Cycling infrastructure

VERSION 1

In this chapter

5794_20.04.21

01 Introduction

PURPOSE

Cycling infrastructure includes facilities that are dedicated for cycle use, as well as specific standards for general infrastructure to meet the needs of cycle users.

This document explains how to choose approved cycleway facilities for each street type.

It provides requirements for specific features relating to the implementation of cycleways, and for supporting infrastructure such as cycle parking.

QUALITY OF SERVICE TOOL

This tool is used to assess the Quality of Service provided by existing infrastructure, and by proposed infrastructure, to determine safe and consistent routes of travel for people on bikes.

ROADS AND STREETS FRAMEWORK (RASF)

This sets out the process for planning a transport network.

It provides guidance on the strategic types of street and the functions and features to be expected in each street, together with modal priorities.

It also describes the process for resolving conflicts for priorities. This should be used to resolve the common issues around general traffic provision with other modes of transport.

URBAN STREETS AND ROADS DESIGN GUIDE (USRDG)

This sets out principles for design of the various urban street types.

Chapter 1 Design Principles These principles must be understood by all designers as the basis for decisions, and the approach to be taken in the design process. In particular, this sets out how safety must be incorporated in all design work.

Chapter 2 Neighbourhood Design focuses on design aspects of planned networks, either as a means of designing the relationship between land use and movement, or for evaluating the local design context for a specific street or place within a neighbourhood. It also includes guidance on environmental design within a neighbourhood.

Chapter 3 Street Users takes each user group in turn, and describes their needs, specific design principles and the features that can be provided for them. Having understood principles and context, this chapter guides the choice of elements for each user to meet the planned function.

Chapter 4 Design Controls deals with the issues of geometric design that need to be considered, to ensure that drivers of vehicles in particular are guided to behave reliably in the way planned for them, safely and efficiently.

Chapter 5 Street Types and **Chapter 6 Intersections** can then be used to put the elements together in accordance with the design principles into street and intersection layouts that will effectively deliver the planned outcomes. Typical layouts are shown, not as finished designs, but to illustrate the design considerations required to fit elements together into the design of a whole place.

RURAL ROADS DESIGN GUIDE

This is to be developed later, to set principles for design of the various rural road types.

DEPARTURES

Where any deviations from the standards are necessary, they must be clearly documented and must follow the AT Departures from Standard process. This includes existing cycling infrastructure that is not included in this Code as an approved type, but is affected by a design.

This code gives Preferred dimension or options. If a design does not meet these Preferred requirements, a Departure from Standard must be applied for. Alternative Minimum dimensions are given as a guide only, to indicate the limit for which a Departure might be considered.

02 Choosing the right facility

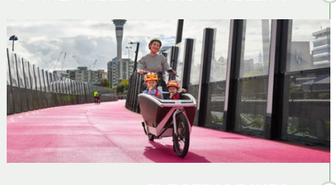
2.1 Design parameters

PEOPLE ON BIKES

There is a greater range in the age, ability, cognitive response and skill of people on bikes than of people driving motor vehicles. This must be recognised in choosing design parameters for cycle infrastructure.

People of all ages and abilities (AAA) should be provided for on shorter Local trips. Long distance Express route trips will largely be more confident cyclists, but may include children for recreational trips and older riders using e-bikes.

ACCESSIBILITY AND MOBILITY



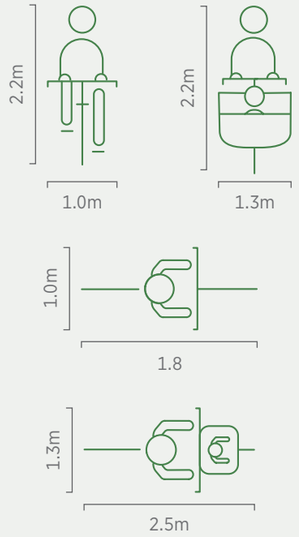
Consideration must be given to people with varying mobility needs. Three and four wheeled cycles are likely to become more common as cycle infrastructure provides opportunities for greater mobility for these people.

Infrastructure must also avoid impeding accessibility for people with visual, mobility or cognitive requirements.

ELECTRIC BIKES

The number of electric bike users is rapidly increasing. Size, weight and speed of these bikes can be greater than conventional bikes. Infrastructure must be designed to accommodate them, with measures to manage speed where this may put people at risk.

DESIGN USER DIMENSIONS



Most bicycles are about 1.7 to 1.8 m in length, and about 70 cm wide, with the height of the cyclist generally varying from 1.8 to 2.2 m. Larger bikes such as cargo bikes tend to be wider (up to 1 m) and longer, varying from 2 to 2.5 m. This has implications in all infrastructure where a person on a bicycle is present, from refuges and pram ramps to shared paths and separated cycle paths.

An envelope 1.0 m wide and 2.2 m high is to be used for the standard bicycle, allowing for a standard degree of hunting (slight deviation from straight line in normal cycling).

An envelope width of 1.3 m is to be used to allow for non-standard cycle types in single lane facilities, or where a high proportion of non-standard cycles may be present to allow passing each other.

A length of 1.8 m is to be used for standard design bike. Trailer bikes, cargo bikes and tandems require 2.5 m length, and this length of envelope should be used to assess waiting spaces for turning or crossing for safety for these types.

For cycle parking, and manoeuvring of cycles at very low speed, use the dimensions in Table 1 below.

TABLE 1 CYCLE PARKING AND MANOEUVRING AT LOW SPEEDS: MINIMUM DIMENSIONS

	Width (mm)	Length (mm)	Min. turning circle (mm)	
			Outer radius	Inner radius
Conventional bicycle	700	1800	1650	850
Tandem	700	2400	3150	2250
Bicycle and trailer	800	2700	2650	1500
Cargo trike	1200	2600	2300	100

Note: a wide range of adapted bikes are used for disability cycling: their design requirements will generally fall within the ranges in this table

DESIGN SPEEDS

Cycling speed can range from 10km/h (children's bike with trainer wheels) to >30 km/h. Electric-assisted bike speeds can range from 25 to 50 km/h. The designer must identify the appropriate design speed for bicycle infrastructure, to provide a safe consistent and predictable experience for users. This needs to take account of the length of the total route, numbers and likely compostition of cycle traffic. Frequency of intersections and crossings affects speed choice.

Avoid mixing high cycling design speed with significant presence of other path users. Separate facilities may be needed in most cases.

Long steep grades need to be designed for higher cycling speeds while still ensuring the safety of all path users.

Features may need to be designed for speed management, to ensure users maintain safe speeds especially on long downhill routes, or approaching constrained locations.

DESIGN SPEED CHOICE

Design speed will vary with path type and with spatial context.

Express networks should be designed to be safe for both slower and faster user types. Safe speed will vary with facility type, and with spacing of interruptions requiring low speed passage (eg. Crossings).

Where there are frequent interruptions, changes of direction or mixture of user types, a Design Speed of 20 km/h or less may be appropriate.

For longer, uninterrupted, and homogenous user sections, a Design Speed of 30 km/h may be appropriate, but check for safe stopping and turning at the maximum likely speed for users.

Local networks are to be designed for recreational and low speed users, with relatively short journey time before reaching an Express network.

Use a Design Speed of 20 km/h but check for safe stopping and turning up to 30 km/h (the maximum speed for vehicular traffic).

Shared paths are to be designed with regard to the possible conflicts between pedestrians and people on bikes.

Intersections and crossings generally require slower approach speeds. 10 km/h may be acceptable in most cases unless cyclists have priority, but geometry and other cues must be provided to keep users at appropriate speed through them, and cues must allow enough time to reduce speed on approaches, with a clear view enabling users to choose and slow down to a safe speed. Cyclist lose stability at less than 10 km/h so design speed should not be less than that, except when braking to a stop.

GEOMETRIC DESIGN

See Section 8 of this code for more detailed requirements.

2.2 Types of cycle facility

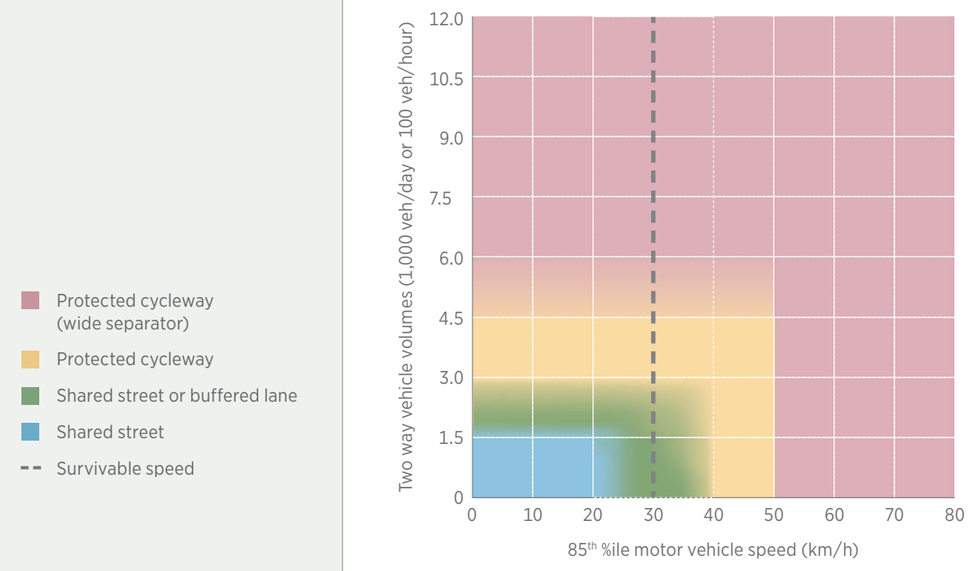
TYPES

Cycle facilities are high-quality infrastructure that reduces real and perceived safety risks and fit into and enhance the quality of their surrounding environment (e.g. street, park, transport corridor). They are required to provide for a broad range of customers making regular, everyday trips for transport. Broadly, facilities are separated into:

- **Facilities within the road corridor;** including separated cycleways and quiet, mixed-traffic street
- **Off-road paths** (e.g. in the Motorway corridor or through parks)

Choosing the right facility starts with assessment of the priority of cycling compared to other modes guided by the Roads and Streets Framework. The Street and Road Design Guide then provides the context for the most appropriate design.

The Urban Road and Street Design Guide, URSDG detail that traffic volume and speed and other street conditions such as on street parking are the key determinants of what type of facility to use. The Quality of Service tool is used to check the suitability of facilities for the given street environment.



QUALITY OF SERVICE

Proposed facilities must be evaluated using AT's Quality of Service tool. The QoS is an evaluation tool for assessing the quality and safety of cycleway and cycle paths. It assesses features such as width, separation, speed, surface, crossings, intersections, priority, delay, and interaction with other modes. A draft copy of the criteria and scoring is included in Appendix A.

New facilities are to be designed to achieve QoS1. Facilities with QoS2 will still be suitable for all ages and abilities but will require a Departure. For retrofit projects (i.e. working within an existing and constrained road reserve) QoS3 and 4 are still safe cycle facilities but will not likely attract the broad range of riders anticipated in the Cycle Strategy. Projects with sections of QoS3 and 4 will require a Departure from Standard that explains the constraints and demonstrates that the design is safe and approriate.

Facilities that do not achieve a QoS of 4 or above may not be safe or appropriate for cycling and shall only be considered with explicit understanding and support from the AT Client.

APPROVED CYCLEWAY TYPES

Express networks are major cycleways on busy streets or off-road paths. They connect people to major centres and form the base structure of the cycleway network. Express networks should be planned as part of the regional network, using Roads and Streets Framework. This network must be extended locally where streets are newly-built or newly-categorised as Arterial or Collector types and on any street exceeding 1500 vpd, 150 vph in one direction, or vehicle speed more than 30 km/h.

New off-road Express network paths may be planned to link incomplete parts of the network.

Local networks are both on and off-street, and are designed to create safe and pleasant neighbourhoods that encourage walking and cycling for local trips.

An on-street Local network has pedestrians accommodated on footpaths with streets that are safe enough to cycle on without the need for separated cycle lanes. Traffic calming tools, pavement markings and signage.

Local networks may require cycleways on streets that exceed thresholds for Mixed Traffic.

Local networks may follow express network routes in places. The mix of different users needs to be considered, to be safe for all. For short distances, all cyclists may share at a low speed to be safe for mixing. If delays for express route users would be too great, then further separation of fast and slow users must be provided for.

OTHER INFRASTRUCTURE USED BY PEOPLE ON BIKES

Even where cycle facilities are provided, some people will still choose to cycle on roadways with mixed traffic. Designers should be aware of this and consider probable users in roadway design.

03 Approved facilities within the road reserve

PRINCIPLES

The following principles are imperative to deliver cycleways that meet the objectives of cycle network design and deliver an all ages and abilities network that attracts new users for more trips. The following approved facility designs achieve these principles and should be used for all projects. Where it is not possible to deliver the approved facility, a departure must be sought through Auckland Transport for each part of the design that is not consistent.

The list of principles below act as a checklist to ensure the departed facility is safe.

- Avoid conflict between vehicles and people on bikes:
  - Require physical separation between cycleway and vehicles, including parked vehicles.
  - Vehicle separation to be designed to prevent or minimise the possibility of vehicles parking and blocking the cycleway or footpath.
- Minimise conflict between pedestrians and people on bikes:
  - Require physical separation between cycleway and footpath.
  - Footpath separation to be designed to prevent pedestrians crossing unconsciously into the cycleway, including vision-impaired pedestrians.
- Minimise driveway entrances:
  - Continuity of the separator is key to safety.
  - Driveway must show priority for pedestrians and people on bikes.
  - Reduce speed for entering/exiting vehicles and ensure visibility.
- Comfortable to use for all ages and abilities:
  - Smooth, continuous and skid-resistant surface.
  - Wide enough to allow riders between 10km/h and 30km/h with areas where comfortable overtaking is possible.
- Quality, integrated outcomes:
  - Designed to support the land use and/or anticipated future land use of the street.

3.1 Separated cycleway (busy, fast, or heavy traffic)

DESCRIPTION

Use these approved types if any of these criteria apply.

TABLE 2 CRITERIA FOR SEPARATED CYCLEWAYS (BUSY, FAST OR HEAVY TRAFFIC)

Lanes	>2 lanes (peak or permanent) or
Vehicle Flow	>5,000vpd or >500vph, or
Speed	85th %ile >50km/h, or
Heavy vehicles	Frequent/Rapid PT network or >4% HCV

A cycleway separated from moving traffic provides real and perceived safety to people on bicycles by the distance between different modes and the physical barrier of the raised buffer. It is suitable for streets with local to strategic place significance and moderate to high traffic volumes.

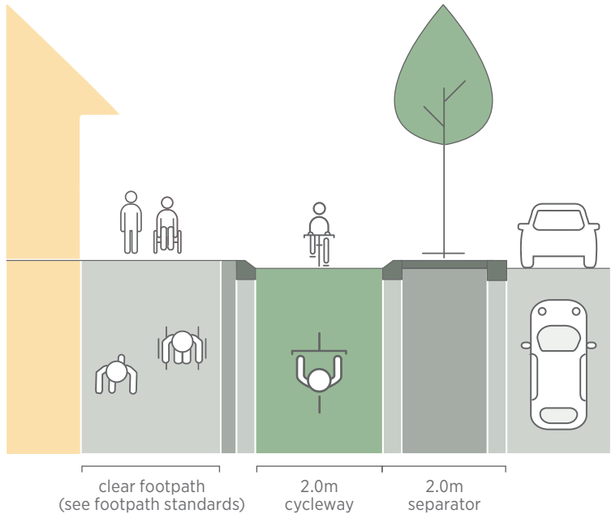


Figure 1 Approved design option 1

Typical kerb detail K01
65mm hieght 1:3,
No lip at cycle surface

Typical kerb detail K02
150mm height, vertical

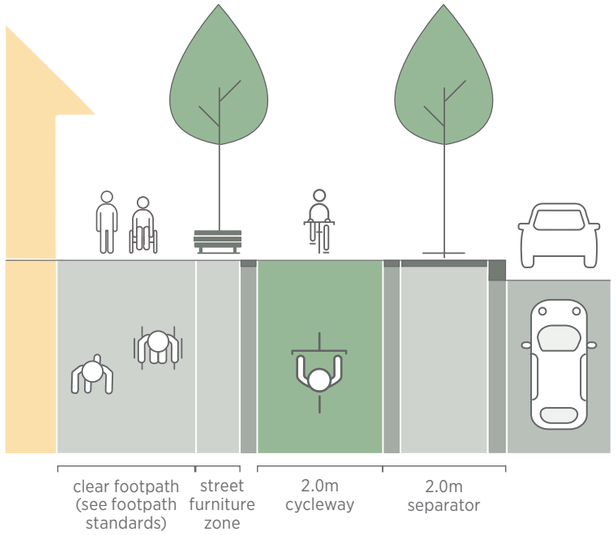


Figure 2 Approved design option 2

Typical kerb detail K03 flush,
300mm tactile separator

Typical kerb detail K02
150mm height, vertical

FEATURES

Bevelled kerbs (Option 1) on either side of the cycleway are to be 1:3 gradient, 65mm high, no lip between surface and kerb).

Street trees/planting are standard in the separator and furniture zone (Option 2) buffers

Standard vertical kerbs (minimum height 150mm) are required along the kerbside traffic/parking lane.

Different paving material and/or colour is required between footpath and cycleway.

Footpath in accord with Engineering Design Code - Footpaths and Public Realm may include a street furniture zone and frontage zone.

ALTERNATIVES SUPPORTED (BY DEPARTURE)

*Minimum dimensions may be accepted by departure. Less than minimum will need to demonstrate compliance with design principles and a departure may be denied.

TWO-WAY

Two-way facilities (3.2m minimum) can pose additional safety risks and reduce accessibility. To be suitable, two way facilities must provide safety, directness, comfort or attractiveness benefits e.g. a higher QoS score than two one-way cycleways.

REDUCED WIDTH SEPARATOR*

In many retrofit areas it may not be possible to achieve a 2m separator. A minimum 1.2m separator may be suitable if no safety or public realm issues are present.

