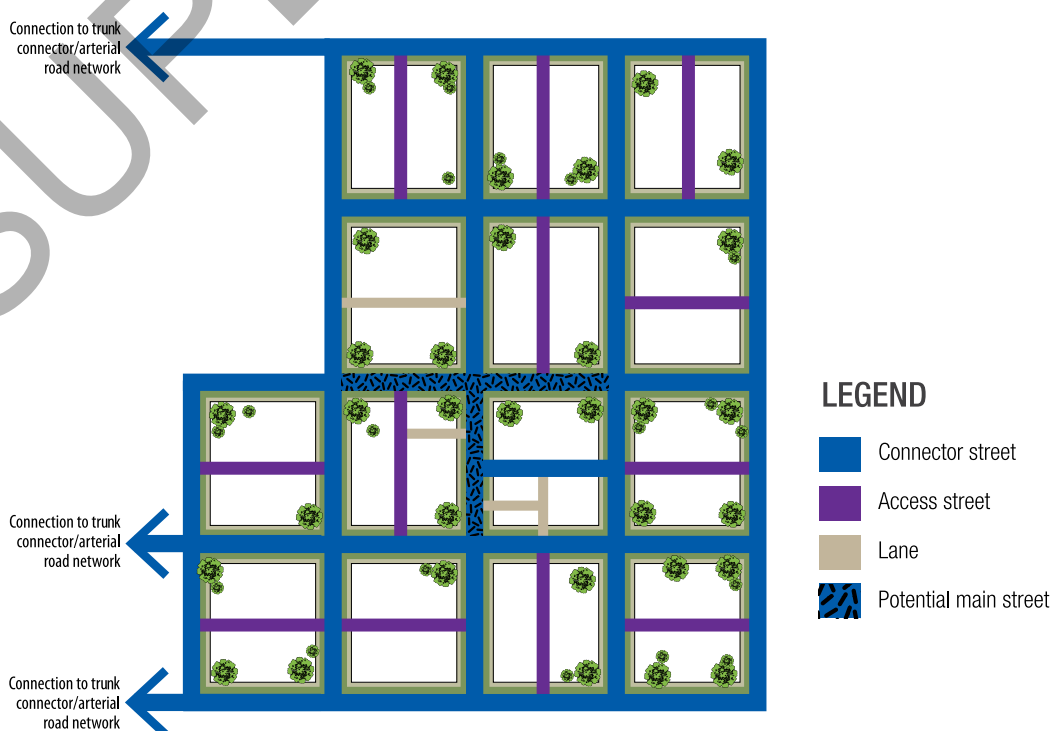
To provide adequate network connectivity, the following design requirements apply:

- » Networks should form a highly connected, legible and permeable grid pattern to provide choices in route and mode of movement

- » Networks promote safe traffic and transport movements and provide direct pedestrian and cyclist access to key activities, focal points and transit opportunities
- » Pedestrian and people-orientated activities are a priority, so pedestrian connections, with adequate pedestrian space, should be provided.
- » Cyclists' needs must be met through street design:
  - Commuter cyclists must have on-road options to minimise the effect of cyclists on the motor vehicle traffic flow
  - Alternative routes are essential to accommodate casual cyclists, usually provided by shared pedestrian and cycle pathways located separate to the road carriageway.
- » Public transport connections must be frequent and easily accessible by all street users.
- » Ensure driveways are kept to a minimum width to maintain footpath connectivity.
- » Centre connector streets should have limited direct access, to ensure the safety of all street users.

The requirements for intersections within the centre street network are similar to the neighbourhood intersection requirements detailed in the neighbourhood street network section. The detailed specifications of centre streets are provided in the street types and specifications section of this guideline.

**Figure 3 Centre street network**



## Industrial street network

Figure 4 displays the industrial street network and complements ULDA *Guideline no. 10 Industry and business areas*. The industrial street network consists of:

