



Street and movement network

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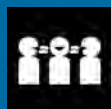
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Introduction

Purpose

This guideline sets out the standards for the planning and design of street and movement networks within Priority Development Areas (PDAs).

Application

The guideline is intended to be used in the following circumstances:

- » by EDQ and its consultants to inform preparation of development schemes and interim land use plans (ILUPs) for PDAs
- » by developers and their consultants to inform preparation of development applications for development in PDAs and
- » by EDQ when assessing relevant development applications.

The guideline should be used and interpreted in conjunction with the relevant PDA development scheme (or ILUP) together with other relevant guidelines.

Relationship to development schemes and ILUPs

The guideline is subordinate to development schemes. Where a development scheme or ILUP specifies a principle, objective or standard that is different to the guideline, the development scheme or ILUP requirement applies. This approach recognizes that guidelines are generic in nature and have been prepared to apply broadly across a range of PDAs, whereas development schemes have been tailored to respond to the specific circumstances of an individual PDA and to reflect the outcomes of community consultation about that PDA.

The guideline applies where the development scheme or ILUP:

- » calls up the guideline, either in whole or in part, or
- » does not specifically address a relevant matter addressed in the guideline.



How to use the standards

The standards set out in this guideline are not mandatory requirements. The standards have been adopted by EDQ to provide developers and their consultants with a clear indication of the form, type and arrangement of development that is likely to be acceptable in PDAs.

Development proponents are able, and in fact are encouraged, to propose innovative, alternative solutions that can be demonstrated to achieve the objectives set out in the guideline or the PDA-wide criteria in a development scheme or ILUP.

Street network

Street and movement network design standards

This guideline addresses only the PDA street network shown in Table 1. The highest order street in the PDA street network is the trunk connector. Below this the PDA 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 PDA street network

PDA 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 PDA 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 PDA street network are provided in the street types and specifications section of this guideline.

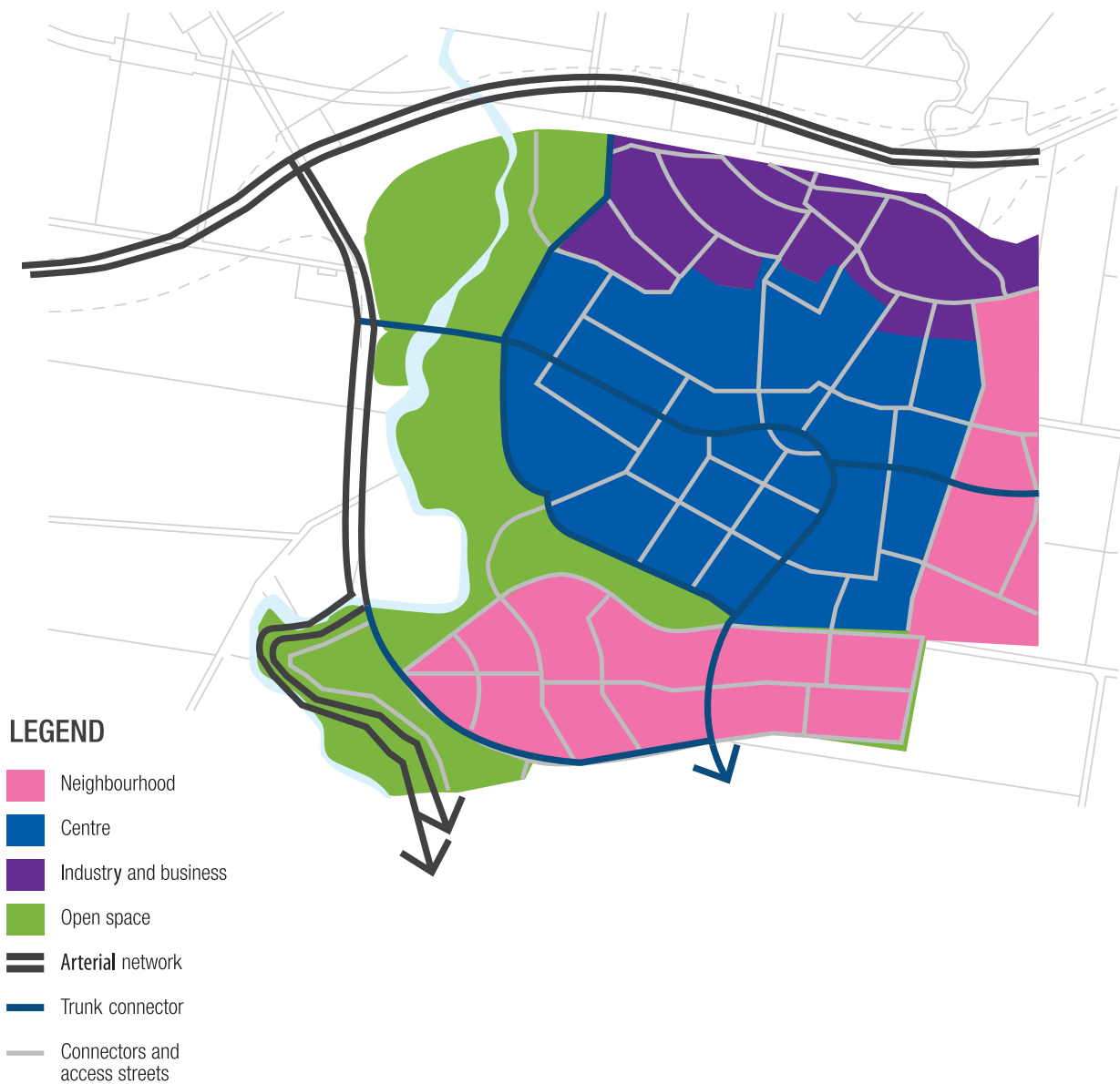
Table 2 presents the arterial road network. These roads are not addressed in this guideline. Table 2 provides the overall road hierarchy context for the PDA street network, and is provided for information only.