REDUCED WIDTH CYCLEWAY*

In many retrofit areas it may not be possible to achieve a 2m cycleway. A minimum 1.8m cycleway may be suitable if no safety or public realm issues are present.

VARIANT: SEPARATOR WITH PARKING

Parking is often not typical on arterial or busier streets. Where parking is deemed a priority, it may be indented to maintain bus priority or vehicle capacity.

A wide separator allows flexibility of use and provides and greater degree of real and perceived protection from traffic stress. This variant can be used on all of the same typologies as the Approved Facility (Option 1 or 2), but the separator may not be suitable for car parking on Out-of-Centre Arterials.

The same alternatives by departure apply to this facility type as for the Approved Facility

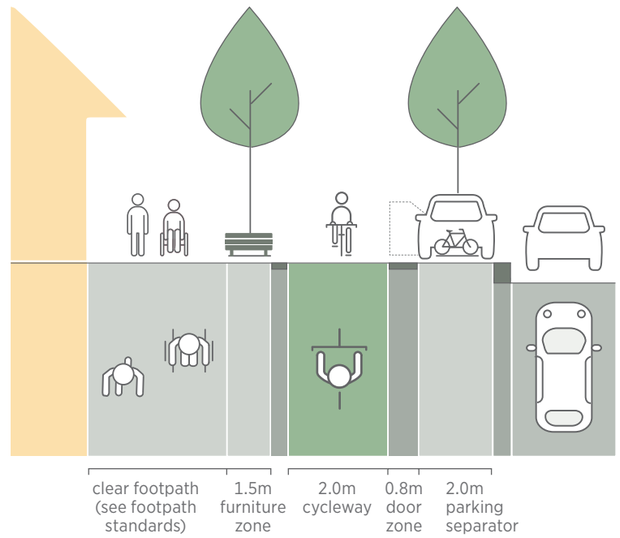


Figure 3 Separator with parking

FEATURES

The separator contains a car door zone, which is also for disembarking passengers to wait in before crossing the cycleway. The rest of the separator is a flexible zone where parallel car parking bays, transit stops, bicycle parking and other street furniture may be accommodated.

Detailing between the separator and cycleway must demarcate a door zone

3.2 Separated cycleway (low volume and slow traffic)

May use the following approved types if all of these criteria apply.

TABLE 3 CRITERIA FOR SEPARATED CYCLEWAY (LOW VOLUME AND SLOW TRAFFIC).

Lanes	Maximum 2 lanes (peak or permanent) and
Vehicle Flow	3,000-6,000 vpd or 300-600 vph, and
Speed	85th %ile <40km/h, and
Heavy vehicles	Local or no PT network and <4% HCV

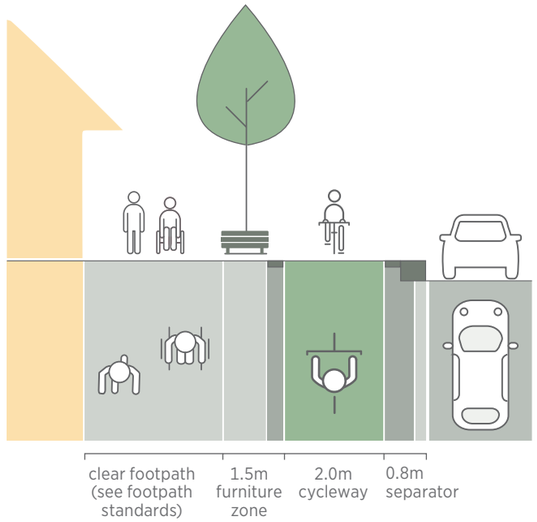


Figure 4 Approved design option 1

- Typical kerb detail K03 flush, 300mm tactile separator
- Typical kerb detail K02 150mm height, straight vertical

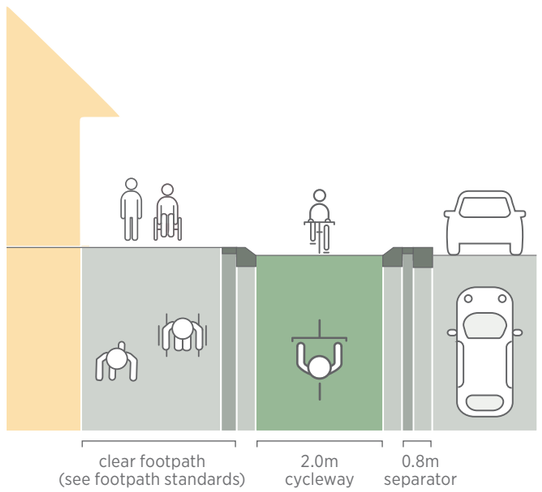


Figure 5 Approved design option 2

- Typical kerb detail K01 65mm heigh 1:3, No lip at cycle surface
- Typical kerb detail K02 150mm height, straight vertical

DESCRIPTION

A Cycleway separated from moving traffic by a narrow raised buffer relies on the physical barrier between different modes to provide real and perceived safety to people on bicycles. It is suitable for streets with local to strategic place significance and low to moderate traffic volumes. Different treatments are appropriate on some local streets and plazas and shared streets in town centres and the city centre, as detailed in Section 4.5.

FEATURES

Street trees are to be provided in the furniture zone (Option 1) unless they reduce footpath width below minimums stated in the "Pedestrian Design Standards".

Bevelled kerbs (Option 2) on either side of the cycleway are to be 1:3 gradient, 65mm high, no lip between surface and kerb).

A square kerb (minimum height 150 mm) are standard along the kerbside traffic/parking lane.

Different paving material and/or colour is required between footpath and cycleway

Footpath to be designed to requirements in the "Pedestrian Design Standards" and may include commercial zone along the building frontage.

3.3 Alternatives requiring specific approval

ALTERNATIVES SUPPORTED (BY DEPARTURE)

The following alternatives may be accepted by departure, but will need to demonstrate compliance with design principles and a departure may be denied.

TWO-WAY

Two-way facilities can pose additional safety risks and reduce accessibility. To be suitable, two-way facilities must provide safety, directness, comfort or attractiveness benefits e.g. a higher QoS score than two one-way cycleways. Minimum width of 3.0 m allows three files for standard bikes. 2.6 m allows two files of cargo bikes.

REDUCED WIDTH CYCLEWAY

In many retrofit areas it may not be possible to achieve a 2m cycleway. A narrower cycleway may be suitable if no safety or public realm issues are present. Width must not be less than the envelope width for cargo bikes. The length of reduced width must be suitable.

CONTRAFLOW CYCLEWAY

On one-way streets it is beneficial to provide separated facilities for cyclists to travel safely against the flow. Special care is needed in design to ensure the entry and exit of the contraflow lane is safe and consistent with traffic rules

VERTICAL KERB

Vertical kerb 65 mm high may be accepted where stone heritage kerbs are required. Cycles cannot come close to a vertical kerb, due to pedal strike risk, so they cannot be used with reduced width cycleways.

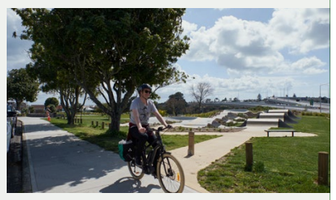
3.4 Mixed traffic streets

DESCRIPTION

In some streets with low traffic volumes and vehicle speeds, formal facility for cycling may not be required. In this section, principles and performance standards are set out for mixed traffic cycling on local streets, followed by a list of tools which can be used to achieve the conditions required for safe, direct and comfortable cycling.

More detailed guidance on designing for walking and cycling on local streets for mixed traffic use are given in the Local Path Design Guide.

PRINCIPLES



Mixed traffic streets must be designed to allow for all ages and abilities cycling. This means they must be:

- **Safe**–stress and conflict points with vehicles are minimised, crime is prevented, and social safety enhanced.
- **Connected**–points of trip origin and destination are linked, including residential areas, employment and education centres and public transport stations.
- **Accessible** and comfortable for all users, including children and people with impairments in terms of width, gradient, level transitions, air quality and noise pollution.
- **Enabling** – local natural and cultural environments are enhanced and celebrated in collaboration with iwi, local community and stakeholders.
- **Green infrastructure** – 'leafy and green' in character and making a positive contribution to ecology.

PERFORMANCE STANDARDS

Mixed traffic streets should be designed to operate within the following criteria:

- Vehicle volumes – 2,000 vehicles per day, or 200 per peak hour is the preferrred maximum, but up to 3,000 per day or 300 per hour may be acceptable.
- Vehicle speeds – less than 30km/h (85th percentile speed).
- Where local network crosses arterial roads – minimum 50 opportunities to cross per hour.
- Accessibility and safety afforded to people of all ages and abilities.

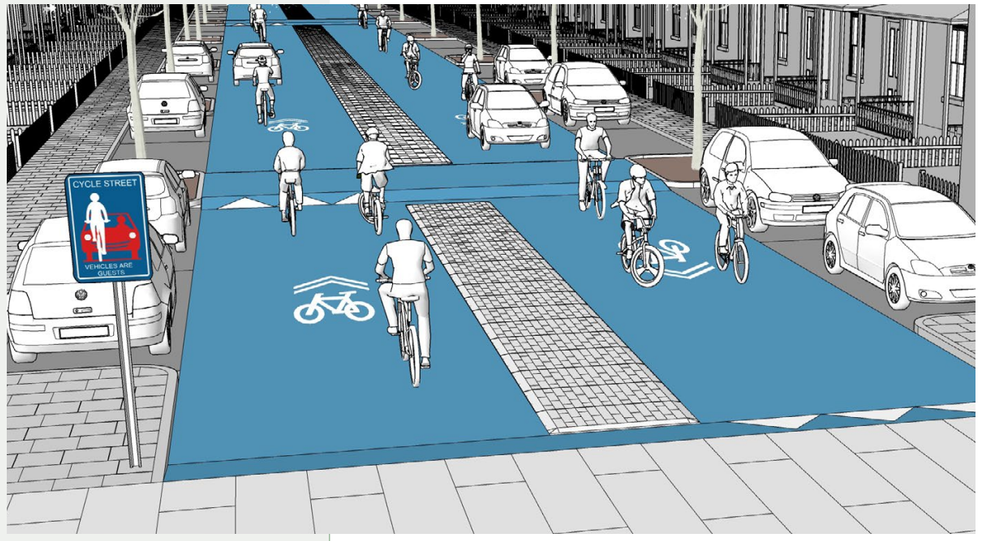
TOOLS

The most important tools to induce the necessary conditions for mixed traffic cycling on local streets are those that address traffic volumes and speeds and street crossings. Other tools to achieve the performance standards are provided in the Local Path Design Guide.

3.5 Cycle streets

DESCRIPTION

On low-speed, low-traffic streets where large numbers of people on bikes are expected as part of a cycle route, specific design of the street can give priority to people on bikes by providing restricted space for vehicle encounters, and limited sharing of space provided principally for cycles. Specific cycle priority signs are not yet authorised, but sharrows may be used.



BENEFITS

- Increase awareness of cycling as the dominant mode in a specific street or section of street
- Provide enough space for relaxed riding, similar to a wide off-road cycle path
- Increased neighbourhood safety by reduced traffic speeds
- Create more space for pedestrians

PERFORMANCE STANDARDS

- Existing low speed (>30km/h) and low volume (~500 vpd) street – a cycle street should not be a tool to reduce vehicle speed on its own. Other measures such as forced turns for vehicle traffic should be included where necessary.
- High volume of cyclists (>500 per day or >100 in peak hours) – this should be equal to or above the volume of vehicles

3.6 Pedestrian priority areas (cycling and pedestrians)

INTRODUCTION

Special designs are required in high pedestrian activity areas, where the risk of conflict is between people walking and people cycling is more relevant than the risk of crashes between vehicles and vulnerable road users. In most cases these will be located out of the road reserve, but part of a cycle route (on a network or otherwise). This includes public squares, plaza, promenades, pocket parks, or similar. However, in some cases, such as Shared Space streets, the concept applies within the road reserve.

The key considerations for cycling in high pedestrian areas are whether people cycling are travelling through or accessing local destinations and the level of separation between pedestrians and cyclists.

PRINCIPLES

Cycling facilities in high pedestrian areas must allow access or passage for people on bicycles without compromising the safety, comfort and convenience of people walking. This means:

- A cycle friendly city will encourage people to cycle on all streets and to all destinations. Exceptional reasons for exclusion may occur where there is insufficient space for cycling and where pedestrian volumes are too high to accommodate cycling. Where cycling is not permitted, people will be asked dismount and not discouraged from entering the space. Variations in restrictions by day and/or time should also be considered.
- The treatment for people on bicycles in pedestrian dominated areas or more open spaces like plazas or squares also differs depending on the volume of pedestrians and cyclists and the nature of the space.
- The nature of bicycle traffic is different for people accessing local destinations and people travelling through.
    - If the cycleway serves through traffic, the cycle facility should be direct, attractive and quick, but this may result in conflicts with pedestrians.
    - If the cycleway serves as a local connection to destinations, cyclists should be able to reach their destination quickly and easily
- The danger and nuisance of mixing cyclists with pedestrians should not be overstated. Research shows that cyclists moderate their behaviour in pedestrian areas. How people might self- regulate under local conditions should be considered.

Design of high pedestrian activity areas should be led by street designers to produce a high quality urban public realm based on the Urban Roads and Streets Design Guide. Cycleways must be carefully integrated into pedestrian or shared spaces

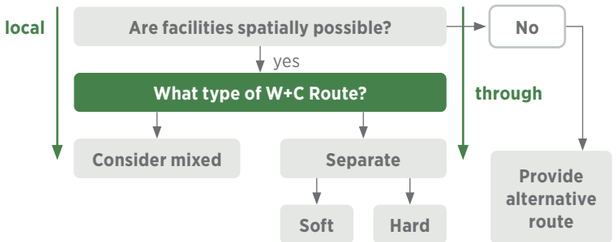


Figure 6 Decision tree for cycling in pedestrian priority areas

3.6.1 Mixing with pedestrians – i.e. no facility

If there are low levels of pedestrians and people on bikes, and the trip routes varied, mixing pedestrians and cyclists is the appropriate design response and has the advantage of providing maximum movement for all users (Precedent 1: St Patrick's Square, Auckland, below). The space should be designed to indicate that people on bikes are guests in the space and should travel slowly and always give way to pedestrians.

In some limited situations it may be appropriate to introduce a "mixed" area on a cycle route. Primarily, this will occur where there is a key cycle route intersecting a short, very heavy pedestrian movement (Precedent 2: Amsterdam Central Station, below).

Figure 7 Cycleway through a pedestrian street or plaza

In these instances, it may be necessary to interrupt the cycle facility for a short section to make it clear to people on bikes that pedestrians have priority. Key design elements include:

- Clear definition of cycle space vs ped space leading up to and from the shared area
- A short shared area where it is possible to see the cycle facility continuing on the other side
- No signals or other element that may cause pedestrians to stop or move slowly in the part of the mixed area that interrupts the cycleway.

3.6.2 Cycling with soft separation

As pedestrian density increases, greater separation between users is recommended. This will lower the probability of crashes and will minimise nuisance between user groups.

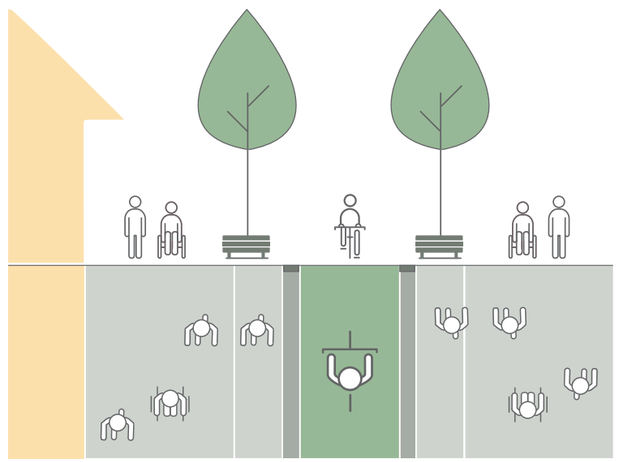
Where cycle speeds are low and pedestrians are frequent, "soft" or visual separation between users is recommended, with no level difference. Soft separation will also prevent trip hazards for pedestrians and cyclists from being introduced.

The design should make clear to people on bikes that they should be riding slowly, aware of pedestrians, but with a visual cue to pedestrians not to stay in the cycleway.

3.6.3 Cycling with physical separation

Where a busy cycle route occurs alongside a busy pedestrian route (i.e. running parallel), physical separation should be used. Separate the cycleway from pedestrians by height or a furniture/ planting zone.

Where very high levels of pedestrians are moving in all directions – particularly across the cycle route, or dwelling, providing for cycling may not be desirable and an alternative route or a short interruption in the cycleway is recommended.



3.7 Interim facilities

FASTER AND RESPONSIVE DELIVERY

For all new roads, full rehabilitations or road improvements where properties are being purchased or road reserve space is available, approved facilities consistent with the Roads and Streets Framework classification are to be provided.

However, there is often a need for AT to respond to changes in the transport network or test layouts for long term projects. These faster and more responsive options are broken down into two types; interim and temporary.

- **Interim Design** – design life of up to 15 years
- **Temporary Design** – design life of up to 12 months

Interim and temporary projects have impacts on the public realm and the delivery of benefits and must be clearly scoped with agreement on long-term network planning. The concept should also be clearly communicated with key stakeholders.

Interim facilities are to be used where network planning and user safety require a facility to be installed economically in an existing road where a business case for the cost of a full approved facility cannot be made until a later improvement or major rehabilitation is programmed.

Temporary designs, including tactical urbanism, can transform a street quickly and cheaply and are perfect to test a layout ahead of a permanent project, or to make use of a space made available through other works.

Cycleways and other cycling infrastructure, whether interim or temporary, need to be considerate of streetscape, land use activity, and pedestrian environment. As such, input at the start of any project is vital from AT Urban Designers and the Auckland Council Design Office (ADO).

3.7.1 Interim facilities Design life up to 15 years

Interim cycleways have the same principles as the approved separated facilities. They are acceptable when the project street will have a significant upgrade or change within 15 years. A departure can be sought for when the main project may be more than 15 years away.

The shorter design life of interim cycle facilities means they should be delivered in lower cost materials that may contribute less to the public realm.

