



Auckland Transport Code of Practice

Chapter 13

Cycling Infrastructure Design

13 Cycling Infrastructure Design

13.1 Introduction

13.1.1 Cycling Facility Types

There are many different types of provisions which can assist cyclists directly or indirectly, as shown in Figure 38. These types of facilities are explained in more detail in this cycling section of the AT Code Of Practice (ATCOP).

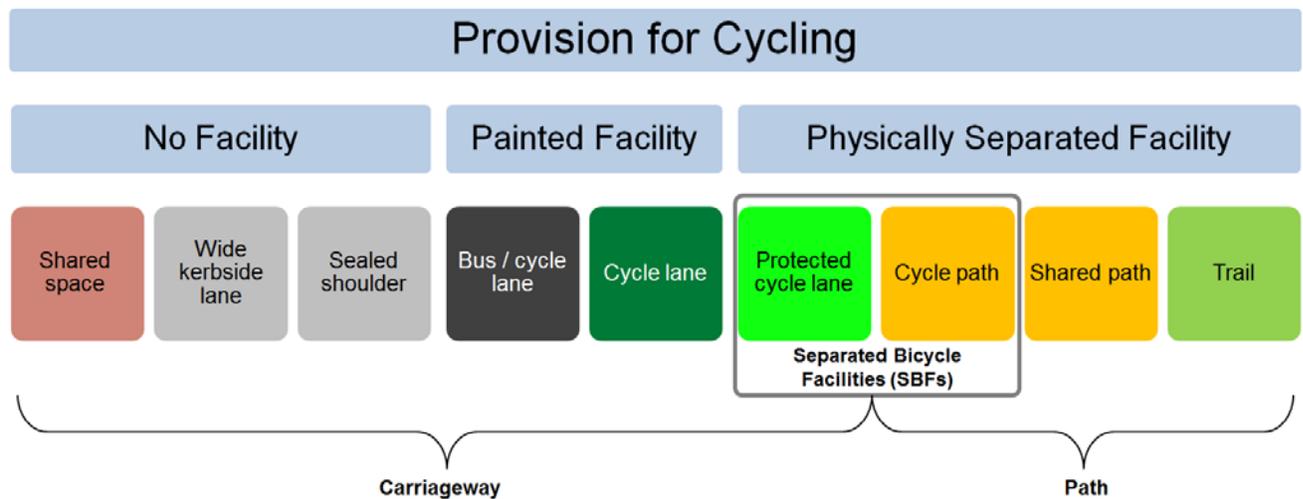


Figure 38: Summary of facility types by category

Treatments/Facilities not covered in this CoP are not necessarily discouraged. However, they should be discussed with an AT cycling and walking specialist.

An **ACN typologies and treatments** diagram, which shows where to use which type of cycling provisions is currently being developed by AT's Community Transport Dept. and will be added once finalised.

13.1.2 Framework for the Code of Practice for cycling

This section of the Code of Practice is based on the Auckland legacy council's local guides, NZTA's Manual of Traffic Signs and Markings (MOTSAM), Austroads' *Cycling Aspects of Austroads Guides (2011)* and NZTA's *NZ Supplement to Austroads Guide to Traffic Engineering Practice Part 14: Bicycles*.



In designing cycle routes, reference should also be made to the current NZ Official Road Code for Cyclists to ensure that the designs comply with advice and traffic rules by which cyclists are expected to use the network.

13.2 Cycle Facilities on Road (Mid-Block)

(See also Cycling Aspects of Austroads Guides Section 4)

See drawings CD002, CD003, CD005, CD006 for design details

13.2.1 Measurement of Cycle Facility Widths

The width of cycle lanes should generally be measured from the kerb face to the centre of the lane line. Refer to section 11.5.6 Maintenance about a flush surface between cycle lane and gutter.

If that cannot be achieved the measurement of the cycle lanes is from the edge of channel.

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

13.2.2 Cycle Lanes

Definition: A lane for the exclusive use of cyclists.