Table 2 Arterial road network

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

Figure 1 shows the overall street network, presenting the interaction between the arterial road network and the PDA street network to which this guideline applies. This figure classifies the PDA 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 PDA *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).
- » Cycle tracks should:
 - be separated from the road pavement on urban arterials, trunk connectors and neighbourhood connector to provide a safer friendly cycling environment
 - be designed in accordance with DTMR Technical Note 128 Selection and Design of Cycle Tracks.

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, PDA *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.

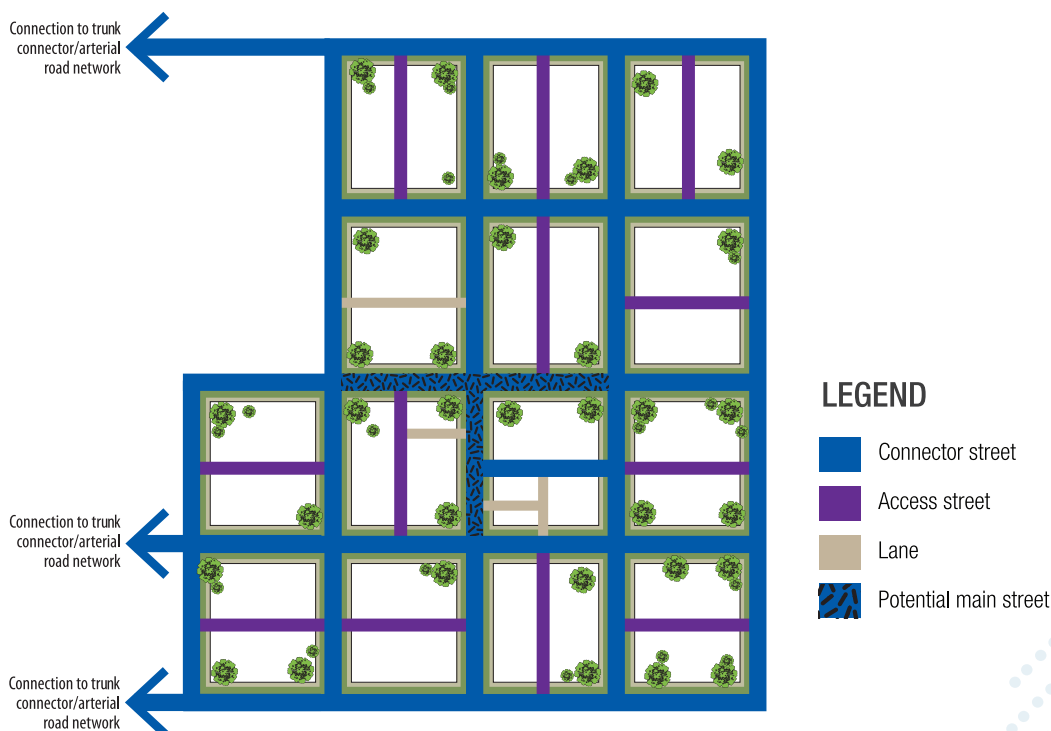
To provide adequate network connectivity, the following design requirements apply:

- » 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.
- » In greenfield areas and where opportunities exist in established areas, cyclists' needs in Centre connector and Centre access streets should be met through the provision of:
 - separated verge-located cycle tracks to facilitate a safer cycle environment and minimise conflict with vehicles and pedestrians; and where appropriate
 - shared pedestrian/ cycle pathways
- » 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 PDA *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.