CONCRETE ISLAND SEPARATORS

Concrete separators are currently used in various locations in Auckland and can be a cost-effective way to deliver an interim facility e.g. Quay Street.

The approved widths for interim facilities are shown below.

CYCLE LANES

TABLE 4 INTERIM FACILITY DIMENSIONS

Element	Approved Width (Minimum)
Cycle lane width	2.0m (1.5 m)
Cycle lane width (two way)	3.0 m (2.6 m)
Separator width (without parking)	0.6m (0.4m)
Separator width (next to parking)	0.8m (0.6m)

Widths above assume clearance from channels, high kerbs, planters, or other hazards next to the cycleway. Clearance (a “shy zone”) is required from any hazard that may be impacted by a pedal or handlebar:

Clearance distances to be added to cycleway width:

- Kerbs higher than 70 mm: 0.2 m
- Vertical feature 150-500 mm high: 0.3 m
- Vertical feature >500 mm high: 0.5 m
- Clear from channel/catchpit, unless made suitable for cycling

Precast concrete islands of 3 m to 5 m long, at least 70 mm high on the traffic side, and maximum 70 mm on cycleway side, should be used. Drainage gaps (typical 500 mm) will be required at regular intervals to allow existing road drainage to continue to capture surface water.

Other products that may be suitable will require specific approval by the Chief Engineer.

Buffered cycle lanes and paint-separated cycle lanes are considered to be interim facilities. They are not permitted for new streets (including full rehabilitations or reconstructions). However, if it is possible to prove they are safe, in some instances they may be appropriate, e.g.:

- Connector or Local Street typologies where traffic speeds and volumes are already low
- as a short-term measure to provide space for existing cyclists, addressing an identified issue
- as a stepping stone to higher quality facilities when budgets are available
- when proposed by or supported by the local community or advocacy groups

In all of these instances, safety is key and the principles of cycle facilities remain.

Cycle lanes are unlikely to be considered safe for all ages and abilities and as such should not be used as a trial. They are unlikely to attract new riders and may not be considered a success.

3.7.2 Temporary cycleway Design life up to 12 months

Temporary cycleways share many principles with approved facilities, but can be implemented quickly and for much lower costs. “Quality and Integrated” is swapped for “Fast and Fun”.

TACTICAL URBANISM

Federal Street

Temporary cycleways are acceptable when the project street will have a significant upgrade or change within 12 months, or as a trial for a new facility proposed for a street.

Temporary designs delivered through Tactical Urbanism, can transform a street quickly and cheaply and as such are perfect to test a layout ahead of a permanent project, or to make use of a space made available through other works. The key tools of Tactical Urbanism projects are:

- People,
- Paint,
- Placekit, and
- Planting

With less physical infrastructure it is vital to get the speed and volume of traffic down to make cycling safe and attractive.

04 Other infrastructure

The following facilities may only be used with specific network planning permission, as interim measures. They may not meet safety requirements and can only be used with approval of AT Chief Engineer.

4.1 Buffered cycle lanes

DESCRIPTION

The buffer consists of diagonal hatch markings between continuous edge lines.

Vertical elements such as posts, or polymer buffer strips with posts may be provided for further separation, e.g. on approaches to parking or before intersections to reduce queuing in the cycle lane and guide turning. Green surface patches with cycle symbols identify the cycle lane.

TABLE 5 WIDTH OF BUFFERED CYCLE LANE

Element	Width Preferred (Minimum)
Cycle lane	2.0 m (1.5 m*)
Buffer (without parking)	0.6m (0.4 m)
Buffer (next to parking)	1.0m (0.7 m)
Buffer (speed limit >50 km/h)	1.2m (1.0 m)

Note: Designers are required to use the Preferred width. The Minimum width is a guide for Departure where existing site constraints prevent achieving Preferred width.

* Length of narrow cycle lane to be no more than acceptable distance with no cycle overtaking.

4.2 Cycle lanes

DESCRIPTION

A basic cycle lane is located next to the kerb or to parking bays. The lane is marked with a continuous edge line and green surface patches with cycle symbols.

Vertical elements such as posts, or polymer buffer strips with posts may be provided for further separation, e.g. on approaches to parking or before intersections to reduce queuing in the cycle lane and guide turning. identify the cycle lane.

ADDITIONAL PROTECTION

To enhance the visibility of the cycle lane (especially at night or in wet weather) or where encroachment by motorists is otherwise likely (such as in advance of busy left turns), a thermoplastic rumble strip line marking or polymer kerb at least 50 mm high with flexible posts may be used. This treatment, particularly a rumble strip line marking in or near residential areas, needs Auckland Transport approval. NSAAT (No stopping at all times) broken yellow lines must be marked in a cycle lane along its entire length.

TABLE 6 WIDTH OF KERBSIDE CYCLE LANE

	Preferred (Minimum)
Cycle lane width	2.0 m (1.5 m)*

Note: Designers are required to use the Preferred width. The Minimum width is a guide for Departure where existing site constraints prevent achieving Preferred width.

*Length of narrow cycle lane to be no more than acceptable distance with no cycle overtaking

4.3 Cycle lanes between other traffic lanes

DESCRIPTION

Cycle lane between traffic lanes – such as these at St Lukes, Auckland – only cater for confident people on bikes.

Cycle lanes are sometimes positioned between traffic lanes, especially at intersection approaches.

While highly useful to confident people on bikes, cycle lanes between traffic lanes are often intimidating for less confident people. They should not be used on roads with design speeds greater than 50km/h or where there are high turning movements.

Alternative intersection treatments should be used where possible.

Where a long auxiliary lane is used for stacking for turning traffic, and a through cycle lane between through traffic lanes and a left turn auxiliary lane is unavoidable, consider use of buffer or polymer kerbs 50 mm high with flexible posts between the cycle lane and auxiliary lane. Sufficient space for deceleration and divergence taper must be provided before a buffer can be commenced.

Cycle lanes between other lanes should be coloured green along their whole length to alert drivers to their existence.

TABLE 7 WIDTH OF CYCLE LANE BETWEEN OTHER LANES

	Preferred (Minimum)
Cycle lane width	2.0 (1.5 m)

Note: Designers are required to use the Preferred width. The Minimum width is a guide for Departure where existing site constraints prevent achieving Preferred width.

4.4 Shared paths

DESCRIPTION

A shared path is not a approved type and may only be used where numbers of cyclists and pedestrians are low enough to avoid frequent conflict.

Shared paths require people on foot to be able to move safely with people on bikes, who may approach them unseen.

CONSIDERATIONS

Conflicts between users at vehicle crossings, intersections and bus stops require attention, and separation may be preferable at these locations. Vehicles reversing at driveways, with limited visibility, should be avoided or mitigated if that is not possible.

Cycle design speed should be managed by change of direction, block length and other measures to prevent high differential speed when meeting pedestrians and other path users.

Where combined cycle usage and pedestrian usage is between 75 and 150 per hour, a Departure from Standard is required, demonstrating that a shared path is safe and appropriate.

Where the function of the path requires a design cycle speed greater than 15 km/h, separation must be provided.

DESIGN FOR ALL USERS

A shared path must be designed for user requirements for people on bikes and for people on foot. This includes universal design principles. See Engineering Design Code - Footpaths and Public Realm.

WIDTH

Site-specific conditions and common user groups must be analysed before deciding on a suitable width for each path. For example, paths must be wider for areas providing links for the elderly, for children or dog walkers, or that are located near schools, as these groups tend to weave more when walking.

Localised widening on bends and downhill sections can help to mitigate conflicts.

Where space permits it is preferable to have a 1m berm between the carriage way and the shared path.

TABLE 8 WIDTH OF SHARED PATH

Element	**Width** Preferred (Minimum)
Shared path	4.0m (3.0 m)
Kerb side buffer zone width (without parking)	0.6m* (0.5 m)
Kerb side buffer zone width (with parking)	1.0m* (0.7 m)

Note: Designers are required to use the Preferred width. The Minimum width is a guide for Departure where existing site constraints prevent achieving Preferred width. This may only be acceptable over short distances.

* The width of the buffer depends on requirements for features (e.g. poles and clearance) as well as on adjacent traffic speeds and volumes.

LOCALISED WIDTH REDUCTIONS

Path width should only be reduced where existing physical constraints cannot be removed, to not less than 2.5 m over a length not more than 15 m.

Visibility must be available through the full length of the restriction on each approach for the stopping distance for cyclist design speed.

VEHICLE CROSSINGS

Care must be taken to minimise the conflict between drivers and people on bikes when the shared path is next to the road. Reverse manoeuvring should be avoided where possible. Visibility splays must be provided and kept clear, based on the stopping distance for cyclist design speed.

In addition, the gradients, colour, material and widths of the shared path must continue across driveways, to ensure a consistent, smooth cycle facility. In particular, there should be minimal changes in gradient on shared path across vehicle crossings.

05 Off road cycle paths

INTRODUCTION

A path primarily for use by people on bikes, on an alignment away from the street network.

- Cycle paths are appropriate where a route can be more direct and convenient than by following the street network.
- May be parallel to a motorway or major expressway; along an esplanade reserve; or through public open space.

Although nominally exclusive, pedestrians may choose to use the path. Where more than 100 path users (pedestrians and cyclists) may be expected to use the path during peak hour, an alternative footpath on a similarly direct alignment must be provided.

If a parallel footpath is provided the same principles related to separation of riders and pedestrians apply as within the road corridor. The paths shall be separated by a height difference (65mm bevelled kerb), or if a single flush surface, by a furniture zone. Materials and/or colour should be used to clearly differentiate between the cycle and pedestrian paths.

WIDTH

Cycle paths will operate as two-way and are to be a minimum of 3 m. If shared use by people on foot is expected, the width should be increased to 4.0 m minimum.

As with any cycleway, it is necessary to provide clearance to path side hazards. Clearance distances to be added to cycleway width:

- Kerbs or drops higher/lower than 70 mm: 0.2 m
- Vertical feature 150-500 mm high: 0.3 m
- Vertical feature >500 mm high: 0.5 m
- Clear from channel/catchpit, unless made suitable for cycling

ROAD TRANSITIONS

If the path connects to a road, the transition must be a ramp that is flush with the road surface. The entrance/exit to the path must be kept clear of parked vehicles through parking restrictions.

USE BY PEDESTRIANS

Although nominally exclusive, pedestrians may choose to use the path and are legally allowed to do so. If there is no separate or alternative path for pedestrians, it is likely that some will use it. Where more than 100 path users (pedestrians and cyclists) may be expected to use the path during peak hour, an alternative footpath on a similarly direct alignment must be provided.

FENCING AND CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

- Where a cycle path crosses open public space, fencing may not be required adjacent to the path.
- Fencing must not create blind areas. Along or close to the path.
- Protective fencing may be needed next to drops or slopes.

Where use of public open space adjacent to a cycle path may lead to obstruction of the path, fencing may be needed to segregate users (eg. Along edge of playing fields).

- A cycle path between residential properties should have permeable style fencing erected on both sides of the path to a height of 1.8m. Adjacent residential properties are encouraged to place habitable windows overlooking cycle paths. Permeable fencing can consist of pool style fencing, or similar, to allow full visibility and discourage graffiti.
- In areas where crime or issues of resident security are an issue, or where a cycle path in public open space is close to a commercial or residential boundary, alternative security fencing may be considered. Matt black as a colour is encouraged for permeable fencing types, as this can help the fence blend into the environment.
- An impermeable fence could be accepted as long as the fence can be lowered to a height of 1.2m and good sightlines can be provided from adjacent buildings or activity.

If existing higher impermeable fencing bounds public open space, the cycle path should be kept away from the boundary if possible, or the length close to the fence should be open to surveillance from both ends.

LIGHTING

All areas with cycle or pedestrian traffic must be lit appropriately for the activity, providing no more illumination than is necessary for security and safety. Cycle and pedestrian access ways must have lights at each end and at intervals of 50m maximum along the length of the access way. Lighting must be located and mounted to minimise light shining upon residential windows or into the eyes of drivers, pedestrians or people on bikes.

All lighting should be consistent with the Engineering Design Code - Street Lighting.

06 Intersections

PRINCIPLES

Intersections are where most crashes involving people on bikes occur. Design plays an important role in ensuring safety as well as efficiency. To be consistent it is important that the type of intersection is consistent with the mid-block facilities it links. If it is not well designed, it will be a weak point of a route in a potentially dangerous location.

- **Safe** - Suitable for all ages and abilities. Forgiving, speeds are survivable, perceived & actual safety are both important
- **Simple** - Easy to navigate, need to be practical & functional, consider sensory & dementia impairments
- **Legible** - Easy to understand, create predicable behaviour
- **Consistent** - Consistency in experience not infrastructure, LoS/ QoS are important
- **Incorporating context** - gather the right people in the room at very start of project/ design process, design to reflect context (and users related to context) & consider future changes
- **Designed for "tomorrow's" behaviour and use** - Significant ageing population, many living with mobility or sensory impairments, designing for the behaviour we want
- **Inclusive** - Design for the wide range of pedestrian abilities and types of bikes and riders that might use this infrastructure now and into future
- **Modal Priority** - Network plans must be used to ensure that intersection treatments are appropriate and do not interrupt connected routes.

6.1 Cycleway intersections

Intersections between cycleways must take account of design speed, especially T-intersections where through movement may be much faster than turning speed. Where large numbers of people on bikes will merge with or cross each others' paths, the intersection design must provide suitable gap acceptance opportunity and visibility. Reduction of approach speed to consistent slow speed 15-25 km/h may make conflicts safe and convenient. Swept path tracking should be used to confirm safe design paths.

Where cycle facilities terminate, this should be done with transitions to whatever safe interface is appropriate, whether to parking places at a destination; a route to dismount and wheel or access to a safe mixed-traffic road.

All intersections or terminations must be made visible and easy to understand, so that a safe speed is adopted on the approach. A high friction surface along with suitable signage and delineation is to be provided to the approach to all high-use intersections and terminations.

6.2 Roundabouts

The design of roundabouts should provide an acceptable level of safety and convenience for people on bikes. To support safety for people on bikes, roundabouts should be designed to achieve the lowest practicable vehicle approach speed.

SINGLE-LANE MIXED TRAFFIC (LESS THAN 150 BIKES AND VEHICLES PER HOUR)

The roundabout should be designed to achieve low entry and circulating speeds not exceeding 30 km/h anywhere for cars. People on bikes should be able to claim the lane, enter and circulate safely with other traffic.

Width of entry and circulating lanes should be limited, so that cars do not pass alongside people on bikes. Over-run aprons for large vehicles should be used if needed.

Example: Customs Street West/Pakenham Street East

SINGLE-LANE (HIGH TRAFFIC VOLUME)

Transition ramps should be provided to enable cyclists who wish to avoid traffic to leave the roadway before reaching each entry and cross with people on foot. A shared path must be provided between the entry and exit transitions and at crossings of all arms.

Where traffic speeds and volumes are higher and approach roads have cycleways, the facility:

- should transition to a suitable protected cycle path around the roundabout
- provide off road paths are to be separated from pedestrians, and
- have dedicated parallel cycle crossings across all traffic lanes.

This is an all-ages and abilities requirement and does not replace the need to design the roundabout for low entry and circulating speeds so more confident riders can claim the lane and use the roundabout as a vehicle.

Example: Franklin Road

MULTI-LANE

Any multi-lane roundabout, whether signalised or not, should be provided with safe parallel cycle crossings at the roundabout, or offset if the deviation from a direct route is not excessive.

Existing multi-lane roundabouts should be reduced to single-lane if acceptable traffic capacity allows.

6.3 Signalised intersections

There are three signalised intersection types approved for use on streets suitable for cycling:

- Protected
- Signal prioritised
- Shared path corners

6.3.1 Protected Signalised intersection

APPLICATION

- Approved for intersections of significant cycle routes (or future cycle routes)
- Should not be provided unless there are protected facilities on the receiving streets (or protected facilities are proposed)

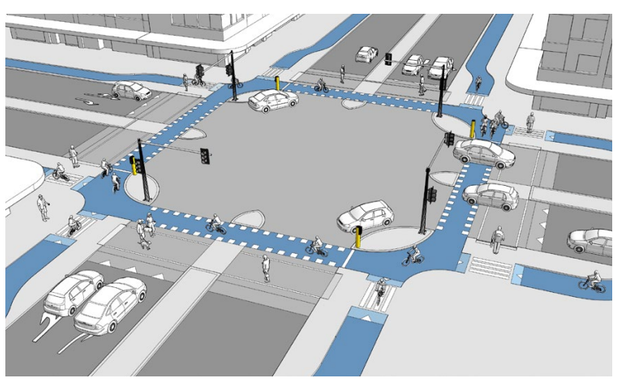


Figure 8 Design elements

DESIGN ELEMENTS

- Space for a protected intersection should not reduce footpath widths below the standards outlined in the Engineering Design Code - Footpaths and public realm.
- Logical and consistent use of tactiles is vital to ensure blind and partially sighted peds can navigate safely
- Tight corner radii for vehicles
- Design will use vertical or horizontal deflection to reduce cyclist speed and raise awareness of pedestrians and the crossing facilities

The receiving island needs to be able to hold all pedestrians waiting to cross. This creates a shorter crossing distance, gives priority to pedestrians across the cycleway by use of a zebra, and removes cyclists from the signal control for left turn movements.

- If there is insufficient room for peds on the road side of the cycleway, the separator should be as narrow as possible, and the cycleway will come under the control of the signals (i.e. pedestrians wait and cross the cycleway and road in one phase).

Pedestrian should have only one level change (i.e. depending on cycleway height, it is either raised to footpath level or the separator is dropped to road level).

6.3.2 Signal prioritised

DESIGN ELEMENTS

- Safe, but may not be suitable for all ages and abilities
- Approved for retrofitting intersections in constrained environments
- Parallel (Toucan) crossings should be provided on all arms that lead to existing cycleways
- Hook turn boxes should be provided on routes that people on bikes are likely to use
- Safety of people on bikes is a built in with the signal control, but the efficiency of the intersection (delay) for riders is key. Long delays for riders will drive unsafe movements against the signals
- Detection technology can be used on key routes to lengthen the amount of green time for people on bikes. This can be used for bicycle or vehicular traffic
- With the short crossing times for people on bikes, reintroduction of bike green may be an option if conflicting phases do not have demand
- Low speed interaction of people on bikes and pedestrians can be controlled by the existing Road User Rules (e.g. riders with a green cycle signal, who are turning left across a green pedestrian signal, are required to give way to pedestrians).