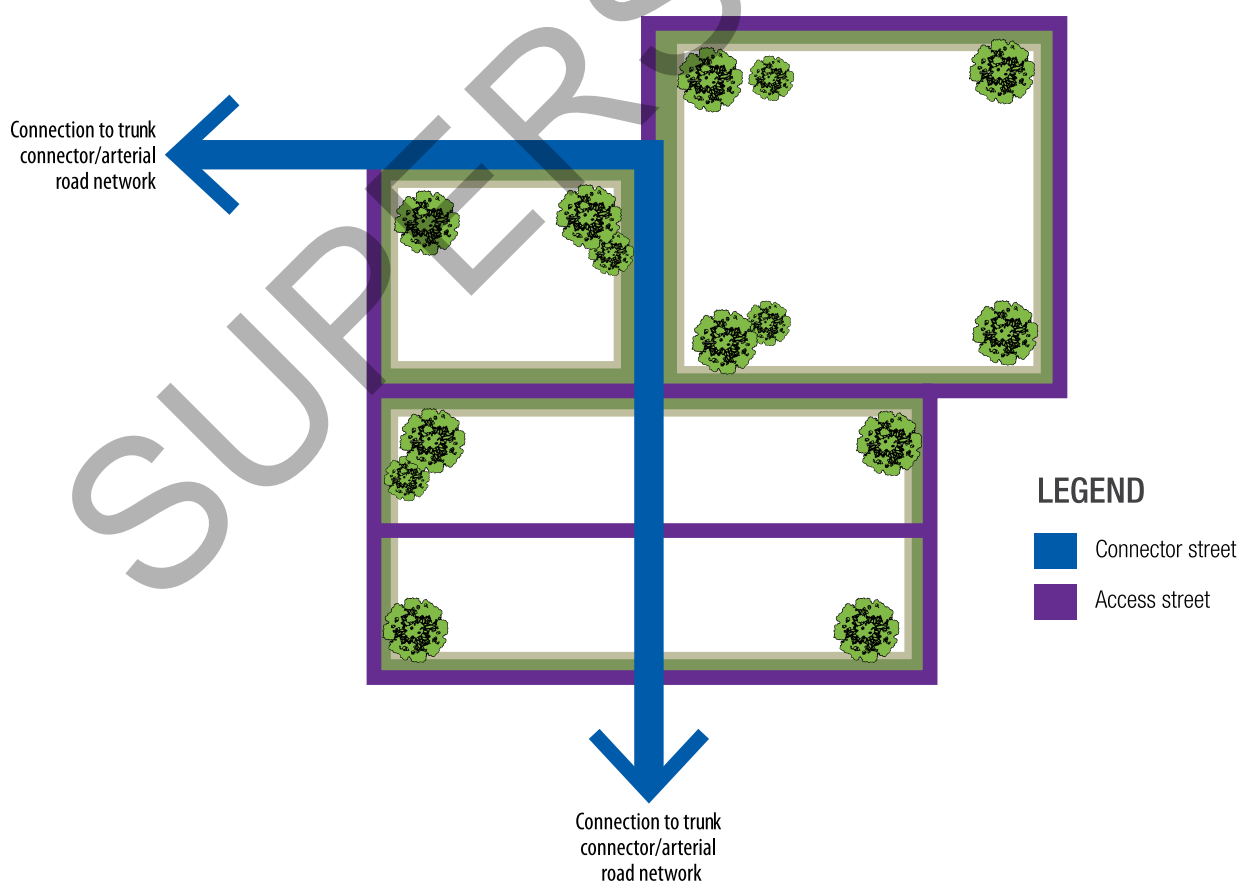
- » Industrial connector streets – provide a route via industrial access streets to industrial destinations.
- » Industrial access streets – provide direct access to properties and have a footpath on one side of the street for pedestrian connectivity.

Industrial street networks have a different purpose to neighbourhood and centre street networks, with a greater focus on motor vehicle and freight transport than pedestrian and cycle movement. The following design requirements apply to industrial street networks:

- » A highly connected, legible and permeable grid pattern to provide direct access to industrial and business users
- » Promote safe traffic and transport movements and provides direct pedestrian and cyclist access to industrial areas
- » Use of dead-end streets and cul-de-sacs should be avoided. Formal turn facilities should provide enough room for the freight design vehicles to manoeuvre
- » On street parking should be line-marked and clear zones used to improve street access and line of sight issues.

The requirements for intersections within the industrial street network are similar to the neighbourhood intersection requirements detailed in the: Neighbourhood street network section. The street types and specifications section provides the detailed specifications for industrial connector and access streets.

**Figure 4 Industrial street network**





## Street types and specifications

The UDA street types fall into four categories, as outlined in Table 1 and listed below:

- » Trunk connector
- » Neighbourhood
  - Connector street
  - Access streets
  - Lane
- » Centre
  - Connector street
  - Access street
  - Lane
- » Industrial
  - Connector street
  - Access street.

The following sections provide street characteristics and a typical cross-section for all the streets listed above.

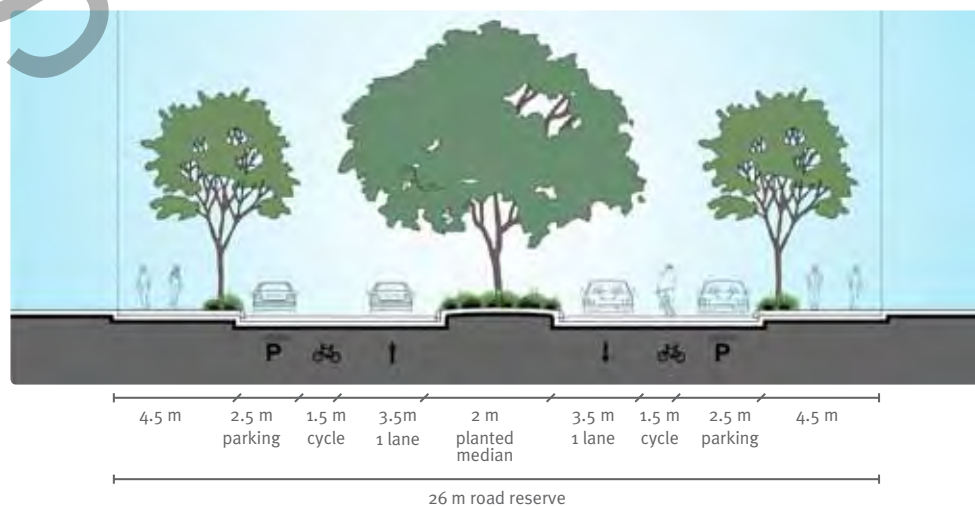
## Trunk connector

Trunk connectors play an important role in the overall street network and carry relatively high traffic volumes. They provide the link between the arterial road network and the lower-order streets (connector and access streets). Trunk connectors can include a bus and cycling route. Typically, trunk connectors have few driveways serving larger consolidated development parcels.