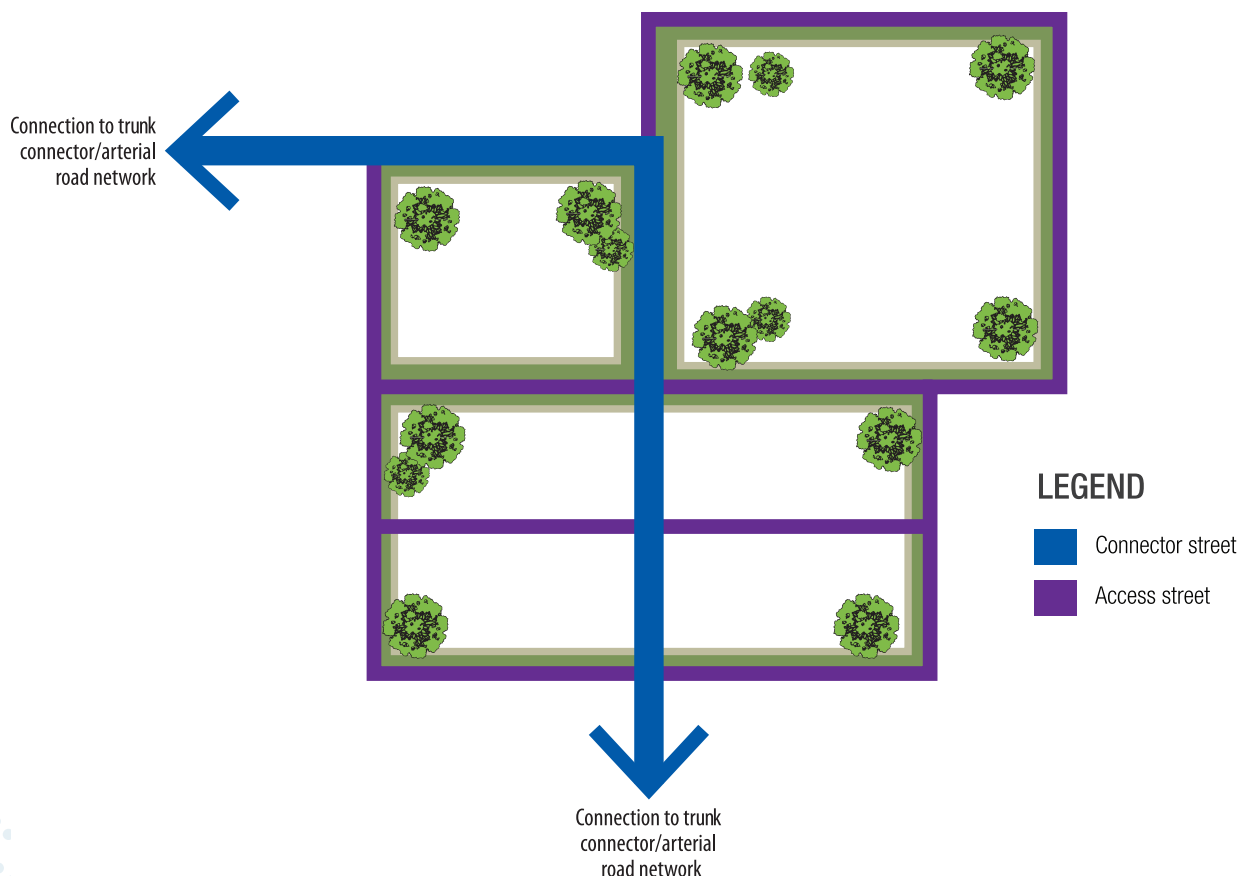
Industrial street networks have a different purpose to neighbourhood and centre street networks, with a greater focus on motor vehicle and freight transport than pedestrian and cycle movement. The following design requirements apply to industrial street networks:

- » 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.
- » In greenfield areas and where opportunities exist in established areas, cycle tracks should be provided on industrial connector streets separated from the road pavement in accordance with DTMR Technical Note 128 Selection and Design of Cycle Tracks.

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 PDA 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 demonstration examples 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 a safe family friendly cycling route. Typically, trunk connectors have few driveways serving larger consolidated development parcels.

Table 2 Trunk connector characteristics

Street type	Trunk connector (Figs 5A, 5B & 5C)
Function	Distributes traffic volumes from the arterial network to the connector network. Pedestrian, cycle and bus transport modes are supported.
Traffic volume	7,500 – 18,000 vpd (2 lane) 18,001 – 30,000 vpd (4 lane)
Reservation	22 – 24 m (2 lane); 33 m (4 lane no parking)
Median (width)	» 2 lane: optional » 4 lane: 6 m
Trafficable lanes	3.5 m wide
Parking	» Posted speed – 60 kph or less: 2.4 m indented where practicable » Posted speed > 60 kph: no parking
Footpath	» 1.5m minimum width on both sides
Bus route	Yes
Cycle track	» 2m wide one-way separated cycle tracks on each verge » 3m wide two way cycle track in one verge acceptable for interim 2 lane configurations
Property access	no direct access for traffic volumes > 10,000 vpd or posted speed > 60 kph
Traffic calming	No
Kerb type	Upright
Posted speed	50 – 70 km/h
Intersection spacing	300 metres minimum

Figure 5A: Demonstration example - trunk connector (2 lane - no parking)

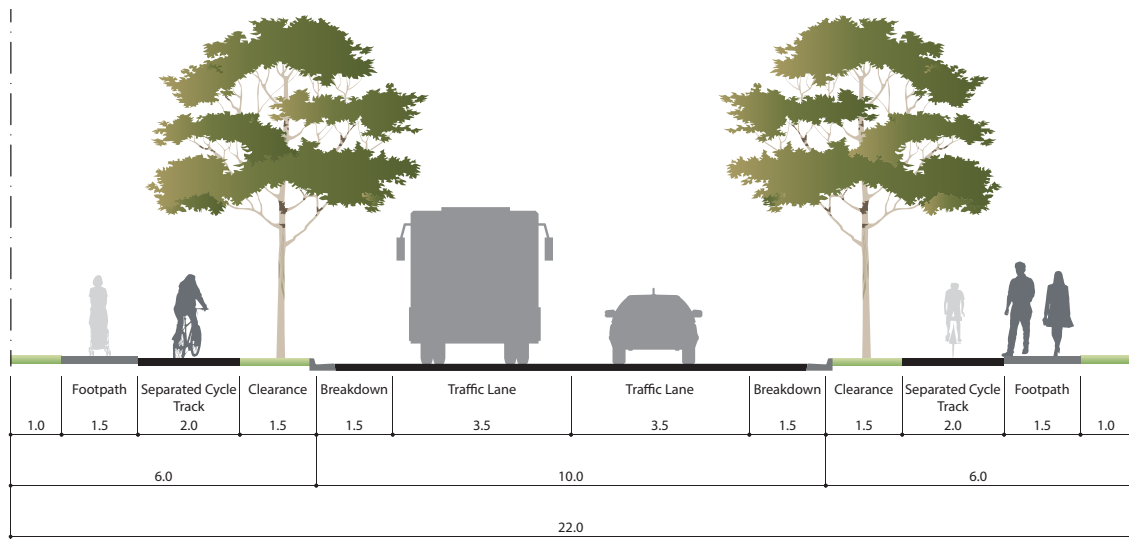


Figure 5B Demonstration example - trunk connector (2 lane - parking)