Use nearside small cycle lights to ensure people on bikes catch the signal

6.3.3 Shared path corners

- Safe in many instances, but may have poor outcome for pedestrians
- Only to be applied by Departure
- Cannot be used on priority cycle routes or in higher volume pedestrian/cycle areas

- Must have sufficient space for people on bike to be waiting out of the way of pedestrians
- Requires minimum 3 m wide shared crossing
- Design must indicate pedestrian priority
- Design must include clear, tactile, threshold between the cycleway and the “shared corner” space

6.4 Unsignalised intersections

Where a cycleway crosses an unsignalised side road a raised table is to be provided. The table will reduce the speed of vehicles approaching the side street crossing and provide priority to the pedestrians and people on bikes. It will also align the driver to be at more of a right angle to the bikeway when crossing, making it easier to see approaching people on bikes. Detail on construction of side road speed tables is contained in the Engineering Design Code - Traffic calming.

TURNING VEHICLE WAIT SPACE

Recessing the crossing at the top of the ramp by 2-5m from through traffic lane allows cars to wait clear of through traffic. Where space does not allow 2m setback, the toe of the ramp may follow the adjoining kerbline, but this should only be used where through traffic speed is less than 50 km/h for roads with two through lanes, and 40 km/h or less for roads with one through lane, so turning traffic can wait without significant risk of collision from rear. It is preferred that the table is flush with the adjoining path.

PRIORITY

Where cycle path users are to have priority over road traffic, a paired crossing must be installed with signs and markings.

CYCLE CROSSING

Where turning traffic has priority over cycle path users, the raised table may be lower than the adjacent path, with a ramp gradient of between 5–8% and give-way markings should be considered for the cycle path. The ramp transition (and drainage channel if unavoidable) should be relatively smooth to avoid sudden bumps that would cause a cyclist to lose balance. Signs and markings must be provided to show priority

6.5 Midblock crossing

SIGNALISED

Where a signalised mid-block crossing provides for both people on bikes and pedestrians, separate signal hardware and detection for the two user groups should be provided. Cycle signals need to have red, yellow and green aspects (i.e. a two-aspect display is insufficient).

In locations where cycle crossing is frequent without pedestrians, the pedestrian and cycle signals are to be timed separately, so that the signals can return to the next phase more quickly when the (longer) pedestrian phase is not required. It is preferred that people on bikes and pedestrians are separated on the crossing. See also Cycling Aspects of Austroads Guides Section 5.3.10.

PAIRED CROSSING (UNSIGNALISED OR ZEBRA)

A paired pedestrian cycle crossing can be used under current TCD Rule to give priority to pedestrians and people on bikes crossing a road.

A Paired Crossing is a cycle priority crossing located beside Zebra crossing where all elements of the Zebra Crossing and of the TCD Rule 11.4(5) crossing must be used.

The paired crossing can be used in a midblock, side road or on a slip lane configuration. It should be used midblock on roads with one lane per direction only.

It can be used to connect shared paths or separated cycle facilities. Figures 9 and 10 show a shared path case only.

The zebra crossing should be designed as standard width. The cycle crossing should be designed according to the movements (two-way or one-way movements) between 2m to 3m wide.

Design elements:

- Zebra crossing markings, preferred on raised crossing table
- Belisha Beacon signs
- Give way marking on approach lanes
- Give way signs with supplementary “TO PEDESTRIANS AND CYCLISTS” on approach lanes

(Optional information signs – cycle symbol above “WATCH FOR TRAFFIC”)

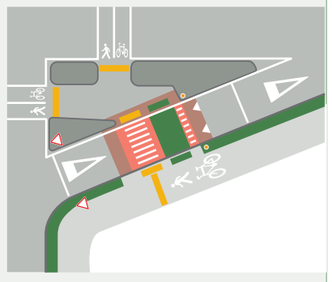


Figure 9 Paired crossing - one-way traffic

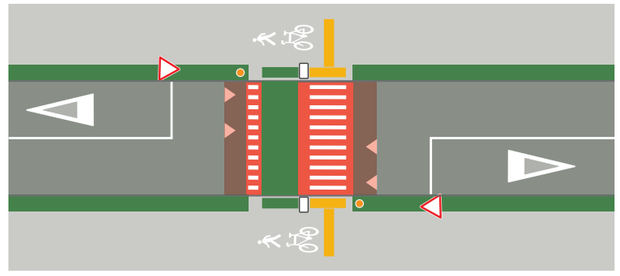


Figure 10 Paired crossing - two-way traffic

6.6 Vehicle crossings

In all instances private driveways are to be designed to show priority for pedestrians or people on bikes on footpath, cycleway, or shared path. The driveway needs to be accessible for the design vehicle, but a flat surface of the path or cycleway takes precedent over the smooth or shallow entry for vehicles. In design terms, this means providing:

- A flush surface for the pedestrian and cyclist e.g. the cycleway, footpath etc is to have a flat vertical alignment and the driveway changes grade between road and property boundary.
- A continuous surface e.g. the cycleway, footpath etc. is to be seen as a single, uninterrupted surface, while the driveway material or colour is interrupted. (see below)

Visibility splays must be provided suitable for the operating speed of the cycleway, from a vehicle stopped clear of the cycleway.

On-street parking must be controlled to ensure adequate visibility for vehicles turning into a property.

Vehicle crossings to multiple residential properties may require a speed control measure such as a ramp up to the vehicle crossing at the property boundary in addition to visibility splay.

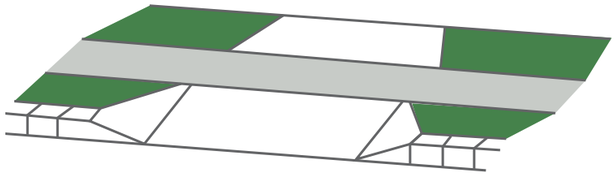
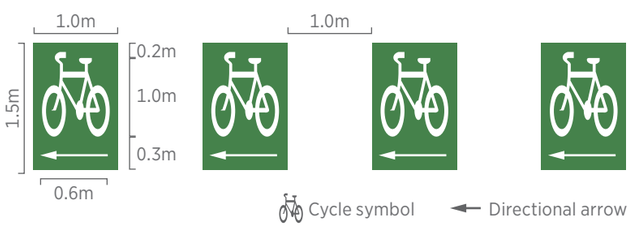


Figure 11 Surface treatment at vehicle crossing

6.6.1 Commercial driveway

Where possible, without deviating too significantly from the desire line or interrupting sightlines, consider recessing the bikeway/vehicle crossing point away from the road so as to allow entering or exiting vehicles to stop between the bikeway and the through road, for safety and capacity benefits.

Where cycle facilities cross commercial driveways “green dashed” markings should be used to raise awareness of people on bikes. This treatment should not be used on side roads as priority is different between the types of crossing (legal road vs private vehicle crossing)



07 Kerbside activity

PRINCIPLES

Kerbside activity is an important aspect of many urban street typologies. Public transport stops, loading, and parking will usually interact with cycleways within the road corridor.

- No surprises – visibility, consistency,
- Separate by space

Separate by time if space not available

PARKING

People on bikes have priority over people crossing to and from parked vehicles.

For Collector or more quiet street typologies, a 0.8m minimum buffer is required between any cycleway and the edge of parking. For Arterial or busier Collector street types 2m buffer is required as a minimum.

This buffer protects the people on bikes from car door opening and allows a space for car passengers to exit the vehicle, check for people on bikes and cross the facility.

Where cycle movements are expected to be over 1,000 per day, and parking is well used, it may be necessary to have time restrictions in the peak hours to ensure priority for cyclists and avoid crashes.

LOADING

- People on bikes have priority over people loading and unloading in a dedicated loading zone.
- A minimum 1.2m zone is required to allow deliveries to load a hand cart or similar prior to crossing the cycleway.
- If loading is provided, the cycleway should be flush with the footpath or use 1:3 angled kerbs to allow easy passage for loading.

Where cycle movements are expected to be over 500 per day, and parking is well used, it may be necessary to have time restrictions in the peak hours to ensure priority for cyclists and avoid crashes.

PLANTING

Street planting is a vital part of a successful, healthy street and can be used to separate cycleway and footpath. Detail relating to street planting is in the Engineering Design Code – Footpaths and Public Realm.

STREET FURNITURE

Street furniture zone can be used to separate cycleway and footpath. Detail relating to street furniture is in the Engineering Design Code – Footpaths and Public Realm.

WASTE COLLECTION

Public or private waste collection can be difficult to provide for in conjunction with cycleways. The waste collection requirements affecting any cycleway must be evaluated. Street space must be allocated to ensure bins do not obstruct cycleways or footpath through routes when set out before and after collection. and provision made so that the operational activity of collection can take place safely.

Specific requirements for Traffic Management Plans so that the operational activity of collection can take place safely must be identified and approved by Auckland Council and Auckland Transport.

BUS STOPS

There are three types of treatments where cycleway pass through bus stops:

- Full island,
- Partial island, and
- Boarder

They provide the hierarchy of treatment. A full island stop should be used for all new street design. It provides the least disruption for pedestrians and people on bikes and the safest environment for bus passengers.

Partial island and Boarder stops may only be used by Departure.

Details of the treatment of cycleway at bus stops is contained in the Engineering Design Code – Public transport – Bus infrastructure. The diagram below has the key dimensions and treatments relating to the cycleway component.

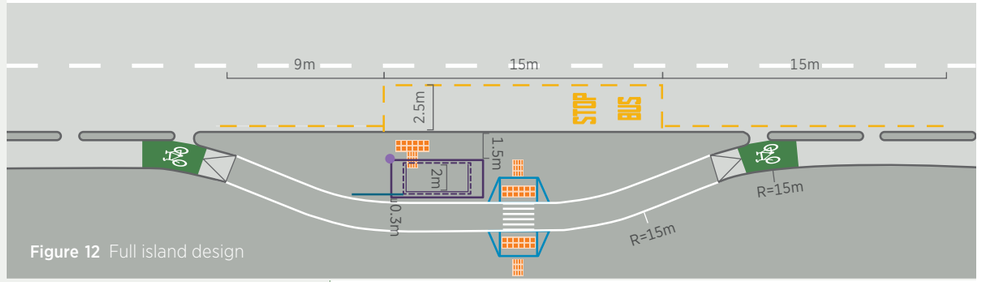


Figure 12 Full island design

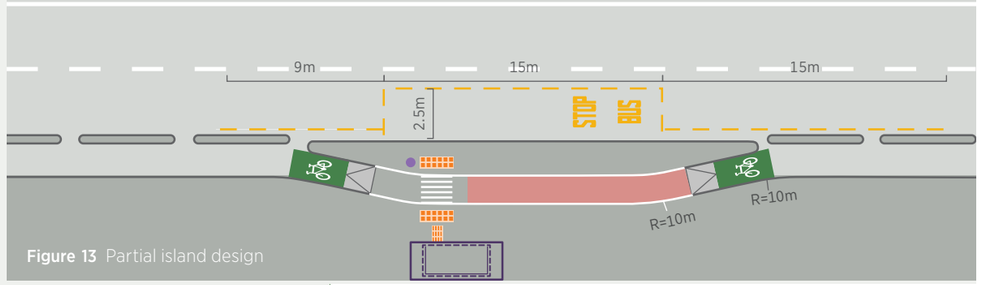


Figure 13 Partial island design

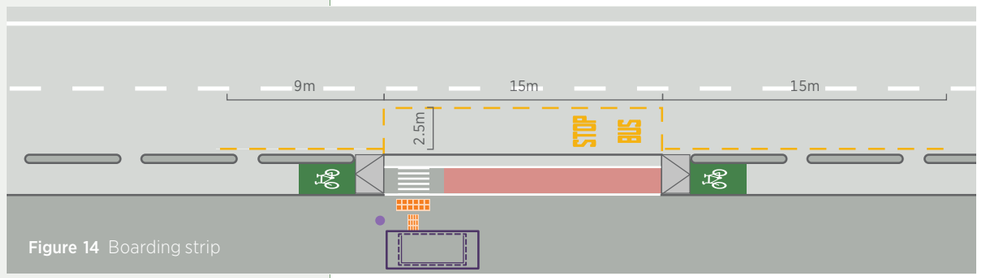


Figure 14 Boarding strip

Bus shelter

Physical barrier to prevent conflict at 'Blind' corner (eg railing, planters prevent conflict

Red surfacing

Bus stop sign and flag

08 General Design

8.1 Design controls

DYNAMIC DESIGN PARAMETERS

Because bikes and the ways they are ridden vary greatly, this formula cannot be applied simplistically.

Reaction time is given a standard value of 2.5 sec which may be varied as a Departure in particular contexts.

The coefficient of friction is an approximation, and the values used to derive the standards are varied in relation to speed and other contexts.

The figures and tables provide the derived values that are to be used to represent the majority of user and context combinations to be acceptable in most cases.

Any Departure from Standard will need to show a clear understanding of the dynamics of the particular situation to demonstrate a safe and acceptable solution.

SAFE CYCLEWAY USE

See Engineering Design Code - Urban and Rural Roadway Design Section 4.3 for safe use design general requirements. Parameters need to be modified for performance of riders and cycles in applying these to cycleway design.

Three particular road user tasks need to be assessed to ensure road infrastructure can be used safely by all:

- **Safe Path** Each road user must be able to see the way ahead of them to identify a safe path to follow, to choose, and to achieve a safe speed to approach features.
- **Safe to Go** When their path brings them into an area that may conflict with other users such as an intersection or a crossing, they must be able to see approaching users for long enough to judge a safe opportunity to enter the conflict area.
- **Safe Avoidance** They must be able to see unexpected stationary or moving hazards that may be in their path, or about to cross their path, in sufficient time to respond and avoid collision.

STOPPING DISTANCE AND VISIBILITY

Stopping distances are calculated using the formula:

$$S = \frac{V^2}{254 \times \left(f + \frac{G}{100}\right)} + \frac{R_T \times V}{3.6}$$

where S = stopping sight distance (m); V = speed (km/h); R_T = reaction time (sec); f = coefficient of friction; G = grade (%, + for uphill, – for downhill)

AT Stopping Distance tool should be used, with deceleration coefficients for cycles.

Safe Path: Ensure that any feature (such as a bend or intersection) can be clearly understood so that a person can reduce speed to a speed that is safe for any manoeuvre required (turning, slowing or stopping). At higher speeds, more reaction time may be needed to identify the feature correctly. A series of constraint features may induce a lower operating speed in general through a section of path. The first feature encountered should be used to induce a safe speed for any following features that also require low speed and may have limited reaction time available.

Safe to Go: gap acceptance requires a clear view of a gap in a flow of users on a busy path. Gentle deceleration of other users to widen a gap can be considered.

Safe Avoidance: Moving hazards may include people on bikes travelling at a speed greater than the general design speed, if not constrained by tight curves. Avoidance may include stopping in path or deviation to avoid conflict if this is shown to be safe. High deceleration should be applied only in a straight line. Slowing or stopping in a curved path requires a lower deceleration to avoid loss of traction and control.

SIGHT LINES AT CURVES

Observer height is 1.4 m. Object height is generally 0 to allow observation of surface defects and layout of path ahead.

For people on bikes approaching each other, an object height of 1.0 m can be used. SSD is additive, if both users need to be able to stop at a point of conflict such as a narrow point or passing a hazard object. on a path.

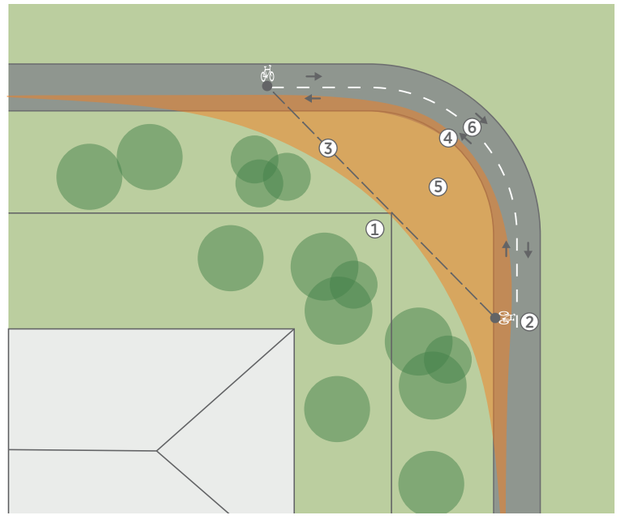


Figure 15 Lateral clearances on horizontal curves

① A structure, fence or group of trees may limit visibility at a bend. Include growth allowance for trimming of vegetation.

② A hazard to be avoided may be moving (a cyclist approaching at speed) or static (a pothole, trolley, pole or a crossing).

③ The field of view that people on bikes need to be able to safely avoid a hazard is related to the speed the observer is travelling and the ability to slow, change direction or stop.

④ The distance ahead along the path of travel that people on bikes need to observe can be reduced by choosing a curve radius that can be clearly seen, with a Safe Path speed that matches the visibility available for Safe Avoidance of a hazard.

⑤ The combination of possible hazard locations and speed with observer speed and Safe Avoidance distance defines a visibility envelope that must be kept clear of obstructions.

⑥ Where visibility is restricted to the limit for Safe Avoidance, a centreline should be marked with direction arrows, to assist in avoiding conflicts.

VISIBILITY AT POINTS OF CONFLICT

Where turning vehicles cross the path of cyclists, the approach must be free of obstructions to visibility, including fixed and moveable street furniture and parked vehicles.

The length of approach clear space is affected by cyclist speed and the turning speed of an approaching car. Cycle speed is taken as 25 km/h and car turning speed as 20 km/h. 3.0 seconds should be allowed for observation, decision and action, in addition to braking time.

If people on bikes may approach at more than 25 km/h or cars may turn at more than 20 km/h, then physical measures should be installed to reduce speeds at the point of conflict. tight radius turns and raised intersection crossing can aid this.