**Table 2 Trunk connector characteristics**

Street Type	Trunk Connector
Function	Distributes traffic volumes from the arterial network to the connector network. Pedestrian, cycle and bus transport modes are supported.
Traffic volume	< 10,000vpd
Reserve width	26 metres (depending on median selection)
Carriageway width	15 metres
Median (width)	2 – 6 metres planted
No. traffic lanes	2 x 3.5 metres (1 each direction)
Parking / No. street sides	2.5 metres minimum on both sides
Footpath width / No. street sides	Footpath 1.5metres minimum on both sides
Bus route	Yes, stops allowed for in parking lane, separate lane marking
Cycleway	1.5 metres cycle lane on both sides adjacent to parking lane
Property access	Limited property access
Traffic calming	No
Kerb type	Upright
Posted speed	60km/h – 70km/h
Intersection spacing	300 metres minimum spacing

**Figure 5 Trunk connector cross-section**



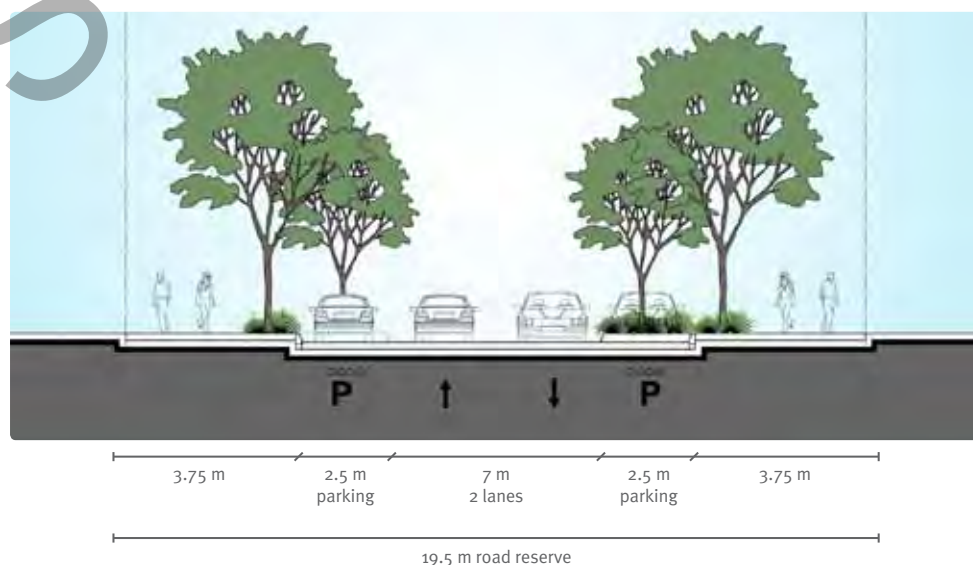
## Neighbourhood street network

### Neighbourhood connector street

**Table 3 Neighbourhood connector street characteristics**

Street Type	Neighbourhood Connector Street
Function	Neighbourhood connector streets connect neighbourhood destinations including shops and parks, provide access to the surrounding road network and can include a bus and cycling route.
Traffic volume	< 7,500vpd
Reserve width	19.5 metres
Carriageway width	9.5 – 12 metres
Median (width)	No
No. traffic lanes	2 x 3.5 metres (1 each direction)
Parking / No. street sides	2.5 metres minimum on one or both sides
Footpath width / No. street sides	1.5 metres minimum on both sides
Bus route	Where required as part of overall network, provide additional lane widths.
Cycleway	No
Property access	Direct property access
Traffic calming	No
Kerb type	Upright
Posted speed	Default 50km/h, unless signed otherwise.
Intersection spacing	120 metres minimum spacing

**Figure 6 Neighbourhood connector street cross-section**



## Neighbourhood access streets

Neighbourhood access streets provide high levels of connectivity throughout the neighbourhood, are of an appropriate length and have carriageways with sufficient width to enable safe and efficient through vehicle movement in association with on-street parking and passing opportunities. Streets and driveways are designed to ensure motorists are able to enter on-site parking space/s in one movement in a forward gear.