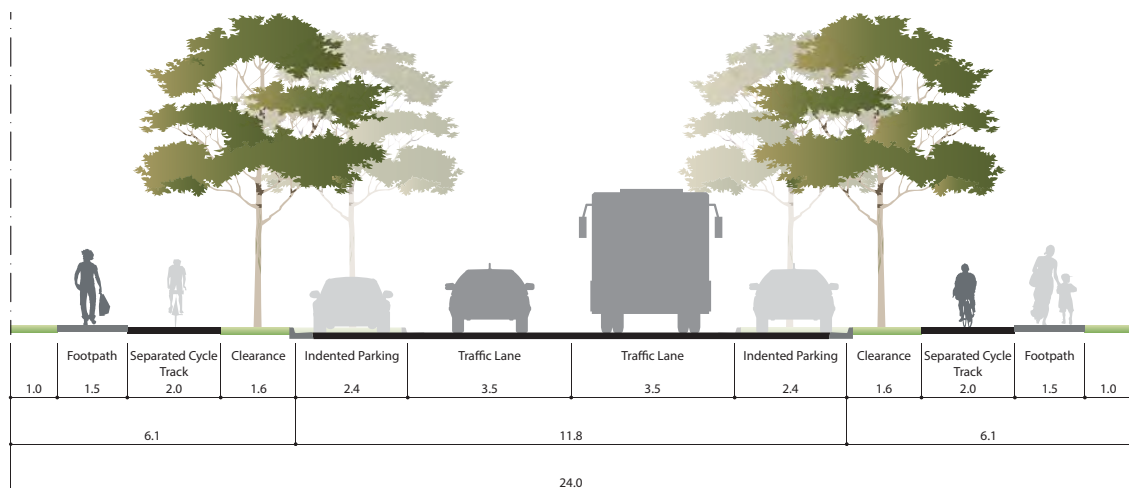
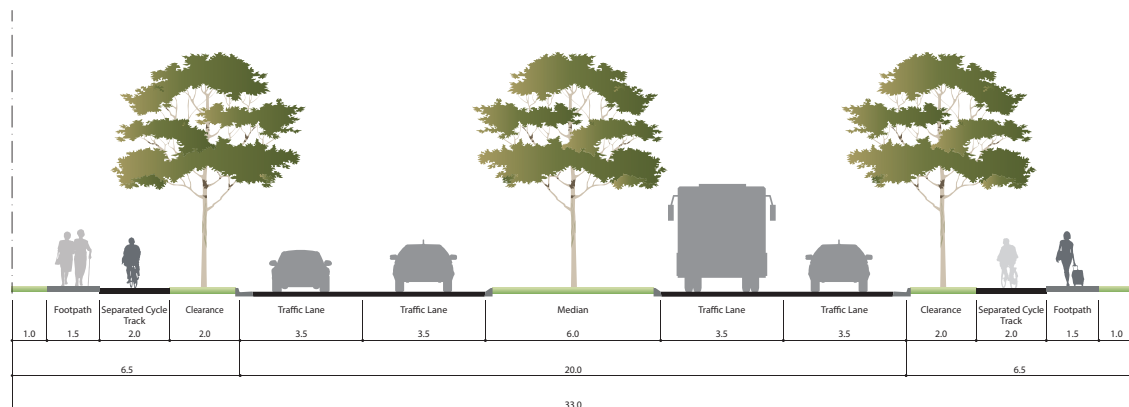


Figure 5C: Demonstration example - trunk collector (4 lane - no parking)



Neighbourhood street network

Neighbourhood connector

Table 3 Neighbourhood connector street characteristics

Street type	Neighbourhood connector street (Fig 6)
Function	Neighbourhood connector streets connect neighbourhood destinations including shops and parks, provide access to the surrounding road network and can include a bus and a safe family friendly cycling route.
Traffic volume	3000 - 7499 vpd
Reserve width	22 m
Median	No
Trafficable lanes	1 x 3.3 m lane in each direction
Parking	2.3 m minimum indented where practicable on both sides
Footpath	1.5 m minimum on one side
Shared path	3 m wide on one side
Bus route	Where required as part of overall network
Property access	Direct
Traffic calming	No
Kerb type	Upright/ rollover
Posted speed	Default 50 km/h
Intersection spacing	120 metres

Figure 6: Demonstration example - neighbourhood connector



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 street	
	7.5 m (Fig 7A)	6 m ¹ (Fig 7B)
Function	Provide direct residential property access. Also allow for vehicle, pedestrian and cyclist connectivity.	
Traffic volume	< 3000 vpd	< 3000 vpd
Reserve width	16 m ²	15.5 m
Carriageway width	7.5 m	6 m
Maximum block length	200 m	200 m
Median	No	No
Trafficable lanes	Varies, minimum one traffic lane with passing opportunities	Varies, minimum one traffic lanes with passing opportunities
Parking ³	kerbside	2.3 m minimum indented on one side
Footpath	1.5 m minimum on one side ⁴	1.5 m minimum on one side ⁴
Bus route	No	No
Cycle track	No	No
Property access	Direct	Direct except via indented parking bays
Traffic calming	Generally not supported	Generally not supported
Kerb type	Roll Over	Roll Over
Posted speed	Default 50 km/h	Default 50 km/h
Intersection spacing	na	na

¹ A preferred alternative profile where no access driveways are required via the indented parking bays eg. where rear lane product is proposed.