If visibility is restricted or speeds might not be controlled, then Safe to Go and Safe Avoidance calculation will be needed.

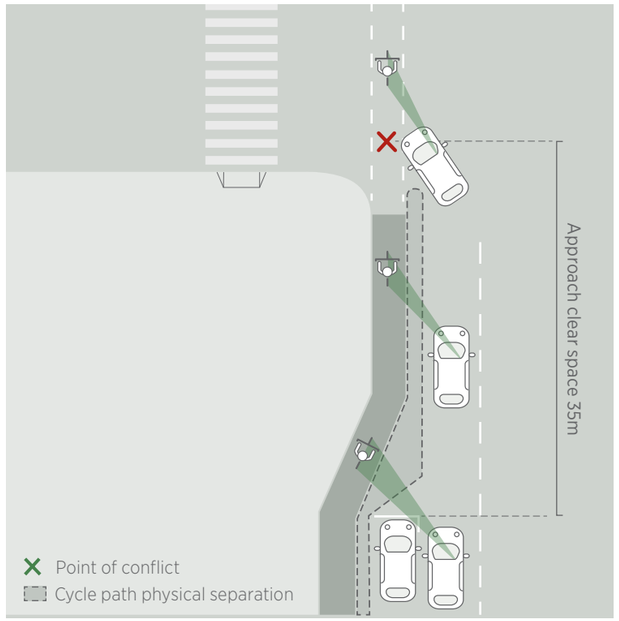


Figure 14 Approach clear space – driver gives way to cyclist

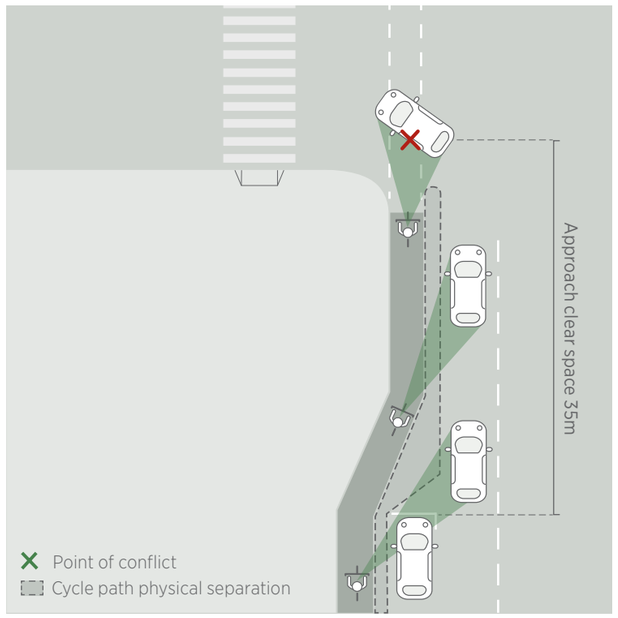


Figure 15 Approach clear space – driver gives way to cyclist

VISIBILITY AT CYLEWAY INTERSECTIONS

People on bikes can merge smoothly, if they are approaching a conflict point at similar speeds, have time to judge relative movement of each other and there are gaps in flows. Manage approach speeds to enable visibility for all approaches and check visibilty envelopes.

If people on bikes will need to slow to less than 10 km/h to approach a path terminal, crossing or T-intersection with limited visibility, they will need Safe Path visibility time on the approach, to be able to slow to a stop if necessary.

A Safe to Go check will need to include acceleration from stop. Gap acceptance becomes significant for safety and delays in such cases.

8.2 Horizontal and vertical alignment

HORIZONTAL ALIGNMENT

Use AT design cycle tracking in TDM Tools for horizontal alignment. This will show how realistic behaviour will define the acceptable width and radius for curves and through intersections, including cycle envelope widening for low speed turning.

AT Visibility tool is to be used with this to combine path geometry with safe speed decision-making. This is particularly important on approaches to locations where physical constraints require speed reduction for safety.

The space for turning may be provided within a wider path or open area, or may be defined using a curved path edge.

The table below is given for guidance, but it is often easier to design a path using the Design Tools. Radius is to the inside edge of path.

MAINTENANCE ACCESS

For cycle paths away from roadside, all curves should be checked for tracking of any check vehicle intended to be used for maintenance access.

TABLE 9 HORIZONTAL CURVES

Travel speed (km/h)	Preferred minimum radius
Stopping	2 m
10	4 m
15	7 m
20	10 m
25	18 m
30	25 m
40	50 m
50	94 m

1 Based on zero superelevation and friction factors of 0.31, 0.28, 0.25 and 0.21 for speeds of 20, 30, 40 and 50 km/h respectively.

VERTICAL ALIGNMENT (GRADIENT)

Practicable maximum gradient may be affected by topography, especially for bicycle facilities at the side of existing roads.

The whole route length, for either local or longer trips, should be considered in steep terrain, to minimise isolated steep sections. Wherever possible, a maximum grade of 3% should be provided.

Gradients that exceed 5% are undesirable because the ascents are difficult for many people on bikes to climb and the descents cause some to exceed the speeds at which they are competent or comfortable. On some shared paths, where terrain dictates, designers may need to exceed the 5% grade recommended for short sections.

Steep downhill grades need to be followed by an uphill grade to allow slowing. Conversely, steep uphill grades benefit from a downhill approach to gain momentum. Curves, intersections and obstructions at the bottom of a steep grade need to be protected, allowing safe braking and turning.

See Table below for preferred grade and grade lengths.

LANDINGS/REST AREAS FOR PEDESTRIANS ACCESSIBILITY

Landings for pedestrian accessibility can be uncomfortable for people on bikes. Where possible, cycle and pedestrian paths should be separated to avoid landings/rest areas on the cycle path. Pedestrian rest platforms shall be provided off the side of the cycle path. Where lengths of a route exceed the maximum gradients in Table 14 below, landings/rest areas should be provided. Rest platforms shall be provided both on the path and adjacent to the path. The platform width shall be equal to or greater than the width of the path – preferably 4 m in length where topography allows.

The minimum length shall be 3 m. For landing/rest areas only, the minimum vertical curve length may be reduced to 2 m for up to 45 m between landings. The portion of a vertical curve greater than 5% grade shall be included in the grade length for comparison with the maximum.

TABLE 10 GRADIENTS

Use	Max. gradient	Preferred max. length
Cycles only	3% (1:33)	No limit
	5% (1:20)	240m (maximum)
	8.33% (1:12)	90m (maximum)
	10%	30m (maximum)
	12.5%	15m
Combined Cycle and pedestrian paths	3% (1:33)	No limit
	5% (1:20)	120m (between landings)
	8.33% (1:12)	45m (between landings)
	10%	9m (between landings)
	12.5%	3m (between landings)
Landings/rest areas	2%	3 m (minimum)*

Interpolation between values is permitted.
*3 m landing excludes a 2 m length of a transition curve at each end.

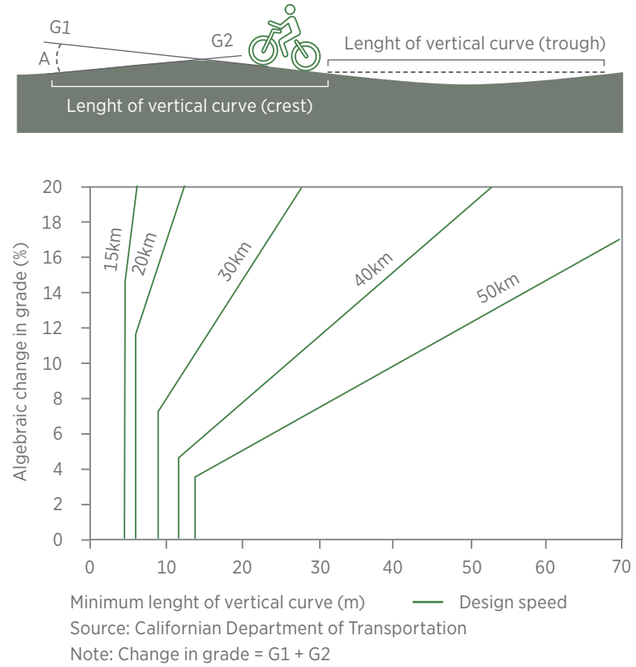


Figure 16 Gradient changes
Source: Californian Department of Transportation
Note: Change in grade = G1 + G2

CROSSFALL

Preferred crossfall should generally be between 1% and 2%. Paths may fall to either side or be crowned, provided drainage can run off and be treated or captured. Paths should not exceed 3% crossfall when used by other than people on bikes. Crossfall towards the inside of horizontal curves is preferred. Where unavoidable, adverse crossfall should not exceed 2%. Unsealed trail paths should have a crossfall of 5%, preferably crowned.

PATH CONNECTIONS

Where two paths intersect and join, the major (through) path shall be no steeper than 2% longitudinally for a minimum of 3.0 metres length, centred about the intersection with the minor path. Any localised increase in gradient required to accommodate the flattened section of path shall be provided only on the low side of the flattening. Vertical curves for the relevant design speed shall be provided on both sides of the flattened section of path.

8.3 Widths and clearances

DETERMINATION OF PROPOSED WIDTH

Standard widths for approved cycleway types are given in Section 3 and 4.

Where large numbers of people on bikes are expected, cycleways must be widened to accommodate additional files as described below.

In constrained locations, the file width principles below should be used to ensure that cycleways are safe and sufficient for planned use throughout their length.

WIDTH MEASUREMENT

The width of cycle lanes should be measured from the edge of the channel to the centre of the lane line. Measure from the kerb face only if there is no drainage channel (>5% crossfall) formed.

If the cycle lane is between two traffic lanes, measure from the centre of one lane line to the centre of the other.

If the cycle way is between two kerbs (without channel >5% crossfall), e.g. protected cycle lane, measure the width between the kerb faces.

FILE WIDTH FOR BIKES

The width for each file for cycling is the design bike envelope width, plus additions below.

NUMBER OF FILES FOR BIKES

Separate lanes for cycling are not marked, except in some cases to segregate for direction in two-way facilities or for user type in shared paths.

Path width W is to provide for one or more files of people on bikes, and allow for passing in same or opposite direction, or cycling side-by-side.

Basic cycle lanes less than 2.0 m wide allow for passing only when safe to do so, by moving into the adjoining traffic lane.

All other facilities require additional width where more than two files of bikes are to be provided for.

TABLE 11 THRESHOLDS FOR NUMBER OF FILES

One-way path	
Bikes (peak hour)	Files Preferred (Minimum)
<150	2 (1)
150–750	2 (2)
>750	3 (2)
Two-way path	
<150	2[1] (2)
150–750	3[2] (2[1])
>750	4 (3)

Note: Designers are required to use the Preferred number. The Minimum number is a guide for Departure where existing site constraints prevent achieving Preferred number and should only apply over a limited distance.

1. Width of 2.6 m allows 2 opposing files (including two non-standard bikes) and for occasional opportunities for passing.
2. Path divided equally by centreline.

TWO-WAY CYCLE PATH OR SHARED PATH

Allow 0.5 m between cycle envelopes for opposing cycle directions when high-speed cycling is expected.

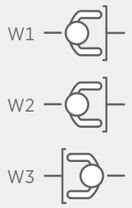
UPHILL CYCLE ENVELOPE

For cycle paths in excess of 5% uphill grade, allow 1.5 m for cycle envelope width.

SHARED PATH – OTHER PATH USERS

A minimum width of 1.5 m must be provided for other users, in addition to each file of people on bikes.

Below the threshold values for people on bikes and pedestrians.



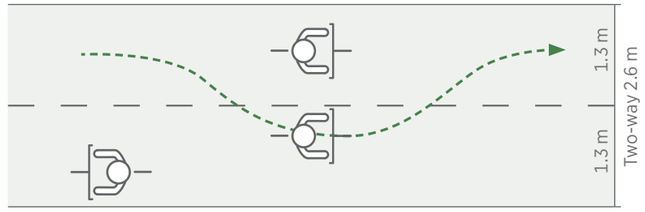


Figure 17 Example of file width considerations

CLEARANCE WIDTH

Objects at or close to the edge of a cycle way affect how close to the edge people can ride. These clearance widths should be measured from the width as defined above.

Vertical features are any items higher than 150 mm above the cycleway surface, including posts, railings and vegetation. Further allowance must be added for seasonal growth for vegetation.

The minimum margin between the edge of a path and any adjacent slope >1:10 is 1.0 m. This may be reduced to 0.5 m through highly constrained sections

A fence, parapet or wall may be fitted with a smooth, continuous rubbing rail between 1.0 and 1.5 m above surface level. A clearance of 0.3 m should be allowed from cycle envelope width from this.

Any utilities, such as manholes and cabinets, must be located clear of paths with sufficient space for vehicles to park nearby and for access and working space at the chamber or cabinet so that the path may remain in operation when routine maintenance is being carried out.

CURVE WIDENING

The path swept by a cyclist through a curve widens with decreasing radius. Each file of cycling should be considered, and the envelope width increased in accord with the table below. This is particularly important for low speed situations. It is also relevant to the wheeling of cycles when below stable cycling speed (less than 10 km/h).

Check to ensure whether the cycleway width will accommodate the widened envelope for swept paths and widen if necessary. At constrained locations, it may be desirable to have people on bikes pass through in single file. If this is so, they must be able to recognise the constraint in sufficient time to adjust speed and move into single-file. Surface markings or signs may be needed. On two-way paths, a centreline may be marked at hazards, with direction arrows in advance of the hazard and at the hazard. Safe Avoidance check should allow for people who may cross this centreline.

It is easier to use the Design Tools to identify acceptable path alignment and width.

TABLE 12 CYCLE ENVELOPE WIDENING

Radius (m)	2	3	4	5	10	15	20	25	30
Widening (m)	1.0	0.7	0.6	0.5	0.3	0.2	0.2	0.1	0.1

TABLE 13 EDGE CLEARANCES

Type of edge constraint	Clearance C Preferred (Minimum)
Vertical kerb 65 - 150 mm high	C1 (from cycle envelope) 200 mm
Vertical feature with Rubbing rail	C2 (from cycle envelope) 300 mm
Kerbed edge – Vertical feature	C3 (from face of kerb) 250 mm
Flush surface – Slope >1:10 or drop <0.5 m or vegetation	C4 (from edge of path) 1000 mm (500 mm) (increase by width of trimming allowance for seasonal growth of vegetation)
Flush surface – Vertical feature	C5 (from cycle envelope) 500 mm

Note: Designers are required to use the Preferred width. The Minimum width is a guide for Departure where existing site constraints prevent achieving Preferred width.

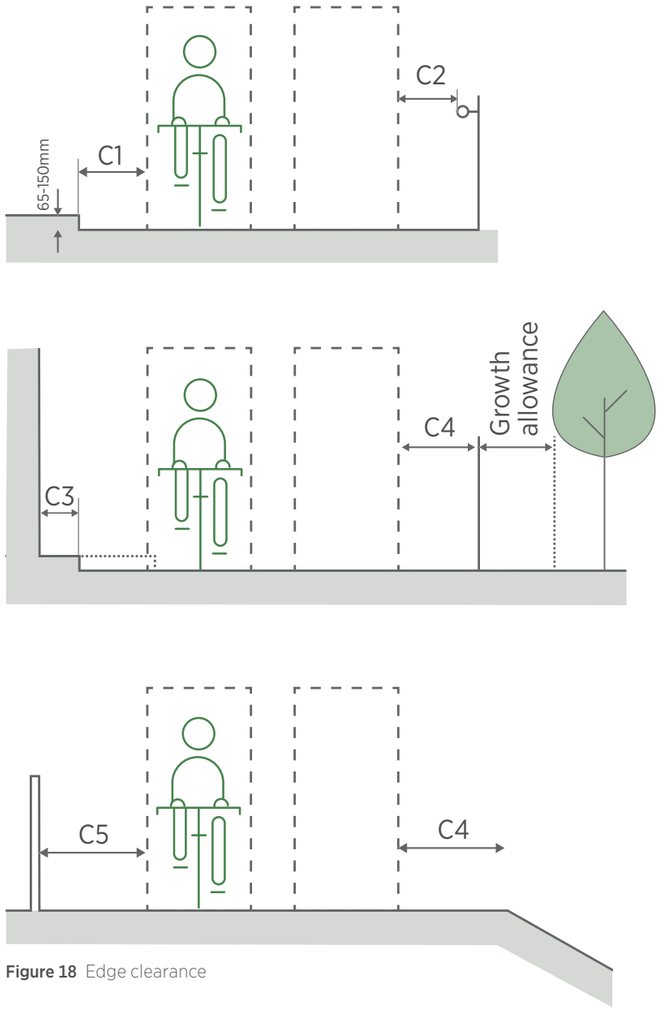
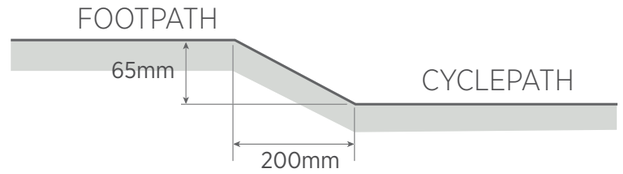


Figure 18 Edge clearance

8.4 Construction

KERBS

Fully-mountable kerbs 65 mm high and 200 mm wide should be used between separated cycleway and footpath where they are adjacent.



Kerbs not more than 70 mm high may be used at the edges of a cycleway next to a separator or buffer strip. These provide clearance for pedals.

Standard vertical kerbs at the cycle lane edge should only be used where existing kerbs are to be retained for economy.

SEPARATORS

Concrete separators are currently used in various locations in Auckland and can be a cost-effective way to deliver an interim facility e.g. Quay Street.

Precast concrete islands of 3 – 5 meters long, at least 70 mm high on the traffic side, and maximum 70 mm on cycleway side, should be used. Drainage gaps (typical 500 mm) will be required at regular intervals to allow existing road drainage to continue to capture surface water.

SURFACE

The provision of good riding surfaces is critical for safe and comfortable cycling. Cycle lanes and paths must have permanent, all-weather surfaces, with a smooth transition between adjacent surfaces where people on bikes may need to move sideways off the facility.