**Table 4 Neighbourhood access streets characteristics**

Street Type	Neighbourhood access streets	
	7.5 metres <sup>1</sup>	5.5 metres <sup>2</sup>
Function	Provide direct residential property access. Also allow for vehicle, pedestrian and cyclist connectivity.	
Traffic volume	< 5,000vpd	< 2,500vpd
Reserve width	15 metres	13 metres
Carriageway width	7.5 metres <sup>3</sup>	5.5 metres <sup>3</sup>
Maximum block length	150 metres	150 metres
Median (width)	No	No
No. traffic lanes	Varies, minimum one traffic lane with passing opportunities	Varies, minimum one traffic lane with passing opportunities
Parking / No. street sides	2.5 metres minimum on one or both sides	2.5 metres minimum on one side, staggered to provide passing opportunities
Footpath width / No. street sides	Footpath 1.5 metres minimum on one or both sides <sup>4</sup>	Footpath 1.5 metres minimum on one or both sides..
Bus route	No	No
Cycleway	No	No
Property access	Direct property access (vehicle access may be via rear lane)	Direct property access (vehicle access may be via rear lane)
Traffic calming	No	No
Kerb type	Roll Over	Roll Over
Posted speed	Default 50km/h, unless signed otherwise.	Default 50km/h, unless signed otherwise.
Intersection spacing	na	na

<sup>1</sup> A parking analysis plan\* is required to demonstrate compliance with the above standards if the proposed neighbourhood access street will provide access to:

- » lots less than 12.5m wide, or
- » a multiple residential development including up to 6 dwellings.

Refer to the ULDA practice note for more information on parking analysis plans.

<sup>2</sup> Generally only acceptable where:

- » net residential densities do not exceed 20 dwellings per hectare
- » on-street parking can be provided in accordance with ULDA Guideline No 7 Low rise buildings
- » where adequate passing opportunities can be provided to accommodate predicted traffic flows, and
- » where supported by a parking analysis plan.

<sup>3</sup> Carriageway widths may need to be increased to provide adequate vehicle manoeuvring space, particularly where on-street parking is provided opposite driveways.

<sup>4</sup> For additional information see ULDA practice note on footpath provision in residential subdivisions.

Figure 7 Neighbourhood access street – 7.5m cross-section

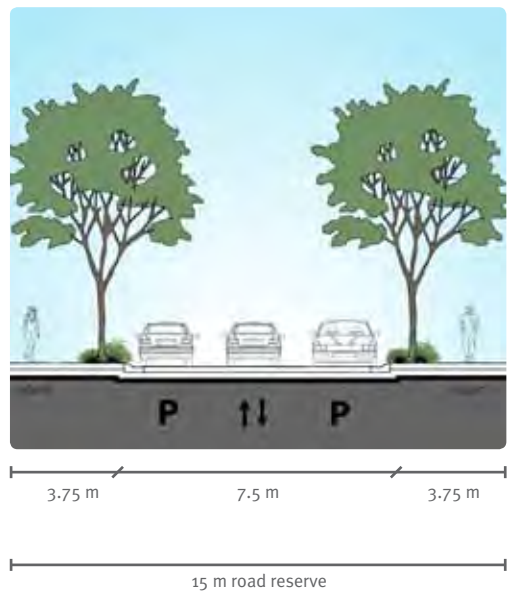
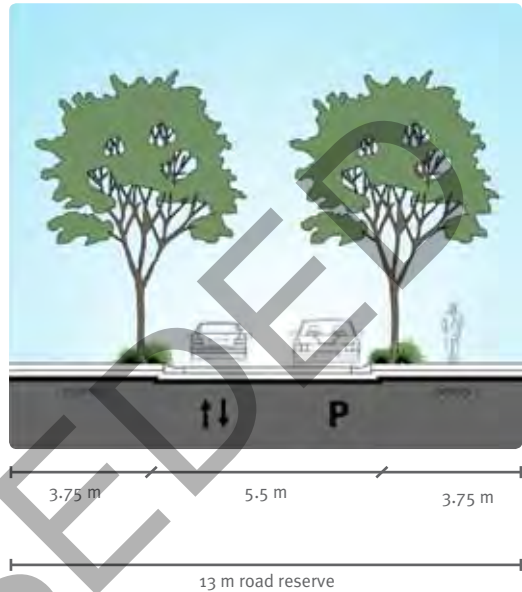


Figure 8 Neighbourhood access street – 5.5 m cross-section





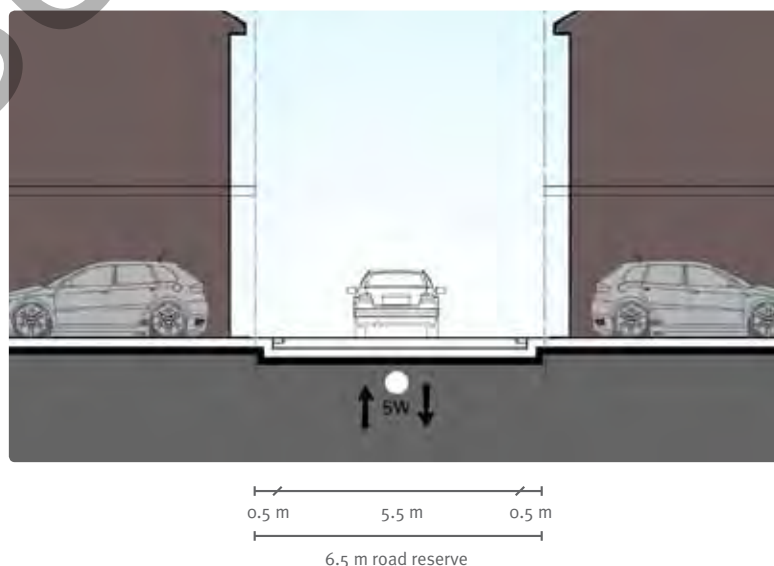
## Neighbourhood lane

(refer to ULDA Practice Note no.12 Rear lanes: design and development for detailed design guidance)