² Verge widths must be increased appropriately to accommodate any proposed WSUD devices

³ 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 PDA practice note for more information on parking analysis plans.

⁴ For additional information see PDA practice note on footpath provision in residential subdivisions.

Figure 7A: Demonstration example - neighbourhood access street - 7.5 m

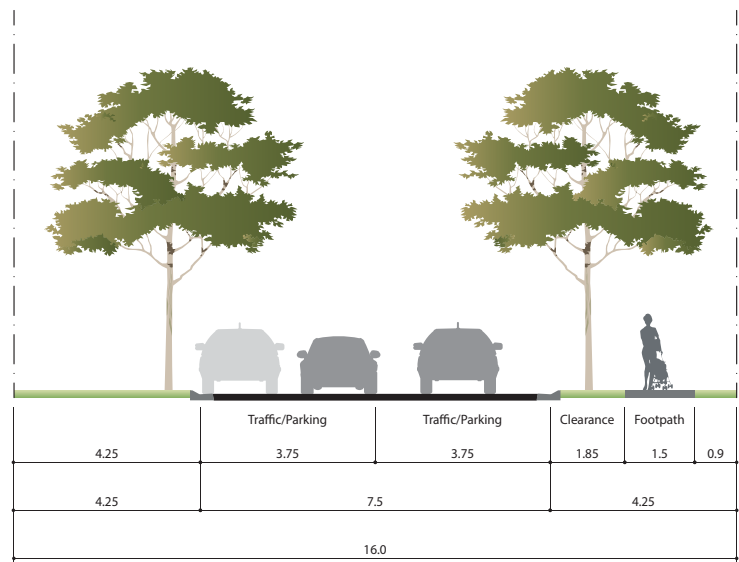
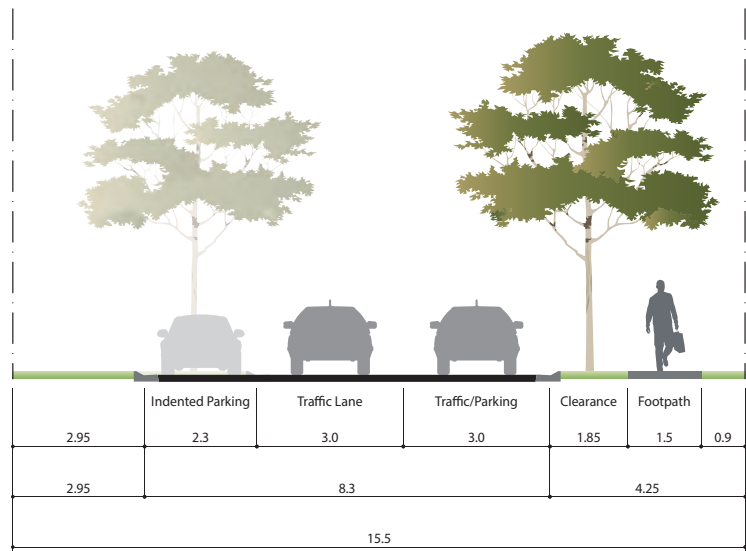


Figure 7B: Demonstration example - neighbourhood access street - 6 m



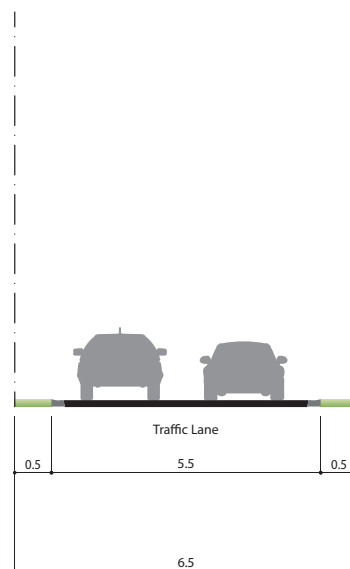
Neighbourhood lane

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

Table 5 Neighbourhood lane characteristics

Street type	Neighbourhood lane (Fig 8)
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 m
Carriageway width	5.5 m
Median	No
Trafficable lanes	1 in each direction
Parking	No
Services	Yes
Footpath	No
Bus route	No
Cycle track	No
Property access	Direct property access
Traffic calming	No
Kerb type	Flush
Posted speed	Default 50 km/h, unless signed otherwise.
Intersection spacing	na