Timber surfaces for cycle paths should be avoided. They can be dangerously slippery when wet and make corners particularly difficult for people on bikes and runners.

Skid resistant surface coatings can be applied to various substrates to make them suitable for bicycle use.

APPROVED SURFACE

Asphalt surfacing is the approved surface for cycleways and off-road paths. It provides a smooth ride with lower friction drag, but good slip resistance.

Chip seal should never be used on cycleways cycle paths.

Concrete may be used on shared paths – or via departure for cycleways and cycle paths. The design needs to ensure the concrete finish is sufficiently different in colour from any footpath, and have a smooth, skid resistant surface with 90degree edge saw cut joints.

Other surfaces, such as boardwalks, must provide suitable slip resistance and durability and will require departure.

UTILITY COVERS

Utility covers are preferred not to be within cycle facilities. When this is unavoidable, they should not be located where they risk destabilising people on bikes, especially in wet weather, e.g. on curves or braking points. Covers should have a surface finish with high slip resistance. For metal covers, an applied surface coating is preferred. This is subject to agreement by the utility operators, who own the covers. Covers should be 0-5 mm above the surrounding surface to avoid trapping surface water.

APPROVED COLOURS

The colour of cycleway is important for a number of reasons:

- To provide a clear contrast with pedestrian areas
- To differentiate it from a vehicle lane and avoid the carriageway feeling too wide
- To contribute positively to the public realm
- To provide a consistent experience for people on bikes

Based on international experience Auckland Transport supports the use of “Oxide red” (RAL 3009) coloured surfacing on cycleways as the best way to meet the above requirements. Currently there is limited availability of coloured asphalt in the NZ market and use of standard black asphalt is supported while products are tested and approved.

8.5 Drainage

See Engineering Design Code – Road Drainage for design and construction requirements

DESIGN CRITERIA

Note that the design rainfall event for cycle path use is not the same as for vehicle traffic lanes. This may enable some economies of design to deal with issues relating to the relative levels of road channel and cycle path, and cycle path kerbing.

CHANNELS

Where practicable, concrete channels shall be reduced to 3-5% crossfall in place of conventional 10% crossfall to avoid hazard to people on bikes. This must be done at kerb ramps for pedestrians crossing cycle facilities and transition ramps across kerbline.

CATCHPITS & GRATES

Catchpits and grates may be placed adjacent to and flush with, but not within cycleways or cycle paths.

Approved designs are shown in the Engineering Design Code – Road Drainage for any road being constructed or prepared for use by people on bikes.

COMBINED KERB/DRAINAGE

Kerb drainage blocks may be used to provide effectively continuous inlets, especially on flat grades.

This can avoid the need for concrete channels and reduce the need for catchpits at kerb ramps and path transitions.

WATER SENSITIVE DESIGN

Run-off from cycle facilities should be collected and treated separately from contaminated road run-off where practicable.

Impervious area of cycle facilities should be kept to the minimum consistent with Preferred facility types and widths. Pervious paved surfaces may be used in some cases to help with this.

A minimum 0.5 m level berm width is preferred between cycle lane or path edge and the edge of any stormwater treatment device that requires a drop-off. Swales with 1: 3 sloping sides up to the edge of a cycle lane or path are acceptable, but vegetation should be designed to avoid reducing the facility width below the design Preferred width.

8.6 Signs and markings

DRAWINGS

Standard Drawings in CD series provide requirements for various arrangements of cycle lane and path.

Other specific signs and markings are shown in figures through this code.

8.6.1 Cycle lanes

LIMIT USE OF SIGNS

The use of pole signage should be minimised. Signs that provide a regulatory or warning function are required, but optional signs (e.g. the Cycle Lane sign) are not compulsory and should not be used unless there is good cause to do so.

WHITE CYCLE LANE SYMBOL

Cycle lanes are legally authorised by the presence of M2-3 white cycle symbols marked in the lane, as per Schedule 2 of the Traffic Control Devices Rule (TCD Rule). Signs are not required, but may be used to reinforce a cycle lane or to indicate the start or end of a cycle lane, although visual clutter should be avoided. The M2-3 cycle lane symbol is to be used as shown in Figure 21, with a symbol at the start of each block, a maximum spacing of 100m between symbols and with symbols used more frequently in more complex traffic situations, e.g. at intersections or around parking or busy driveways.

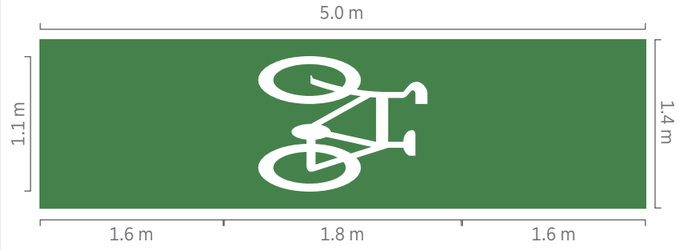


Figure 19 Cycle lane symbol

GREEN SURFACE

A green surface should be applied to cycle lanes where drivers have to be reminded of the presence of people on bikes, at conflict points, or at other locations where people on bikes may feel vulnerable. The colour guides people on bikes through the intersection, makes people on bikes’ behaviour more predictable to motorists and reinforces the potential presence of people on bikes to motorists. It is commonly used at intersections, side roads, busy commercial driveways, pinch points, sharp bends and shared bus/cycle lanes.

Preferred colour for bus or cycle lanes is A/NZS 2633 G26 “Apple green”.

SERVICE COVERS

Coloured surfacing should not be applied over service covers within the lane, unless the service covers are very large and omission could confuse the layout.

8.6.2 Cycle paths

LIMIT USE OF SIGNS

Generally, signs and markings should not be used on cycle paths and shared paths. A centre line or median may be useful in areas of poor visibility, e.g. around a corner. Arrow or Keep Left markings may be useful as a reminder in areas where conflicts may occur. If conflicts are frequent, consider creating separate paths for each mode. Signs advising of courtesy codes, e.g. to encourage sharing of facilities, may be considered.

START AND FINISH

The start and finish of a shared path must be indicated through the appropriate cycle symbol markings (true start or end of a path).

GREEN SURFACE

Green surfacing may be used in protected cycle lanes or paths to warn footpath users of cyclist priority.

At least one cycle symbol marking should be used with each section of green surfacing.

8.6.3 Wayfinding

WAYFINDING

Wayfinding signs and/or marking are an important part of a cycle route and should be provided at all places where direction may change or be uncertain, and to confirm a route. Guidance is provided in AT Roads & Streets Wayfinding Guide

8.7 Lighting

Cycle lanes and cycle paths shall be lit to ensure clear view of any defects, debris or obstructions within the path of cyclists. Lighting categories P3R and P4R shall not be used, and Category V lighting design shall include the cycle lane or path as traffic lanes.

OTHER GUIDE

See also Engineering Design Code–Street Lighting

09 Ancillary features

TRANSITIONS

A transition may be required where a cycle lane ends and a cycle path starts, or where people on bikes transition from the carriageway (without a cycle lane) onto a path to avoid potentially hazardous situations, e.g. parked cars or roundabouts.

TRANSITION RAMPS

Transition ramps between on-road and off-road must be designed to minimise any speed reductions for the people on bikes, while also ensuring their safety and reducing potential conflict with other path users, e.g. pedestrians. Crossings should be flush, and without a formed drainage channel. Kerb lips may deflect cycle front wheels at shallow approach angles and destabilise people on bikes.

Surface water should be captured upstream close to the crossing, and the channel should be reduced to the crossfall of the roadway, or not more than 5%.

Gradient of ramp should not change by more than 8% along line of travel and 3% across line of travel.

The toe and top of the ramp should be close to right angles to the path of the cyclist.

KERB RAMPS

Kerb ramps as shown in Engineering Design code – Footpaths and Public Realm and Plan FP009 may only be used along cycle paths where people on bikes are required to stop before crossing. Gradient of ramp plus gradient of road or channel should produce not more than 10% change of grade.

TACTICLE PAVING

Where cycle paths cross traffic lanes alongside pedestrian crossing points and pedestrians could stray into the cycle crossing area, green TGSI warning tiles should be used across the cycle path at the traffic lane edge and yellow across the footpath.

OBSTRUCTIONS

All obstructions within cycle paths shall be coloured yellow with red reflective bands near the top or 1.4 m above ground, and at 1.0 m intervals on horizontal rails.

Poles at the edge of a cycle path should be white, or contrasting with their background, with red reflective band or disc at 1.4 m above path level.

BOLLARDS

Bollards, staggered barriers and gates should only be used where unauthorised vehicles must be physically excluded or stock control is required and no other method of protection is practicable. They must allow for the convenient passage of mobility scooters, motorised wheelchairs, large baby buggies and bicycles. Barriers and bollards should not be designed as a tool to slow down people on bikes. If this function is required, the path design on the approach should provide for this.

Bollards are the preferred end/entry treatment if required for shared paths and cycle paths. They should leave a gap of 1.6 m, leaving enough space for wheelchair and wide stroller access, but keeping narrow cars out. They should have a minimum height of 1.2 m. Bollards must be adequately located, coloured yellow and reflectorized to be visible to pedestrians and people on bikes. On high-volume or high-profile paths, they may be internally illuminated.

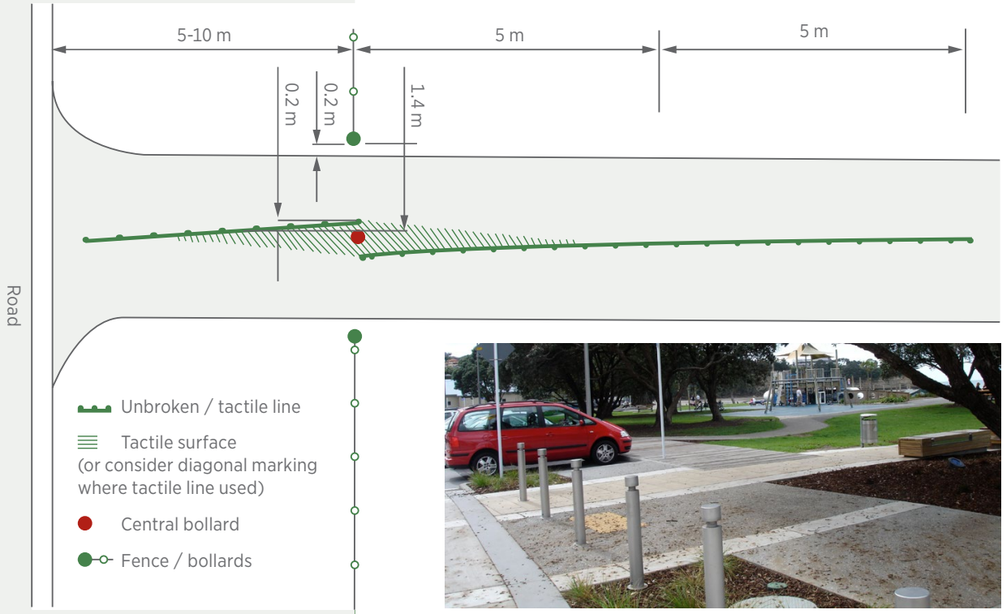


Figure 20 Cycle lane symbol

GATES

If gates are required for stock control, they should be capable of being opened easily from both sides by a person mounted on a bike. Sprung latches and self-closing are preferred.

STRUCTURES

Structures generally require Building Consent and are required to meet Building Code requirements in addition to the following.

Comprehensive advice for off-road bridges, boardwalks, underpasses and tunnels is contained in Sections 6.3 and 6.5 of the NZ Cycle Trail Design Guide (NZTA).

BRIDGES & UNDERPASSES

New road bridges and underpasses should be constructed to allow for cycle facilities consistent with the facilities on adjoining roads.

For existing road bridges, if the bridge forms part of a cycle route, and the required width for a cycle facility is not available, then the bridge should be widened to provide a continuous facility for people on bikes and pedestrians. Solutions may include building a clip-on bridge on one or both sides of the main bridge, or a separate bridge. In exceptional circumstances where that is not possible and a two-way facility is the only possible provision on one side of the bridge, safe crossing facilities (e.g. signalised) has to be provided.

Underpasses for pedestrians and people on bikes should be considered if the key components are suitable. Key components of bike underpasses are consistent with CPTED best practice:

- Open sightlines – it must be possible to see fully through the underpass an see open space on either side of the other end
- Gradual slopes – access ramps of less than 7% to make it easy and safe to approach
- Well lit – both day and night if it's accessible 24/7
- Surveillance – there must be passive surveillance from houses, workplaces or passing vehicles. Security cameras should also be used to deter crime.

Underpasses should have a minimum 2.5m height clearance for spans under 15m, or 3m if longer. Underpasses should be a minimum width of 4m if sides are 90 degree, 3m is acceptable where the sides are sloped and allow more light to enter.

STAIRS & WHEELING RAMP

If access onto a bridge or underpass cannot be provided through a ramp with acceptable gradients and is only provided through stairs, provide a cycle wheeling ramp so that people on bikes can push their bicycles up or down the stairs.

A cycle wheeling ramp should also be provided at stairs at rail stations and interchanges. If the station is retrofitted, a simple (e.g. metal) wheeling ramp should be provided. If a station is upgraded or built, the wheeling ramp should be an integral part of the stairway.

Stairs with wheeling ramps may also be provided between path sections with large vertical separation, where they form a more direct route as an alternative to a less direct route without stairs.

The alignment of stair connections should minimise the number of turns as far as practical.

Wheeling ramps should be kept under a hand rail or as far to the side as possible to prevent it being a trip hazard. The surface of the ramp should be L or U shaped to hold the wheel and have a skid resistant surface.

New construction:

Pitch 23° (1V:2.35H, 43%).

Risers 120-180 mm.

Tread at least 310 mm.

Height of each flight at least 360 mm up to 2500 mm.

Landings at least 1800 mm for each flight and preferably clear of through routes at top and bottom.

Retrofit:

Where a wheeling ramp is added to an existing stair, pitch up to 32° (1V:1.6H, 62%) may be accepted. Metal trough wheeling ramps may be used, but width, and the height and angle of the edge nearest to the steps must be sufficient to allow for wide tyres, and the angle at which a bike is held.

OTHER GUIDE

See Standard Engineering Details CD015 – CD017.

10 Design for maintenance

MAINTENANCE

The cycle facilities in this Chapter will require special consideration of the methods of maintenance.

Access for routine maintenance and reconstruction should be considered when planning the route and width available for the cycle facilities. This may be from adjoin traffic lanes, footpath or landscaped areas.

Cycle facilities may also need to provide a route of access for maintenance of other adjoining land uses, including public utilities.

SWEEPING

Cycle lanes need to be swept regularly to keep the lanes free of broken glass, debris and hazards. Protected cycle facilities should be designed to facilitate sweeping, as well as drainage maintenance.

In Centres, use of specialised footpath sweepers for narrow cycle facilities is practicable.

Away from centres, standard street sweeper trucks may not be able to access all types of cycle facility which may affect layout and width. Protection against accumulation of debris by design should be considered.

The ability of drainage suction trucks to access pits within cycle facilities should be considered, and drainage layout designed to minimise traffic management difficulties.

Height, profile and construction of separators may be designed to allow appropriate maintenance vehicles to drive across them to maintain the cycle way.

USER SAFETY

Facilities must be designed for users to be protected during maintenance and access activities.

This may require enough width or special passing places for users to pass appropriate maintenance vehicles.

Width may also be needed to allow maintenance activities to be carried out, such as trimming vegetation or maintaining lighting.

OPERATOR HEALTH AND SAFETY

Working space is required for maintenance operators to access their vehicles and the assets that they are working on. Where vehicles must be left some distance from a work site, operators must be able to move between them and convey tools and materials in safety. Protection from traffic and path users must be considered, and the length and gradient of the route.

TEMPORARY TRAFFIC MANAGEMENT

Provision of Temporary Traffic Management can significantly affect operating costs. Facilities should be designed with regard to operational activities and minimising the operational costs due to this. It is often preferable to provide additional space or facilities (such as vehicle parking stands) to avoid costly or intrusive Temporary Traffic Management measures.

Appendix A Cycle parking

A.1 Introduction

PURPOSE

This section provides a step-by-step guide for planners, engineers, developers, project managers and providers on how bicycle parking should be provisioned in Auckland. It provides information and guidelines for planning, design and installation of bicycle parking. It also outlines the requirements and measurements for bicycle parking.

IMPORTANCE OF BICYCLE PARKING

Bicycle parking is a key consideration in any new development and mandatory under the Unitary Plan. Bicycle parking should be provided as a part of most, if not all, major transport projects and some minor works projects. If bicycle parking already exists, the aim should be to improve the quality and possibly expand the quantity of bicycle parking provided.

Appropriate bicycle parking can remove a barrier and help promote cycling in Auckland to achieve Auckland Transport's vision of creating a world-class cycling city. To meet this objective, the quality of bicycle parking is as important as the quantity.

ROLE OF BICYCLE PARKING

Bicycle parking is part of any bicycle journey at both the beginning and end of each ride. Provision of safe and convenient bicycle parking is essential for promoting and supporting cycling as a practical transport choice. It also contributes to increasing the number of trips made by bicycle, by normalising cycling and making people on bike feel that they are welcome.

TYPE OF BICYCLE PARKING

Different bicycle parking facilities suit different circumstances, depending on the location, estimated length of stay and likely users.

QUALITY OF PROVISION

Auckland Transport, Auckland Council, developers, business and others are expected to make appropriate provision for bicycle parking to support cycling as a transport choice. In order to fulfil that role effectively, the quality of bicycle parking will be as important as the quantity.

Achieving the best quality of provision, in terms of location, design and type is important in order to:

- Ensure enough parking for those who already cycle is provided.
- Encourage more people, and a more diverse range of people, to choose cycling as a transport mode.
- Encourage inclusive cycling.
- Help more children and older people to cycle.
- Ensure that bicycle parking is considered as an integral part of any major transport or streetscape project and is incorporated into any new developments (as per the Unitary Plan), and redevelopments such as streetscape upgrades.
- Support the bicycle without damaging it.