**Table 5 Neighbourhood lane characteristics**

Street Type	Neighbourhood lane
Function	Lanes provide direct access to properties including for refuse collection and other service vehicles. Lanes typically provide rear access to garages but can also provide "front door" access to loft apartments and other small dwellings.
Traffic volume	< 500 vpd
Reserve width	6.5 metres
Carriageway width	5.5 metres
Median (width)	No
No. traffic lanes	2 (1 each direction)
Parking / No. street sides	No
Services	Yes
Footpath width / No. street sides	No
Bus route	No
Cycleway	No
Property access	Direct property access
Traffic calming	No
Kerb type	Flush
Posted speed	Default 50km/h, unless signed otherwise.
Intersection spacing	na

**Figure 9 Neighbourhood lane cross-section**



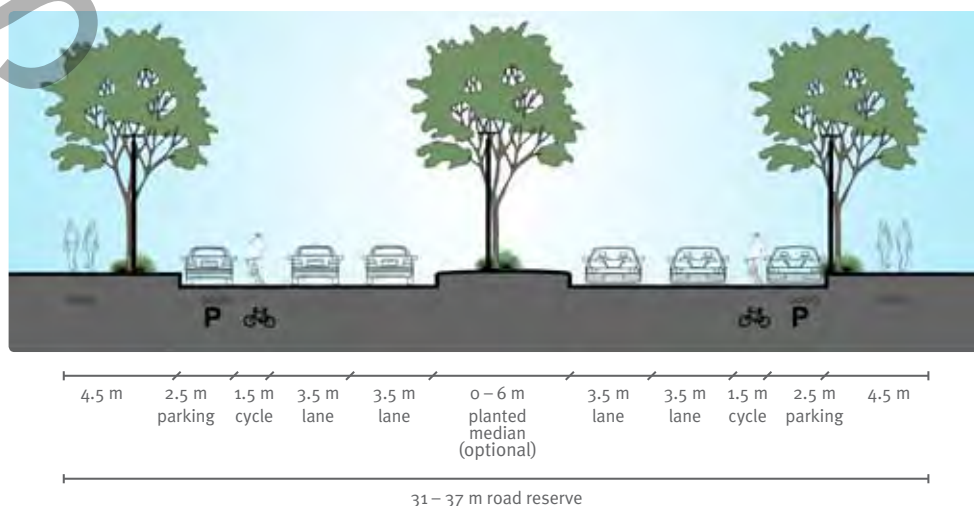
## Centre street network

### Centre connector street

**Table 6 Centre connector street characteristics**

Street type	Centre connector Street
Function	Centre connector streets provide limited property access and provide routes via access streets to centre destinations. They also accommodate a high level of pedestrian and cycle activity.
Traffic volume	< 10,000vpd
Reserve width	31 – 37 metres
Carriageway width	15-22 metres (excluding median)
Median (width)	0 – 6 metres (optional)
No. traffic lanes	2 or 4 x 3.5 metres (2 each direction)
Parking / No. street sides	2.5 metres minimum on both sides
Footpath width / No. street sides	Generally full width, 2.5 metres minimum on both sides.
Bus route	Yes, allowed for in parking lane, separate lane marking.
Cycleway	1.5 metres cycle lane on both sides next to parking lane
Property access	Limited direct access
Traffic calming	No
Kerb type	Upright
Posted speed	60km/h
Intersection spacing	100m minimum spacing