Figure 8: Demonstration example - neighbourhood lane



Centre street network

Centre connector street

Table 6 Centre connector street characteristics

Street type	Centre connector street	
	Fig 9A (parking)	Fig 9B (no parking)
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	7,500 – 15,000 vpd	
Reservation	38 m	34 m
Carriageway width	19 m	15 m
Median	6 m	6 m
Lanes	2 x 3.5 m in each direction	2 x 3.5 m in each direction
Parking	2.5 m minimum on both sides	No
Footpath	3 m both sides	3 m both sides
Bus route	Yes, allowed for in parking lane, separate lane marking.	Yes, provision for indented bus bays where required
Cycle track	2 m one -way separated cycle track in each verge	2 m one-way cycle track on road separated from travel lane by 2m median
Property access	Limited direct access	Limited direct access
Traffic calming	No	No
Kerb type	Upright	Upright
Posted speed	60 km/h	50 - 60 km/h
Intersection spacing	100 metres minimum	100 metres minimum

Figure 9A: Demonstration example - centre connector (parking)

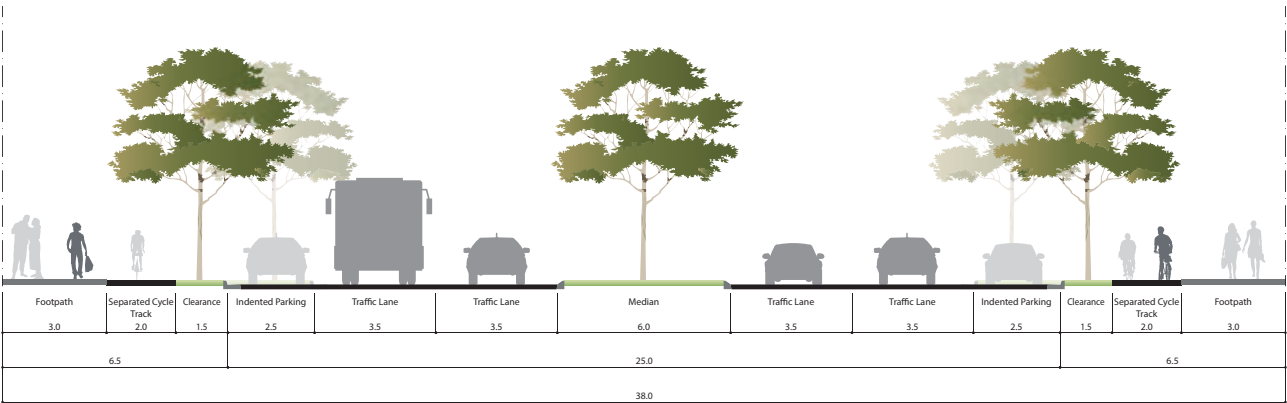
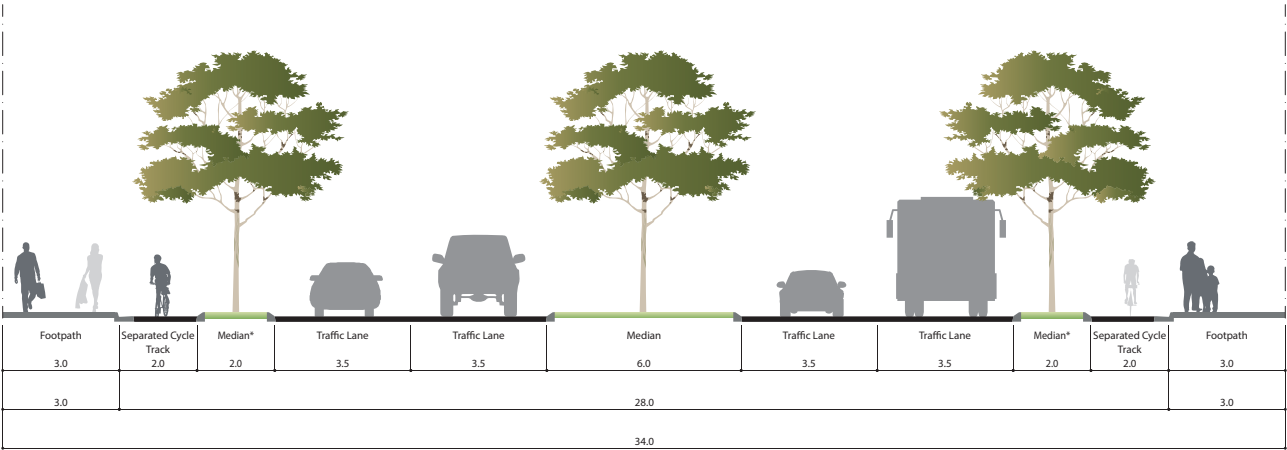


Figure 9B: Demonstration example - centre connector (no parking)