- Reduce bicycle theft through natural surveillance and well-lit (both day and night) locations. (Facilities to lock and store bicycles may be required, particularly for long-term parking.)
- Reduce obstruction and other nuisance caused by ad-hoc parking.
- Avoid the misuse of cycling parking for other purposes
- Avoid creating hazards or impediments to pedestrians of all ages and abilities.
- Have a minimum design life of 20 years (unless temporary).
- Require minimal maintenance.

BICYCLE ENVELOPE

Bicycles vary in size. However, by dimensioning cycling parking facilities as per the basic dimensions described below, most common types of cycles will be accommodated.

STANDARD DIMENSIONS

A standard adult bicycle is 1.8m long, 1.25m high, and 500–700mm wide. The wheels of the bicycle range between 0.3 and 0.7m in diameter and tyres are 23–60mm wide.

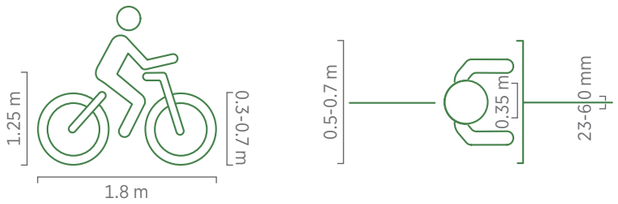


Figure A.1 Basic bicycle dimensions

A standard electric bicycle will be roughly the same dimensions.

NON-STANDARD DIMENSIONS

Children's bicycles come in a range of sizes, generally lower and shorter than adult bicycles.

A cargo bicycle will be longer and wider (typically up to 3.5m long and 1.0m wide), but about the same height.

A recumbent bicycle will be longer, and lower, but about the same width.

Larger bicycles can be accommodated by providing more clearance space around bicycle stands. Bicycle stands at the beginning or end of a group of bicycle stands are most suitable.

A.2 Bicycle Parking General principles

Bicycle parking should be:

- Fit for purpose
- Well-located
- Secure
- Well laid out and easy to use
- Integrated with street design.

These requirements are discussed in more detail below.

FIT FOR PURPOSE

Bicycle parking must meet current demand, while allowing for future demand to be met when required. It should include an appropriate balance of short-stay and longer-stay parking.

Bicycle parking should be easily accessible for people of all ages and abilities on any type of bicycles. This includes provision of parking for electric cycles, smaller children's cycles, larger cargo or recumbent cycles, tandems and solo cycles with adaptations to suit the rider's specific needs. This is important for ensuring that any bicycle user with a physical, sensory or cognitive impairment can enjoy access to good quality bicycle parking.

An inclusive approach to bicycle parking requires:

- Making it easily recognisable.
- Signage to accessible facilities at locations where the type of bicycle parking is difficult or impossible for all to use.
- Step-free access, which may require provision of shallow ramps or lifts large enough to carry all types of bicycle.
- Accommodating for larger models and, potentially, reserving allocated spaces for disabled people on bicycles.
- Providing a mix of bicycle stands to cater for different user needs and shapes and sizes of bicycles. Figure below shows an adaption of a bicycle stand for a child's bicycle

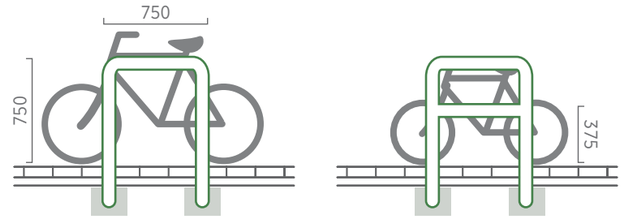


Figure A.2 Adaption of a Sheffield stand for children's bicycles

WELL-LOCATED

Bicycle parking must be located as close as possible to the intended destination entrance – no further than the nearest car parking space. It should ideally be at street level, and never more than one level from the street. The location should be visible by day and night, convenient, accessible and prominently located, without obstructing other people.

It should also be preferably sheltered from the weather, particularly long-term bicycle parking.

Usability and location should be intuitive, without the user having to seek further information. However, if necessary, bicycle parking must be signposted. (See Section A.9 for more details)

SECURE

Bicycle parking must be safe to use, both from an injury prevention and personal security perspective; and theft. Crime prevention through environmental design (CPTED) and urban design principles must be applied when considering the location of bicycle parking. Bicycle parking should be in areas of high levels of natural passive surveillance and well-lit both day and night. Better security is required as the length of stay increases.

WELL LAID OUT AND EASY TO USE

Bicycle parking should provide plenty of locking points for different sizes and shapes of bicycles and space to get bicycles in and out without snagging or getting dirty. It must be located so that a parked or a manoeuvring bicycle will not be hindered by a parked/manoeuvred vehicle or by street furniture.

INTEGRATED WITH STREET DESIGN

Bicycle parking should be well integrated with other uses of a street or public or private space. Where an area has particular characteristics that are reinforced by street furniture, bicycle parking should fit in. It should be designed to be sensitive of the surrounding built environment and adhere to good urban design standards, as set out in the Auckland Design Manual, the Transport Design Manual, the Roads and Streets Framework and CPTED principles.

A.3 Categories of bicycle parking

There are broadly two main categories of bicycle parking, which relate to the length of stay. These are: long-term and short-term. Event bicycle parking is another category that should be considered.

The amount of security and convenience that should be provided depends on the intended length of stay.

Figure A.3 The convenience-security continuum for bicycle parking

SHORT-TERM BICYCLE PARKING

Short-term bicycle parking is typically used for under three hours, mainly for shopping or visiting destinations such as a library, café or a restaurant. This means that turnover is high and therefore convenience of access is the most important factor. The proximity to the entrance is crucial to the success of short-term bicycle parking. In general, the shorter the stay, the closer to the bicycle parking needs to be to the entrance. Short-term bicycle parking should be no further than 15m from the entrance to one destination, or no further than 25m if serving multiple destinations.

LONG-TERM BICYCLE PARKING

Long-term bicycle parking is typically used for more than three hours, e.g. at an university campus . Shelter and security are the most important factors for long-term bicycle parking.

Long-term parking solutions should be in the form of lockable bicycle sheds or multi-storey parking solutions. It should have two stages of security: initial limited access to a secure compound and a bicycle stand suitable for locking a bicycle. When located inside a building, it must be step-free and should involve going through no more than two sets of doors, which are ideally automatic or push-button operated. Any doorway should be at least 2m wide.

Lifts or shallow gradient ramps should be provided to access basement level bicycle parking. To accommodate all types of bicycle, lifts should have a minimum dimension of 1.2 x 2.3m with a minimum door opening of 1m.

For long-term bicycle parking, the bicycle stands should be no further than 50m from the entrance to a given destination.

Long-term parking may be combined with supplementary facilities such as bicycle workshops, drinking fountains, toilets and compressed air. It should allow for the storage of helmets/kit. See Section X.4.5 Bicycle parking hubs.

Electric bicycle parking facilities with charging points can be considered in popular locations to facilitate the growing trend of electric bicycles.

EVENT BICYCLE PARKING

Bicycle parking should be provided for events to encourage people to cycle to the event, relieving some of the pressure off the roads and public transport networks.

To be successful, bicycle parking at events should be well advertised in advance and its location at the events ground must be well visible.

Depending on the location, event organisers should plan for around 5% of attendees to cycle to the event. In central areas close to high-quality cycle facilities, the proportion could be higher. Bicycle parking that may already exist at an event location can be included, but this is unlikely to be sufficient on its own.

Event bicycle parking needs to be compact and mobile to allow for easy cartage and storage. It doesn't have to meet all the same structural standards as permanent bicycle parking, but cycles should still be able to be securely locked. A common type of bicycle parking for events is triathlon-style parking, where cycles are hung from the saddle.

Triathlon-style temporary bicycle parking

Event bicycle parking should be located next to the main entrance to the event, and possibly other entrances. It should be placed where it can gain the most passive surveillance.

Event organisers have three bicycle parking options:

- group of bicycle stands
- enclosure parking and
- valet parking.

Valet bicycle parking is a bicycle parking area that is staffed. It might work in a similar way to a coat check, where the bicycle and its owner receive a tag. Owners are still recommended to lock the bicycle. To make event bicycle parking even more appealing, one of the 'valets' may be a qualified bicycle mechanic who can service customers' bicycles while they attend the event.

A.4 Types of bicycle parking

There are broadly five types of bicycle parking:

- Bicycle stands (these can be provided in group or individually)
- Bicycle corrals
- Enclosures (these are always sheltered, but can be secured or unsecured)
- Bicycle lockers
- Bicycle parking hubs.

These are described in more detail below. The dimension of the bicycle parking (independently of the type chosen, i.e. group of cycle stands; bicycle corral, etc.) depends on the demand for bicycle parking (refer to Section A.10).

A.4.1 Bicycle stands

DESCRIPTION

Bicycle stands can be located almost anywhere. They are common in town centres where a group of several stands are installed on footpaths where there is sufficient space. The various types of bicycle stands are described in Section A.5.

FUNCTION

Bicycle stands are typically for short-term bicycle parking.

LOCATION

Bicycle stands are typically placed on footpaths, plazas close to shops, libraries, eateries, entertainment venues, etc. They are suitable outside shops where it is well lit (both day and night) and there is a high degree of passive surveillance, or where there is CCTV coverage.

Standalone stands placed throughout a town centre are useful for ensuring that customers can park close to their destination. This positively reinforces the convenience of choosing cycle as a transport mode.

Stands should be located where cycles will be protected from weather or incorporate some form of weather protection. People may be dissuaded from cycling if they think their bicycle (especially the seat) is likely to get wet while parked.

Where bicycle parking has to be provided on a slope, the stands must be aligned parallel to the contours (i.e. across the slope) so that bicycles do not tend to roll down the slope.

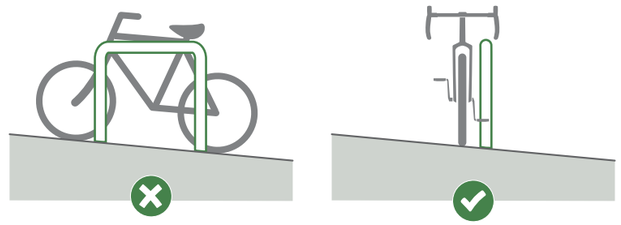


Figure A.4 Bicycle stands alignment in relation to the slope

CRITERIA

A bicycle stand must:

- Have two points of contact for the frame and wheel to be easily locked to.
- Support a standard-sized bicycle without risk of falling over and without damaging it.
- Be secure in and of itself, unable to be moved without special equipment.
- Be of one of the type stands described in Section A.5.
- Be clearly visible (day and night) or detectable for people with visual, sensory, or cognitive disabilities.
- Not require the bicycle to be lifted unless there is no alternative way of providing the required parking volume.
- Be practical, easy and intuitive to use.
- Be robust and easy to maintain.
- Not obstruct others. Poorly designed and installed bicycle parking can be a hazard, especially for visually impaired people.
- To make bicycle parking areas easier to recognise:

RECOGNITION

Fit a tapping rail to the first and last stand. Use strongly contrasting colours as a visual warning. Stainless steel stands should have a brushed finish.

Use contrasting coloured and textured paving. This could be formal hazard warning (corduroy) paving or a more subtle use of material, such as introducing cobbles or setts.

Align bicycle parking with existing planting or street furniture or consider buildouts in the carriageway to accommodate bicycle parking.

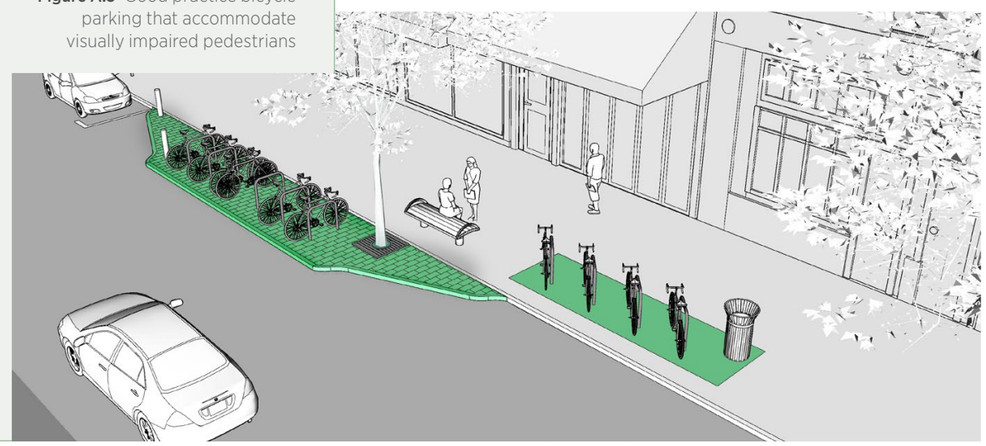


Figure A.5 Good practice bicycle parking that accommodate visually impaired pedestrians

A.4.2 Bicycle corrals

DESCRIPTION

Bicycle corrals are a group of bicycle stands located on the carriageway, typically by replacing a car parking space. A bicycle corral may be also accommodated by building out the footpath kerb into a car parking space.

FUNCTION

Bicycle corrals are typically used for short-term parking

LOCATION

Bicycle corrals are typically located in the carriageway of a town centre or other popular high-amenity area with heavy pedestrian volumes and narrow footpaths. If there is sufficient demand and depending on the street layout, consider locating the bicycle corral in the road corridor rather than taking up footpath space.

CRITERIA

A bicycle corral must:

- Be accessible from the road and the footpath.
- Be designed in a way that a bicycle does not obstruct the footpath or the carriageway when parked or when being manoeuvred.
- Not be at risk of motor vehicle collision from adjacent manoeuvring vehicles and overhang. A fence may be necessary if located on a high-volume road.
- Should typically be made up of 5-6 stands, allowing 10-12 cycles to be parked.
- Be well lit, both day and night.

The most suitable type of bicycle stands for bicycle corrals is the Sheffield stand. See Section A.5.1.

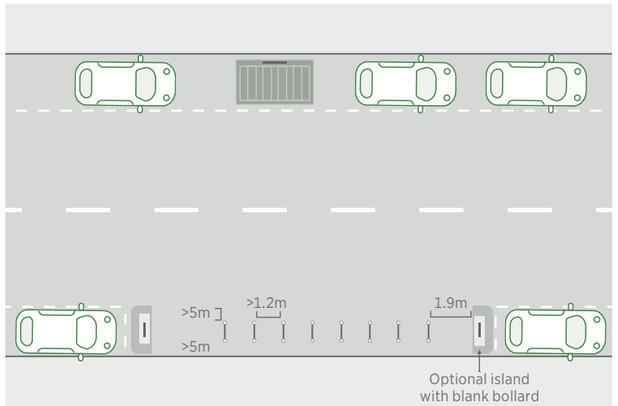


Figure A.6 Indicative bicycle corral

Bicycle corral on Ponsonby Road

A.3.3 Bicycle enclosures

Bicycle enclosures must all be sheltered and come in two types: unsecured and secured.

A.4.3.1 Unsecured parking shelters

DESCRIPTION

Unsecured bus shelters are similar to bus shelters and covers at least five bicycle stands.

FUNCTION

Unsecured bicycle enclosures are suitable for both short or long-term parking.

LOCATION

Unsecured bicycle enclosures are usually at destinations that attract many customers, e.g. public transport terminals, university campuses, hospitals, stadiums.

CRITERIA

A sheltered and unsecured enclosure must:

- Have at least three clear walls.
- Be located in areas of high natural passive surveillance.
- Have similar specs to a bus shelter, ensuring the whole bicycle is covered.
- Be covered by CCTV and/or security guards.
- Be well lit, both day and night.

The most suitable type of bicycle stands is the Sheffield stand. See Section A.5.1.

Examples of unsecured bicycle parking shelter

A.4.3.2 Secured parking shelters

DESCRIPTION

Sheltered and secure enclosures are a communal compound, generally at workplaces and residential buildings, where there may be many people on cycles. These are generally for long-term parking. It is preferable to have this type of enclosure inside a building rather than creating a separate structure.

FUNCTION

Secured sheltered bicycle parking is best for long-term parking

LOCATION

Secured sheltered bicycle parking is best at destinations where people live, commute or are regular visitors, e.g. workplaces, universities and residential buildings.

CRITERIA

A sheltered and secure enclosure:

- Is preferable within a building rather than creating a separate structure.
- Must be protected from the weather
- Must have a high degree of security and an appropriate, convenient and easy form of access control.
- Should ideally include charging points for e-cycles.
- Must be well lit, both day and night.

The most suitable type of bicycle stands is the Sheffield stand. See Section A.5.1.

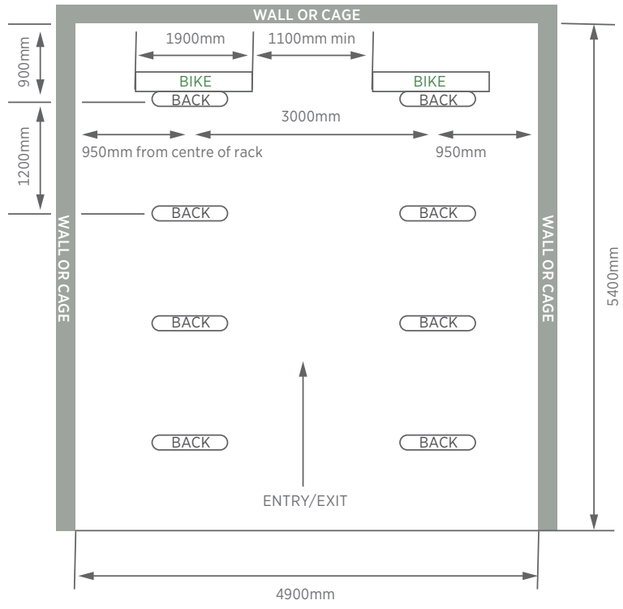


Figure A.7 Long-term bicycle parking (for double sided stands, Sheffield only) layout for 16 cycles

A.4.4 Bicycle lockers

DESCRIPTION

Bicycle lockers are standalone structures for individual cycles and are used where the highest security level is needed. Lockers can also be used to store cycling equipment such as helmets and other personal items. They require more room per bicycle space than enclosure facilities. They can be outside or integrated into buildings.

FUNCTION

Bicycle lockers are used for long-term parking.