**Figure 10 Centre connector street cross-section**

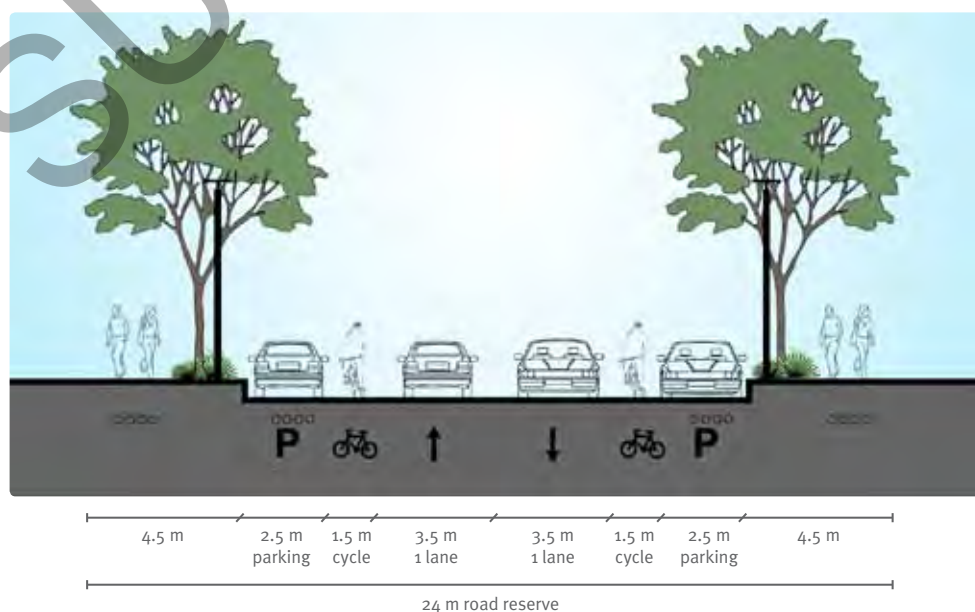


## Centre access street

**Table 7 Centre access street characteristics**

Street Type	Centre Access Street
Function	Centre access streets provide direct property access to commercial centre activities, and support a high level of pedestrian and cycle activity.
Traffic volume	< 5,000vpd
Reserve width	24 metres
Carriageway width	15 metres
Median (width)	No
No. traffic lanes	2 x 3.5 metres (1 each direction)
Parking / No. street sides	2.5 metres minimum on both sides
Footpath width / No. street sides	Generally full width, 1.5 metres minimum on both sides.
Bus route	Not usually allowed, but if needed provide additional lane widths as required.
Cycleway	1.5 metres cycle lane on both sides next to parking lane
Property access	Direct property access
Traffic calming	No
Kerb type	Upright
Posted speed	Default 50km/h, unless signed otherwise.
Intersection spacing	100 metres minimum spacing

**Figure 11 Centre access street cross-section**

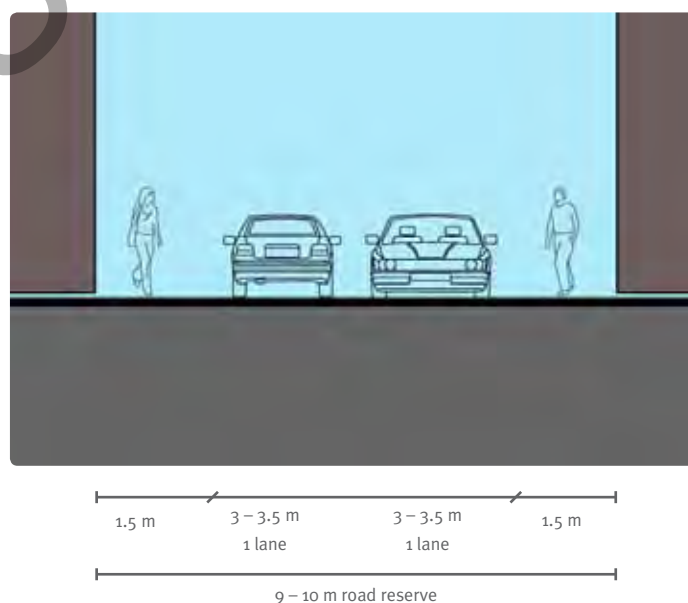


## Centre lane

**Table 8 Centre lane characteristics**

Street Type	Centre Connector Street
Function	Centre lanes provide access to the rear of buildings, including access for loading and delivery vehicles. Centre lanes are not intended as an alternative route option for through traffic, and should not be designed as such.
Traffic volume	< 1,000 vpd
Reserve width	9 – 10 metres
Carriageway width	6 – 7 metres
Median (width)	No
No. traffic lanes	2 x 3 – 3.5 metres (1 each direction)
Parking / No. street sides	No, short-term loading/unloading excepted
Footpath width / No. street sides	Full width where provided.
Bus route	No
Cycleway	No
Property access	Direct property access
Traffic calming	No
Kerb type	Flush
Posted speed	Default 50km/h, unless signed otherwise.
Intersection spacing	50 metres minimum spacing