Cycle lane markings (mid-block) are covered in MOTSAM Section 2.10, pages 2 - 30 to 2 - 33 inclusive. As MOTSAM is steadily being replaced and superseded by the TCD Manual, designers are referred to the current version of MOTSAM from the NZTA website:

<http://www.nzta.govt.nz/resources/motsam/part-2/motsam-2.html>

Designers need to remain alert to the revision of this section of MOTSAM and its eventual replacement by new sections of the Traffic Control Devices (TCD) Manual.

13.2.2.1 Kerbside Cycle Lanes

(See also Cycling Aspects of Austroads Guides Section 4.2.2).

Kerbside cycle lane minimum widths are as shown in Table 34.

Table 34: Kerbside Cycle Lane Minimum Widths

Speed limit or 85 th percentile speed ¹	50 km/h	70 km/h	100 km/h
Minimum cycle lane width	1.5 m	1.9 m	o m

1. The speed limit or 85th percentile speed should be used, whichever is higher.

2. Interpolation for different speed limits or environments is recommended. If the speed limit or speed environment is below 50 km/h, the minimum width for 50 km/h applies.
3. The minimum cycle lane width may be reduced by 0.2 m over a short distance (e.g. 20 m) when it is not possible to achieve a wider cycling facility, but such pinch points are undesirable. It should be considered first whether it is instead feasible to narrow the general traffic lanes instead.
4. In Speed environment above 50km/h physically separated facilities should be considered where feasible, as the perceived safety can still be an issue, even with compliant widths.

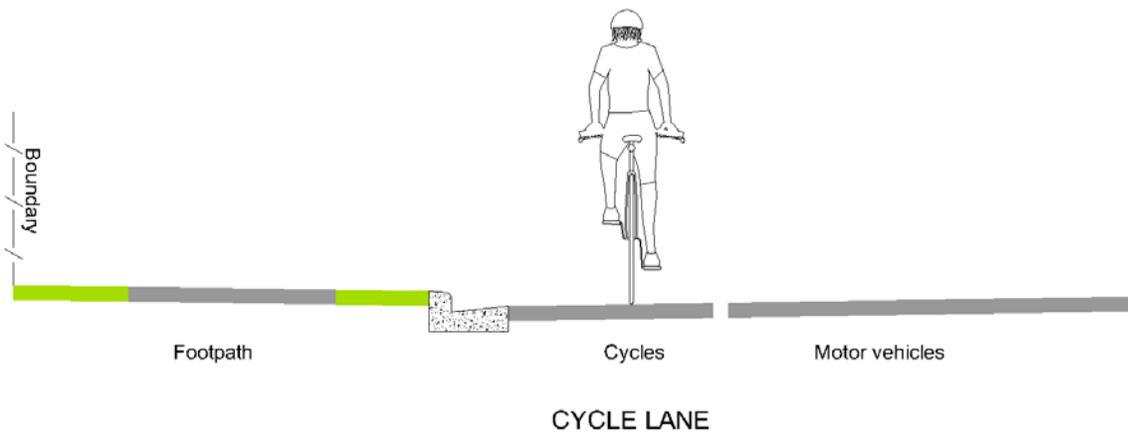


Figure 39: Cycle Lane



Figure 40: Cycle lane with colour at bus stop layby, North Shore



Figure 41: Cycle lane with colour highlight, white cycle logo and "no stopping" lines, Auckland

Part-time cycle lanes (allowing parking during part of the day, as described in Cycling Aspects of Austroads Guides Section 4.2.2) are not authorised in New Zealand.

Parking in cycle lanes is illegal at all times.

On bus routes where a cycle lane exists or is planned, it is generally preferable to interrupt a cycle lane by a bus stop than not provide a cycle lane at all, except if the bus stop is a lay-over point (in which case, the layover should be built as a bus bay if practicable and clear of the cycle lane, or a cycle path should lead around the bus stop).