LOCATION

Bicycle lockers are typically located where people live, work, commute, or are regular visitors, e.g. workplaces, universities and residential buildings.

CRITERIA

Bicycle lockers must:

- Not block pedestrian space.
- Provide at least sufficient space for a standard adult bicycle.
- Be well lit, both day and night
- Only use where specifically approved. There are serious security risks of misuse.

Examples of bicycle lockers

A.4.5 Bicycle parking hubs

DESCRIPTION

Bicycle parking hubs are centrally-based staffed buildings to accommodate bicycle parking and potentially e-bicycle charging facilities alongside other services such as bicycle workshop, bicycle hire, retail, storage, café and end-of-trip facilities such as showers. Bicycle parking hubs may require membership or casual fees to park.

FUNCTION

Bicycle parking hubs are typically for long-term parking, but some short-term parking may also be provided.

LOCATION

Bicycle parking hubs need to be somewhere central where many people may cycle, such as the CBD or public transport terminal with high patronage.

CRITERIA

Bicycle parking hubs need to be somewhere with sufficiently high demand

The most suitable type of bicycle stands is the Sheffield stand. Two-tiered stands might also be used in conjunction with Sheffield stands. See Section A.5.1.

A.5 Types of bicycle stands

Auckland Transport recommends a range of standard bicycle stands. Innovative designs can add to the urban form and encourage their use, but must be aligned with the general principles set in this policy and approved by Auckland Transport.

A.5.1 Sheffield stand

DESCRIPTION

Sheffield stands are among the most common bicycle stands, providing stability and cater to all types of cycles. These stands give good support, security and multiple locking points.

A Tapping rail should be provided at the base for the benefit of visually impaired pedestrians.

Sheffield bicycle stands

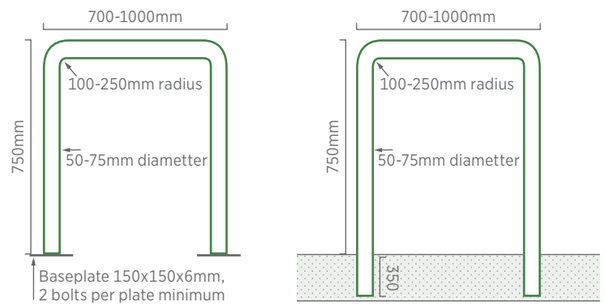


Figure A.8 Sheffield bicycle stand dimensions. Left: surface mounted. Right: in ground

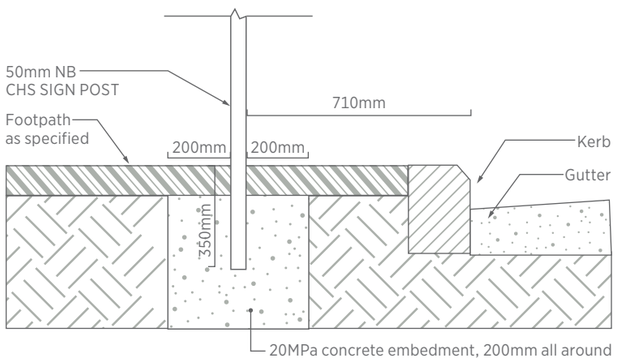


Figure A.9 Required direct concrete embedment for a bicycle stand

INSTALLATION

A concrete base (300x300x300mm) is required around the base of the Sheffield stand.

Nearby underground services and tree routes can affect the placement of bicycle parking and should be considered when implementing bicycle parking as part of a project or new development. When retroactively providing bicycle parking, underground services and tree roots may prevent best practice installation, and alternative solutions may have to be considered.

A.5.2 Harrogate stand

DESCRIPTION

Harrogate stands are narrower than Sheffield stands, which can make them more awkward to lock to for larger cycles. When unused, they take up less space, so are more suitable where available space is constrained and bicycle parking is not in continuous frequent use.

They should have tapping plates at the bottom. These plates help visually impaired people to identify that the pole is part of a hoop, rather than a single pole.

Harrogate bicycle stand in Ponsonby Rd

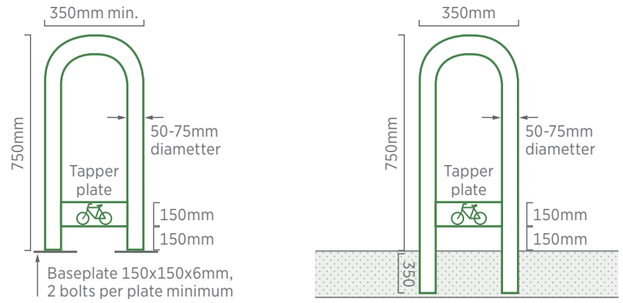


Figure A.10 Harrogate bicycle stand dimensions. Left: surface mounted. Right: in ground

Harrogate stands that are designed to be installed permanently should be installed as per the Sheffield stands, described above in Section A.5.1.

A.5.3 Miniature bicycle stand

DESCRIPTION

Miniature bicycle stand on Karangahape Rd

The miniature bicycle stand is attached to an existing piece of street furniture, such as a signpost. They are relatively quick and easy to install, and do not take up much space. They are recommended for locations where there is high demand, but insufficient space for other type of bicycle stands.

DIMENSIONS

At its lowest point, a miniature bicycle stand should be between 450mm and 550mm above the ground. At its highest point a miniature bicycle stand should be between 650mm and 850mm above the ground. They should be no wider than 700mm.

These stands can only be attached to non-regulatory signposts; and must be parallel to direction of pedestrian movement, and not where footpath width is reduced by other features. Proximity to on-street parking and car door zone must be considered. There can only be one stand per signpost. It must not be located close to mobility parking spaces.

A.5.4 Two-tiered bicycle stands

DESCRIPTION

Two-tiered bicycle stands for long-term parking are common in cities around the world where cycling is mainstream. They are very space efficient and suitable for long-term parking only. They allow stacking of bicycles providing a lift-assist pull-out tray. They are not accessible for all, so should not be used without also providing other types of accessible bicycle parking.

Where used, instructions must be provided on how to use the top tier.

Two-tiered bicycle parking

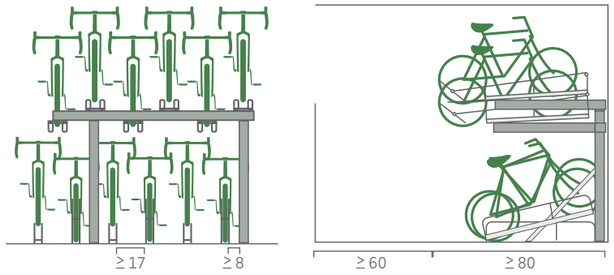
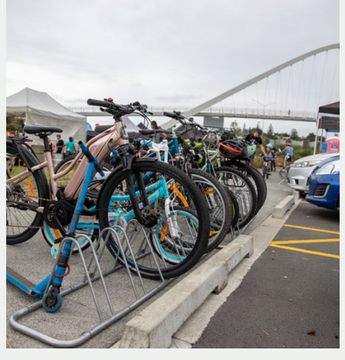


Figure A.11 Double decker lift-assist bicycle racks

A.5.5 Temporary bicycle stands

DESCRIPTION

Temporary bicycle stands are useful in areas that may be going through a re-development. It is preferable to have bicycle stands that can be moved easily and at low cost. These stands do not require the same level of depth as a permanent-style stand, so are suitable for almost all locations.



Example of Interim bicycle parking

A.6 Bicycle parking placement

Bicycle parking should be laid out in precisely the same way as a car park is laid out, with individual parking bays grouped in pairs either side of a shared stand. The bays are accessed from an aisle with parking bays on one or both sides.

TABLE A.1 BICYCLE PARKING BASIC DIMENSIONS

	Desirable	Minimum
Bay width per bicycle	0.6m	0.5m
Spacing between stands	1.2m	1m
Wider bay (e.g. for young children)	0.65 – 0.8m	
Bay length	2m	1.8m
Access aisle width	3 – 4m	1.8m
Total width – parking one side	5 – 6m	3.6m
Total width – parking on both sides	7 – 8m	5.4m

Bicycle parking stands are typically placed in the 'street furniture zone' of a footpath, near the kerbside. This is suitable on relatively quiet roads or on roads that have cycle facilities. On busy roads with or without car parking, kerbside bicycle parking is not recommended and it should be located close to the property boundaries.

When located near the kerbside, bicycle parking should not be placed next to mobility parking spaces, taxi ranks or loading spaces.

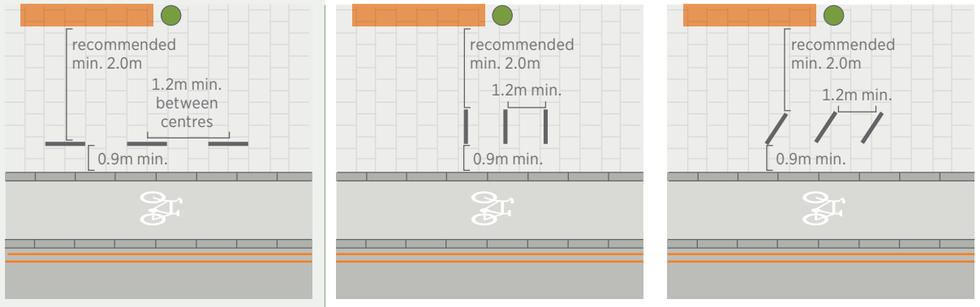
When providing bicycle parking stands, consider whether it is a:

- Busy road, with or without adjacent car parking, where there are no cycle facilities.
- Road with cycle facilities.
- Quiet road with adjacent car parking.
- Quiet road without adjacent car parking.

CLEARANCES

When installed on a footpath, bicycle parking must allow:

- At least 2m clearance from the stand to the property boundary (or other street furniture, or kerbside, depending on placement within footpath) to allow sufficient pedestrian space. Adequate distance from nearby doors and thoroughfares should also be provided.
- 1m clearance from the stand to the kerb or other boundary. It can be less than this, if it is accepted that only one side of the stand will be able to support a bicycle.
- 1.2m between each stand when parallel to each other. 1m between stands for high-density stands.
- 2.5m between stands centres when in a straight line behind each other.



Parallel cycle parking | Perpendicular cycle parking | Echelon cycle parking

Figure A.12 Indicative layout for bicycle parking.

A.7 Bicycle parking access

Getting from the cycling facility (or road) to the cycling parking area must be easy and straightforward and unhindered by traffic or physical obstacles.

Access to the cycling parking area must be as direct as possible from connecting cycling facilities (or road) and minimise the need to mix with pedestrians, especially in busy pedestrian areas.

Moreover, it can be difficult and potentially unsafe for people on bike to stop on the road and lift their bicycle up over the kerb to access on-street cycling parking facilities. Consider how people on bike can easily and safely connect between the adjacent cycling facilities (or road) and the cycling parking facilities. Provide dedicated pram ramps and clear areas between kerbside parking spaces.

A.8 Bicycle stand materials

Bicycle stands must be made of anti-corrosive material; be strong, durable, and not easy to saw through. Use sustainable materials where possible.

Consider rubber sided stands for both the Sheffield and Harrogate stands.

A.9 Signage and wayfinding for bicycle parking

Bicycle parking, particularly short-term bicycle parking, should always be in an obvious, prominent location, close to the entrance.

Where the bicycle parking is not immediately obvious, it should be clearly signed. Using contrasting materials or surfacing for the path to the bicycle parking also helps. This can be advertised by using a sticker or stencil of a bicycle.

For many long-term bicycle parking scenarios, signage will be necessary. Bicycle parking area should be directed to in any wayfinding signage. Where parking is being installed retroactively, the wayfinding signage must be updated.

Figure A.13 Directional and area defining bicycle parking signage.

A.10 Bicycle parking demand

BICYCLE PARKING DEMAND ASSESSMENT

Consider the dynamics of current and future cycle use in an area to provide the right amount and type of bicycle parking spaces. Besides existing demand, potential future demand should be considered.

Demand for cycling parking may be higher where:

- There is an existing network of safe, separated cycle facilities.
- There is a high density of mixed land uses.
- There is evidence of use i.e. informal bicycle parking.

Regular monitoring of cycle parking demand is required to ensure supply is adequate. A cycle parking facility has to satisfy peak demand levels.

Methods to assess bicycle parking demand (existing and future) include (but is not limited to):

- Bicycle parking survey. Count the bicycles formally and informally parked in the area. Do surveys at different times of the day, week and year; survey the number of existing spaces and stands; survey turnover.
- Analysis of trip generators and the relationship between likely origins and destinations; where and when people are likely to, or could, travel there by bicycle.
- Identification of where and when new developments are proposed locally.
- Trial of temporary stands, including stands for larger types of cycles.
- Consultations with people on bike, pedestrians, retailers and local residents, many of whom will be able to give a more rounded view about variation of bicycle parking demand through the day, week and year.

BICYCLE PARKING PROVISION RATES

Bicycle parking provision rates for new developments, businesses, etc., are set out in the Unitary Plan rules, where the minimum required for bicycle parking is specified. See Table E27.6.2.5 Required cycle parking rates in the Unitary Plan for more details.

Where possible, developers and planners should try to provide more than the minimum, particularly in locations where trips by bicycle could grow substantially. The quantity and quality of bicycle parking is likely to become an ever more important factor in attracting potential buyers, occupiers and customers. Between 20% and 50% extra spaces should therefore be allowed when estimating the amount of bicycle parking to be provided.

CONSTRAINTS

When determining if a location is suitable for bicycle parking, the following should be taken into consideration:

- Carriageway or footway space
- Underground utilities or structures
- Existing street furniture
- Placement and access requirements as detailed in Section A.6.

A.11 Bicycle parking at public transport terminals

Bicycle parking at public transport terminals is particularly important for promoting multi-modal transport options and for enabling a better integration between transport modes. Generous bicycle parking provision at public transport terminals, including secure, longer-stay parking, is essential to allow these to act as hubs for interchange and to cope with the projected increase in numbers of people on cycles resulting from investment in cycling infrastructure.

CRITERIA

Bicycle parking at public transport terminals should be:

- Located within the footprint of the station, with convenient access to all entrances and exits.
- Located as close as possible to the platform.
- Accessed via a step-free route, particularly for stands capable of accommodating larger bicycles.
- Served by lifts to platforms large enough to accommodate types of bicycle used by people with physical, sensory and cognitive impairments who need to take their bicycle onto the train/ferry.
- Provided through different types of stands.
- Well managed and maintained.
- Overlooked, with high levels of natural surveillance and CCTV coverage.
- Well integrated with pedestrian facilities, i.e. not an obstruction.
- Clearly signed, in and outside of the terminal, and shown on terminal maps and websites.
- Included in travel information provided to passengers.
- Sheltered, secure and well-lit (both day and night).
- Accessible from the roadway (including bike paths) without obstructions, e.g. doors, gates, barriers arms, kerbs, ticket gates.

Bicycle parking must be considered as an integral part of all new (or renewed) public transport terminals. The supply will be determined on a case-by-case basis. However, a minimum of 10 bicycle parking places should be provided and provision for expansion must be considered if the demand is higher than expected.

The following factors should be considered when establishing the number of bicycle parking places at public transport terminals:

- Near a cycling route.
- Gradient.
- Existing formal and informal demand.
- Propensity for cycling in the area.

A.12 Bicycle parking provisioning process

PARTIES

The parties involved in bicycle parking are Auckland Council, Auckland Transport, the developer and technical experts. For all new developments, bicycle parking must be provided as per the Unitary Plan and these guidelines. Auckland Transport can advise on best practice. Planning, design, installation and maintenance of bicycle parking is at the developer's expense.

PROCESS

To provision bicycle parking, follow these steps:

- Choose the right location in relation to the patterns of movement and destinations of people on bike. Consider where people are most likely to want to park their bicycles.
- Assess current and future demand
- Chose the right type of bicycle parking and bicycle stands in terms of space requirements, accessibility, the needs of specific users, etc.
- Design the bicycle parking facility
- Consider operation and maintenance (how to ensure that the bicycle parking stays looking good).
- Installation
- Post-installation assessment

The principles delineated in this document should be used throughout the process.

Any design departures from the guidelines must be reviewed and approved by Auckland Transport, where appropriate.

RETROACTIVE INSTALLATION

If you are an individual, a business or business association that has identified a public location that may be suitable for bicycle parking, please put in a request to Auckland Transport through our website. This will be directed to the Walking & Cycling team.

They will work with you to identify where best to install bicycle parking, and what type it needs to be.

AT has a small budget available to responding to these requests for installing bicycle parking. Requests will be reviewed in situ to identify potential sites on the public right of way that don't interfere with pedestrian travel and are clear of other street furniture. While we try to conduct in situ surveys as promptly as possible, the process can sometimes take several months. Many factors influence if and when a bicycle stand can be installed, so the date and time of installation cannot be guaranteed.

COSTS

The cost of providing bicycle parking varies enormously depending on the type of provision. Simple, open group of bicycle stands are cheaper than other types of bicycle parking. For example, the provision of a Sheffield bicycle stand is roughly about $1,000.

A.13 Building and installation

SURFACES

Bicycle stands should preferably be installed on:

Concrete. This is the best and least expensive surface material for a variety of stand types and installation methods. Both in-ground and surface mounts work well on concrete and are easy to install.

Asphalt, pavers and tile. The thickness of the surface material, makeup of the below-ground material and climate have to be considered.

MOUNTING

Below are the typical mounting options for bicycle stands:

Surface mount: Metal flange is anchored to the ground with appropriate hardware.

In-ground mount: Stand is embedded into concrete surface.

Rail mount: Stands are bolted to rails which may be anchored to surface or left free-standing.

A.14 Operation and maintenance

Consider the operation and maintenance of bicycle parking over the long term. To deliver best value for money, bicycle parking must be designed and implemented to minimise ongoing maintenance costs.

Bicycle parking must be maintained like other pieces of street furniture. It must function and look good throughout its useful life.

Bicycle parking areas should be clean and well maintained to deter anti-social behaviour, and to make users feel safe and welcome. Therefore, the design and layout of the bicycle parking facilities must facilitate cleaning. It must be fairly easy to sweep around the stands. Stands which are bolted into the ground at relatively few points are generally easy to clean, and installation is relatively straightforward. Regularly tidying of the area is important to prevent disorder.