**Figure 12 Centre lane cross-section**



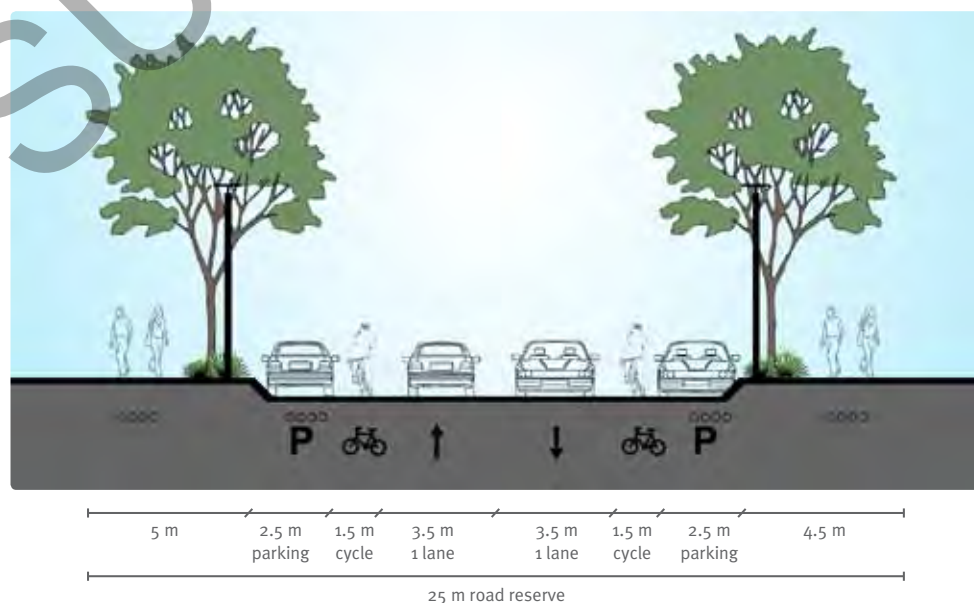
## Industrial street network

### Industrial connector street

**Table 9 Industrial connector street characteristics**

Street Type	Industrial connector street
Function	Provide routes via access streets to industrial destinations. Low requirement for cyclists and pedestrians accessibility.
Traffic volume	< 7,500 vpd
Reserve width	25 metres
Carriageway width	15 metres
Median (width)	No
No. traffic lanes	2 x 3.5 metres (1 each direction)
Parking / No. street sides	2.5 metres parking lane both sides
Footpath width / No. street sides	Footpath 1.5 metres minimum on one side
Bus route	No
Cycleway	1.5 metres cycle lane on both sides next to parking lane
Property access	Limited direct access
Traffic calming	No
Kerb type	Roll over
Posted speed	60km/h
Intersection spacing	150 metres minimum spacing

**Figure 13 Industrial connector street cross-section**

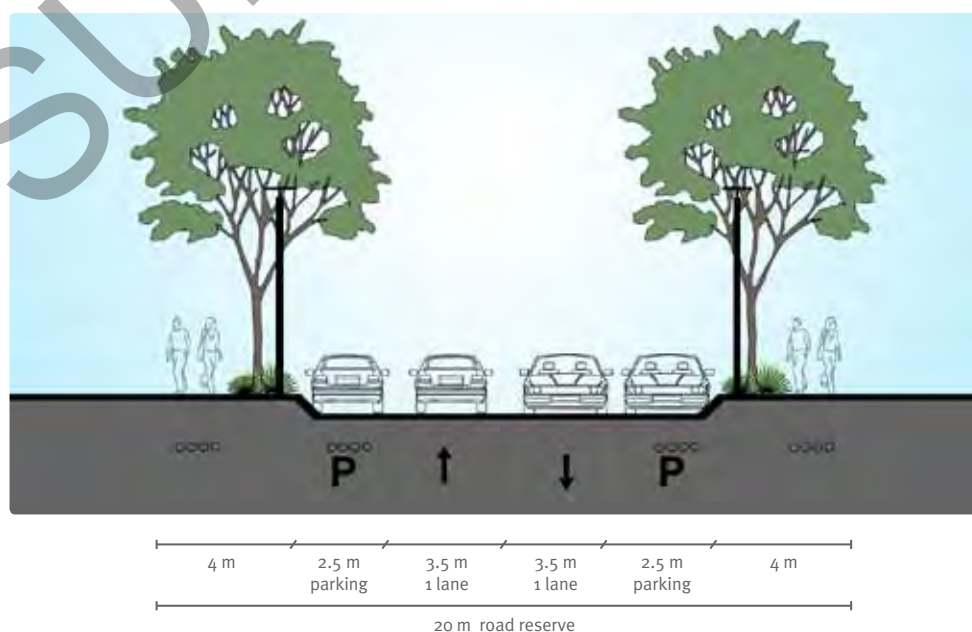


## Industrial access street

**Table 10 Industrial access street characteristics**

Street Type	Industrial Access Street
Function	Industrial access streets provide direct access to properties. Parking lanes are to be provided on both sides to cater for employees and a footpath on one side of the street.
Traffic volume	< 5,000 vpd
Reserve width	20 metres
Carriageway width	12 metres
Median (width)	No
No. traffic lanes	2 x 3.5 metres (1 each direction)
Parking / No. street sides	2.5 metres parking lane both sides
Footpath width / No. street sides	Footpath 1.5 metres minimum on one side
Bus route	No
Cycleway	No
Property access	Direct property access
Traffic calming	No
Kerb type	Roll Over
Posted speed	Default 50km/h, unless signed otherwise.
Intersection spacing	100 metres minimum spacing

**Figure 14 Industrial access street cross-section**





# Appendix A

## Functions of streets

The function of streets is an extremely important part of planning UDAs, as they provide the main linkages within and between neighbourhoods, centres, industrial and other areas of a community.

This appendix provides a brief overview of the functions and uses of streets.

*Complete Streets* (IPWEAQ, 2010) outlines the importance and function of street design within urban, residential and industrial developments, identifying the following principal functions that a street must fulfil:

- » Pedestrian and people activity
- » Cycle activity
- » Public transport activity
- » Motor vehicle activity
- » Parking.

This appendix describes the planning and design principles that have formed the basis of the ULDA street network hierarchy. *Next Generation Planning* (SEQ Council of Mayors, 2010) has also informed the UDA street and movement network described in this guideline.

### Pedestrian and people activity

Pedestrian activity encourages healthy living, social interaction and is an environmentally friendly travel option. It has a positive impact on communities and neighbourhoods, promoting vibrancy and street activities.