To enhance the visibility of the cycle lane (especially at night and in the dark and especially in wet weather, day or night) or where encroachment by motorists is otherwise likely (such as in advance of busy left turns) a thermoplastic rumble strip line marking or rubber kerb (see Figure 42 below) may be used. This treatment may increase the perceived safety of cyclists and reduces encroachment. The usage of this treatment, particularly the usage of rumble strip line marking in or near residential areas, needs to be to the discretion of AT approval.



Figure 42: Rubber kerb example (Sources: Riley left, Vic Roads right)



Figure 43: Rubber kerb used in combination with bendable bollards (Auckland, Clark Street, New Lynn)

13.2.2.2 Cycle lanes next to parallel parking

(See also Cycling Aspects of Austroads Guides Section 4.3.1)

Cycle lanes next to parking need to be wider to allow for avoidance of opening car doors and for “shy space” cycling next to a vertical element. The minimum widths of cycle lanes next to parallel parking are as shown in Table 35.

Table 35: Cycle Lanes Next to Parallel Parking Minimum Widths

Speed limit or 85 th percentile speed	50 km/h	70 km/h
Minimum cycle lane width	1.8 m	2.2 m

1. The speed limit or 85th percentile speed should be used, whichever is higher.
2. Interpolation for different speed limits or environments is recommended. If the speed limit or speed environment is below 50 km/h, the minimum width for 50 km/h applies.
3. The minimum width of kerbside parking is 2.1 m. Recessed parking bays may be wider e.g. 2.5m.
4. Cycle lanes next to parking should not use a “safety strip”, as suggested in *Cycling Aspects of Cycling Aspects of Austroads Guides* Figure 4.3, to separate cyclists from parked cars. Any extra width should be provided in the cycle lane.



Figure 44: Cycle lane next to parallel parking

13.2.2.3 Cycle lanes next to angle parking

(See also Cycling Aspects of Austroads Guides Section 4.3.1)

Cycle lanes next to angle parking are not desirable. If possible angle parking should be changed to parallel parking.

Cycle lanes next to angle parking need to be well clear of the parking to allow drivers to reverse far enough out of the parking space to gain visibility of the cycle lane, before the rear of their vehicle blocks the cycle lane (or they could hit a cyclist). The minimum clearance of cycle lanes from angle parking is as shown in Table 36. For further details refer to drawing CD006.

Table 36: Minimum Clearance Required Between Cycle Lanes and Angle Parking

Parking angle (degrees)	45°	60°	90°
Minimum clearance	2.0 m	2.5 m	3.0 m

1. Cycle lanes should be coloured green alongside angle parking.
2. Angle parking is permissible only at a 50 km/h speed limit (or less).
3. Cycle lane widths should be between 1.5 m and 2.0 m.
4. Minimum clearances and widths should be avoided and should only be used in low speed environments (85th percentile speed of 40 km/h and below) and when it is not possible to achieve greater widths.
5. The provision of kerbed projections (or other treatments including channelisation) is important next to angle parking to prevent motor vehicle drivers driving in a parking area when parking demand is light. Kerb projections should be installed immediately to the left of the cycle lane at the start of the facility and at frequent intervals to discourage people from driving in, or to the left of, the cycle lane.
6. Where “reverse-in” angle parking is used, the minimum clear space should be 1.0 m.



Figure 45: Cycle lane next to angle parking (Christchurch left, Railside Ave, Akl right)

13.2.2.4 *Cycle lanes between other lanes*

Cycle lanes are sometimes positioned between traffic lanes, especially at intersection approaches. They should be dimensioned according to Table 37.

They should be coloured green along their whole length to alert drivers to their existence and should not be used on roads with speed limits or 85th percentile speeds greater than 70 km/h.