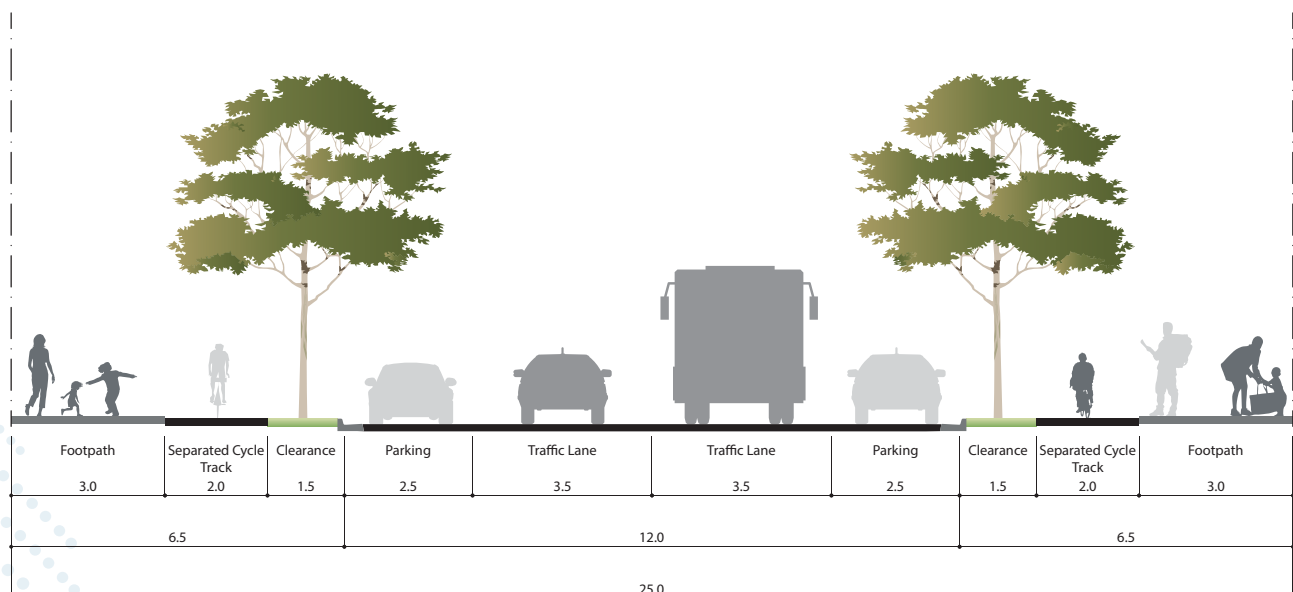


Centre access street

Table 7 Centre access street characteristics

Street type	Centre access street (Fig 10)
Function	Centre access streets provide direct property access to commercial centre activities, and support a high level of pedestrian and cycle activity.
Traffic volume	< 7,500 vpd
Reservation	25 m
Median	No
Trafficable lanes	3.5 m in each direction
Parking	2.5 m minimum on both sides
Footpath	3 m both sides
Bus route	Not usually permitted
Cycleway	2 m one-way separated cycle track in each verge
Property access	Direct property access
Traffic calming	No
Kerb type	Upright
Posted speed	Default 50 km/h, unless signed otherwise
Intersection spacing	100 metres minimum

Figure 10: Demonstration example - centre access street

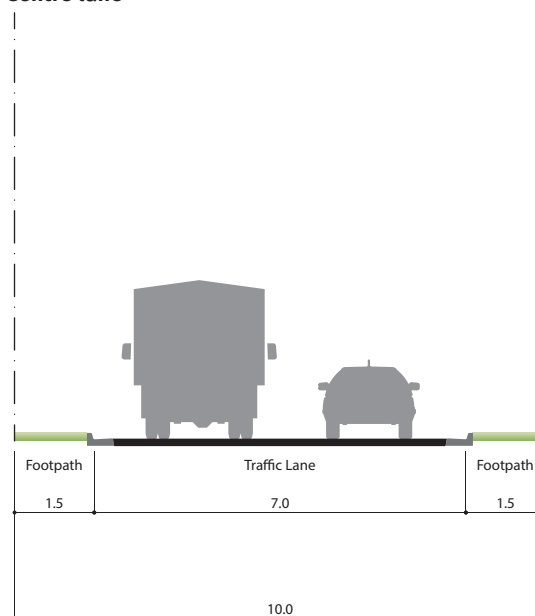


Centre lane

Table 8 Centre lane characteristics

Street type	Centre lane (Fig 11)
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
Reservation	10 m
Median	No
Trafficable lanes	3.5 m in each direction
Parking	No, short-term loading/unloading excepted
Footpath	1.5 m both sides
Bus route	No
Cycleway	No
Property access	Direct property access
Traffic calming	No
Kerb type	Flush
Posted speed	Default 50 km/h, unless signed otherwise.
Intersection spacing	50 metres minimum