Pedestrians can use streets to commute, for fitness and health activities or to access adjacent land uses, such as public parks or commercial precincts. However, people do not use streets exclusively for travelling.

Other activities undertaken by people in streets include street-side dining, shopping, sitting to rest, busking and entertaining, waiting for public transport, exercising and recreation, playing, social interaction.

These activities require space and supporting infrastructure including seating, bus stops and shelters, play space, shade structures, drinking fountains, gathering space, public artwork and outdoor dining.

To ensure equitable access for people with disabilities, infrastructure must be designed to provide continuous accessible paths, appropriate path widths for wheelchairs, provide mobility aids and vision-impaired guidance. Refer to *AS/NZS 1428.1-2009* for detailed guidance on design for access for people with a disability.

Providing space for pedestrians alongside streets, to facilitate pedestrian movement and create activity opportunity is essential in modern street design. Figure 15 and Figure 16 provide examples of a high quality pedestrian environments within a street. The street types outlined in this document create pedestrian space, and encourage people to use streets for activities including active transport.

**Figure 15 Hastings Street, Noosa (Complete Streets, 2010)**



**Figure 16 Complete pedestrian space (Complete Streets, 2010)**





### Cycle activity

Encouraging active transport modes such as cycling should be a priority, by providing a safe and comfortable environment for cyclists, providing network connections and by managing interactions with other street users (refer Figure 17).

There are three general types of cyclists: commuter, long distance and local area cyclists. Commuter and long distance cyclists typically travel at higher speeds. Therefore, it is easier to incorporate their needs on busy streets. Local area cyclists generally have lower skill levels and as such, require wider cycle lanes, separated paths and slower vehicle traffic flows. All three groups have different requirements, and in order to encourage this mode of active transport, provisions need to be made while designing streets to incorporate safe and efficient cycle routes.

Cyclists also require supporting infrastructure such as end-of-trip facilities including secure parking, showers and bike lockers and bicycle-parking facilities.

**Figure 17 Cycling activity (Complete Streets, 2010)**



### Public transport activity

Public transport is a key activity in successful street networks, and provides a more environmentally friendly transportation option than private vehicle transport. Bus services will be the predominant public transport mode using the street network; however provisions should be made for taxi services in appropriate locations such as centres.

Street design should provide public transport routes that integrate with the greater public transport network and with local pedestrian and cycle networks to increase use of public transport. Service coverage and access need to be integrated into street and movement design of neighbourhoods, to enable effective public transport use.

Providing public transport infrastructure such as peak-hour bus lanes on key routes will also increase the use of public transport. Incorporating room in street space for bus stopping bays and indent stops will decrease the conflict between buses and other vehicles. Supporting infrastructure including stops, shelters and bike parking facilities will also provide passengers with comfort and safety, and need to be integrated into street design.

## Motor vehicle activity

Street design for motor vehicle activity must provide for the safe movement of motor vehicles and access to property while managing traffic speed to ensure the safety of all street users.

Providing adequate capacity for anticipated use is a major design consideration, as well as designing streets to passively control the speed of motor vehicle traffic and reduce unnecessary motor vehicle movements (i.e. rat running).

Motor vehicles travelling at lower speeds are more safely able to integrate with other street users and transport modes. Speed control is achieved through speed limits and, where appropriate, should be built into street geometry by designing streets and networks to have short straights and short distances between intersections, lane widths, street-scaping and on-street parking (see figure 18).

A key objective of street design is to provide access to adjoining properties. Access must be controlled in certain environments (such as streets with high levels of pedestrian activity) where it is desirable to reduce the interaction between turning vehicles and other street users.

Providing safe sight distances is also critical and must satisfy the relevant standards in the *Austrroads Guide to Road Design*. Other design requirements such as horizontal alignment grades, vertical alignment grades and cross fall must also comply with Austrroads.

The configuration of the carriageway depends on the function of the street and its users.

## Parking

Parking for motor vehicles is a major consideration for street design. Key objectives include: avoid obstructing other street users, balance supply and demand of parking requirements, provide accessible parking, manage parking zones and time limits to impact positively on the street vibrancy and on other street users.

Parking can be classified into two categories:

- » On-street parking
- » On-site parking.

On-street parking can be uncontrolled, or controlled via time limits or metering, influencing vehicle turn over. On-site parking is required to be provided in accordance with ULDA development schemes and guidelines.

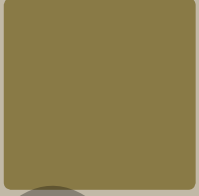
In high activity areas and other appropriate locations, parking lane space should also accommodate taxi stands. Motorcycle and motor scooter parking spaces may be provided at locations according to forecast demand. Provision must be made for commercial loading/delivery vehicles as well as waste collection vehicles.

Parking lane widths must be sufficient to avoid obstruction of other street users, such as cyclists in adjoining cycle lanes.

For more detailed guidance, refer to *AS2890.1 for off-street parking*, *AS2890.5 for on-street parking*, and the *Queensland Manual of Uniform Traffic Control Devices (MUTCD)*.

**Figure 18 Narrow streets aiding low speed environment (Complete Streets, 2010)**





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