Table 37: Cycle Lanes Between Other Lanes – Minimum Widths

Speed limit or 85 th percentile speed	50 km/h	70 km/h
Minimum cycle lane width	1.5 m	1.9 m



Figure 46: Cycle lane between traffic lanes (St Lukes, Akl)

Designers should be aware that while highly useful to confident cyclists, cycle lanes between traffic lanes are often unattractive for less confident cyclists or in areas with reputations for poor driving behaviour. Depending on route type and feasibility, alternatives should be considered, especially in speed environments above 50km/h, at very busy intersections or motorway interchanges or on recreational or school routes. Alternatives may include kerbside cycle lanes or physically separated facilities (combined with crossing facilities over the turn flows closer to the intersection such as a pedestrian crossing or “jug handle” cycle lane crossing (see figure 5.29 of Cycling Aspects of Austroad guides). Ideally, the alternative options are provided in addition, not instead of the cycle lane between other lanes.

13.2.2.5 Buffered cycle lanes

Definition: A cycle lane with a painted buffer space (with no vertical elements) separating the lane from the adjacent motor vehicle travel lane.

The cycle lane can be next to either the kerb or parking. If sufficient space exists to provide a painted buffer, consideration could be given to providing a protected cycle lane.

Painted buffers should be at least 0.5 m wide (or wider) and should be proportionate to vehicle speed or risk to cyclists, while the cycle lanes they accompany should have at least the minimum widths as specified for the appropriate type of cycle lane. To ensure adequate performance of the buffers, they should be marked in non-slip thermoplastic.

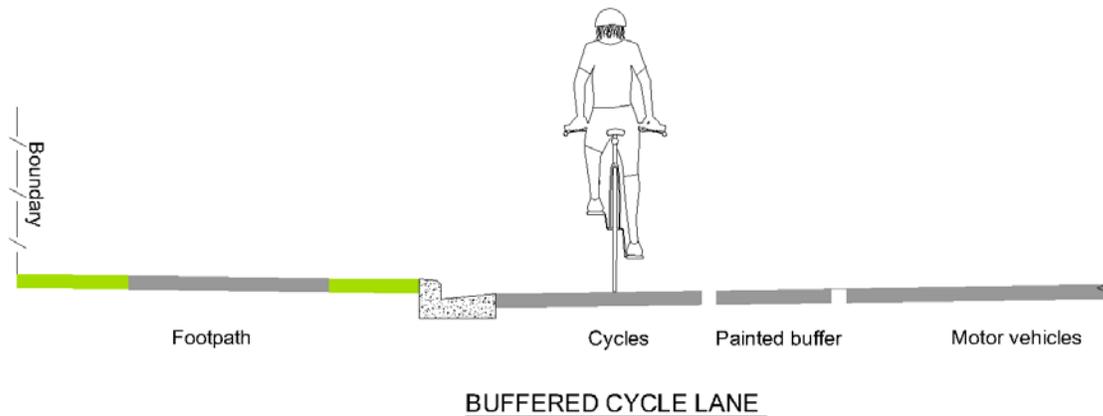


Figure 47: Buffered Cycle Lane



Figure 48: Buffered cycle lane (Melbourne left, Ian McKinnon Drive, AKL right)

13.2.2.6 Protected cycle lanes

(See also Cycling Aspects of Austroads Guides Section 4.3.3)

Definition: A typically one-way cycle lane at carriageway level physically separated from parking or other traffic lanes by an island with raised kerbs, bollards or other vertical features.

Except for perpendicular driveway access, they are not accessible to cars. They are preferably uni-directional and should be wider than conventional cycle lanes to accommodate overtaking and avoidance of kerbs, potholes, debris, gravel or glass.