Figure 11: Demonstration example - Centre lane



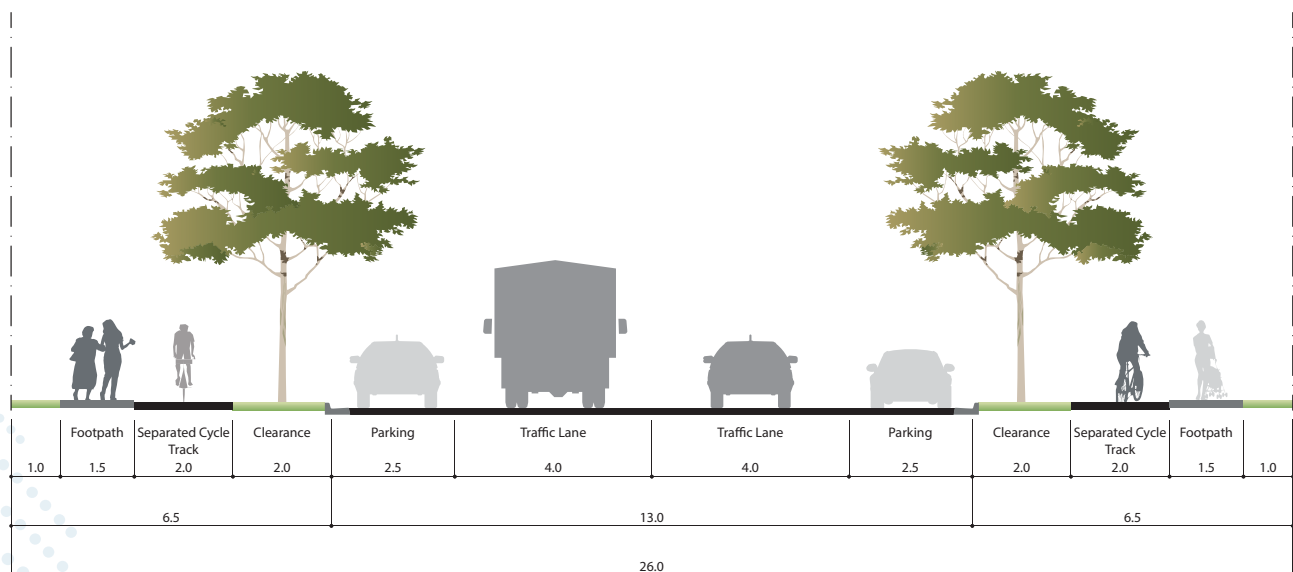
Industrial street network

Industrial connector street

Table 9 Industrial connector street characteristics

Street type	Industrial connector street (Fig 12)
Function	Provide routes via access streets to industrial destinations. Low requirement for cyclists and pedestrians accessibility.
Traffic volume	< 7,500 vpd
Reservation	26 m
Median	No
Trafficable lanes	4 m in each direction
Parking	2.5 m parking lane both sides
Footpath	1.5 m on both sides
Bus route	No
Cycleway	No
Property access	Limited direct access
Traffic calming	No
Kerb type	Upright
Posted speed	60 km/h
Intersection spacing	150 metres minimum

Figure 12: Demonstration example - industrial connector

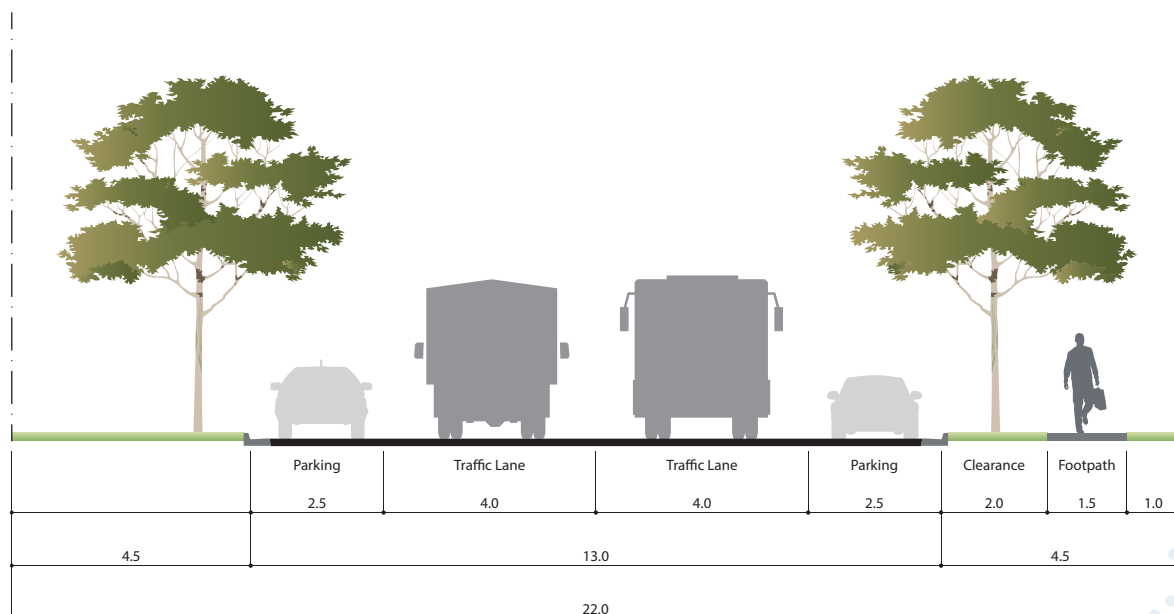


Industrial access street

Table 10 Industrial access street characteristics

Street type	Industrial Access Street (Fig 13)
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	< 3,000 vpd
Reservation	22 m
Median	No
Trafficable lanes	4.0 m in each direction
Parking	2.5 m parking lane both sides
Footpath	1.5 m minimum on one side
Bus route	No
Cycleway	No
Property access	Direct property access
Traffic calming	No
Kerb type	Upright
Posted speed	Default 50 km/h, unless signed otherwise
Intersection spacing	100 metres minimum

Figure 13: Demonstration example - industrial access street



Appendix A - Functions of streets

The function of streets is an extremely important part of planning PDAs, 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 PDA street network hierarchy. *Next Generation Planning* (SEQ Council of Mayors, 2010) has also informed the PDA 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 14 and Figure 15 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 14 Hastings Street, Noosa (Complete Streets, 2010)



Figure 15 King Street, Brisbane Showgrounds



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 16).

To facilitate a much safer cycling environment and minimise conflict between pedestrians and vehicles, separated cycle tracks should be provided on higher order roads and streets in greenfield areas and where opportunity exists in established areas.

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

For detailed guidance on safe cycle facilities refer to DTMR: TN128 "Selection and Design of Cycle Tracks

Figure 16 Separated cycle track Aura



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 17).

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 PDA 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 17 Narrow streets aiding low speed environment





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