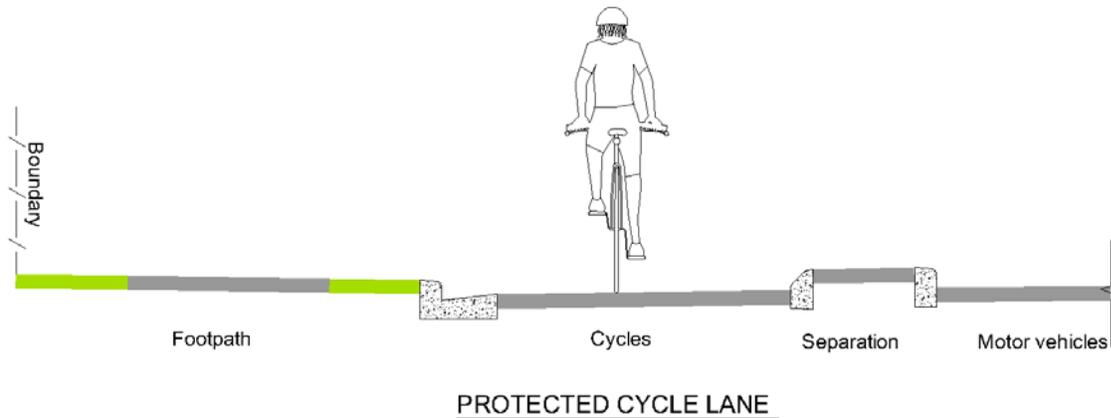


Figure 49: Protected cycle lane

Where driveways cross protected cycle lanes with parking, enough sight distance past parked cars must be provided (appropriate to the speed environment and road character) to ensure entering or exiting motorists do not hit cyclists on the protected cycle lane.



Figure 50: Protected cycle lane (buffer, rumble strip and bollards) with parking between footpath and clearway, Melbourne

Note: cycle lane in this picture is narrower than the AT CoP requirement



Figure 51: Protected (island) cycle lane, Melbourne

Protected cycle lanes should have minimum widths as shown in Table 38.

Table 38: Width of Protected Cycle Lanes

Facility / Type of Separator	Island	Bollards and pavement marking
Minimum cycle lane width	1.8 m	1.5 m
Minimum separator width (without parking)	0.6 m *	0.6 m
Minimum separator width (next to parking)	1.0 m	1.0 m



* width of separator dependant on requirements for features (e.g. poles and clearance)

If the separator is a painted median with flexible bollards, the minimum buffer width is 0.6 m as shown in Table 38. Bollards should be reflectorised red and white.

Landscaped separators should be wider than the minima shown in Table 38 to ensure that the planting is viable. The required width will depend on whether the island is sitting on the carriageway surface or not, whether there is irrigation in the separator, gradients and the types of soil and vegetation proposed. Detailed advice from a landscape architect should be sought on a case by case basis.

Raised separators should have standard kerb heights. Kerb design should be standard semi-mountable kerbs on the cycling side or conventional vertical kerbs with an additional 300 mm of width in the protected cycle lane (above that specified in Table 38) to allow for shy space. The raised separator or islands need to be sufficiently lit so they are well visible in the dark for all road users.

Thermoplastic markings may be used to define protected cycle lanes but only in conjunction with flexible bollards. Rubber based kerbs may be used as a separator too.

The usage of separators needs to be to the discretion of AT approval.

13.2.2.7 *Two-way protected cycle lanes*

Two-way protected cycle lanes should only be installed in specific circumstances and require the approval from AT. If they are provided, the lane width should be proportionate to the volumes and speed differentials of cyclist traffic and road traffic or should be at least 0.5 m wider than the widths for protected cycle lanes as shown in Table 49. A facility of this type may be appropriate in the following circumstances:

1. If most origins and destinations are on the same side of the road and road crossings by most cyclists can thus be avoided;
2. If relatively few driveway crossings exist; and
3. If parking can be removed in the vicinity of side streets, so that visibility of cyclists by turning motorists is maximised.



Figure 52: Two-way protected cycle facility with parallel parking (Sydney)

Where driveways cross protected cycle lanes with parking, enough sight distance past parked cars must be provided (appropriate to the speed environment and road character) to ensure entering or exiting motorists do not hit cyclists on the protected cycle lane.

13.2.2.8 *Contra-flow cycle lanes and contra-flow cycling*

Definition: A contra-flow cycle lane is a cycle lane on a one-way street allowing cyclists to travel against the flow of other traffic.

A contraflow cycle lane or contraflow cycling is particularly useful where this provides an attractive route or shortcut for cyclists to reach a destination.

Contra-flow lanes should only be applied after careful consideration of the risk posed to cyclists and other road users. They should be carefully marked, preferably with buffered road markings. This will avoid encouraging illegal, informal contraflow activity elsewhere.

These facilities must be on the correct side of the street, as perceived by motor vehicle drivers driving on the street. That is on the right side, where drivers would expect to see opposing traffic on a two-way street. At the beginning and end of a contra-flow lane on each block of a one-way street, physical separation is strongly recommended.

Where No Entry signs are used to define one end of a one-way street, an R3-5.2 Except Cycles sign (as per Schedule 1 of the TCD Rule) should be used.



Figure 53: Signs to be used to Contra flow cycle lane entrance

Contra-flow cycle lanes are often provided by removing parking. Kerb separation should be considered; where provided, this would create a contra-flow protected cycle lane. Parking should generally be prohibited adjacent to contra-flow cycle lanes unless the one-way street has very low traffic volumes and operating speeds and low parking turnover.

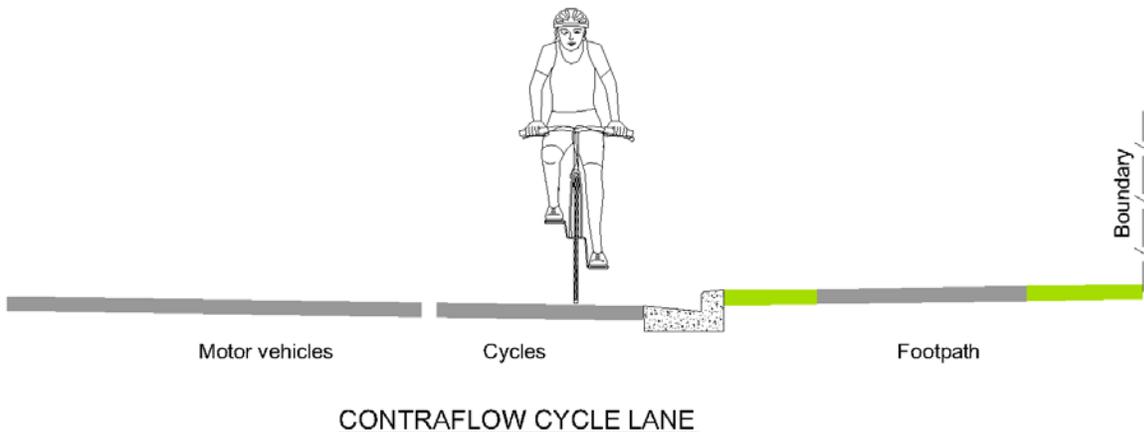


Figure 54: Contra-flow cycle lane minimum widths

Table 39: Contra-flow Cycle Lane Minimum Widths

Speed limit or 85 th percentile speed	30 km/h	50 km/h
Minimum contra-flow cycle lane width	1.5 m	1.8 m



Figure 55: Contra-flow lane on left kerb (one way general traffic approaching viewpoint)



Figure 56: Contra-flow lane on right kerb with standard cycle lane on left of one-way general traffic lane, UK

Contra-flow cycling can be permitted on slow speed (typically narrow) streets or faster but low-volume streets without a painted facility – a sign authorising contra-flow cycling is all that is needed. Where lanes are provided, their widths should be as shown in Table 39

13.2.2.9 Signs and Pavement Markings

(See also MOTSAM Part 2 Section 2.10 and Cycling Aspects of Austroads Guides Section 9.3.) As MOTSAM is steadily being replaced and superseded by the TCD Manual, designers are referred to the current version of MOTSAM from the NZTA website:

<http://www.nzta.govt.nz/resources/motsam/part-2/motsam-2.html>

Designers need to remain alert to the revision of this section of MOTSAM and its eventual replacement by new sections of the Traffic Control Devices (TCD) Manual.

Where differences occur, the ATCOP prevails.

For further details see drawings CD001 and CD004.

The use of signs should be minimised; those 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 in a particular location.

Cycle lanes are legally authorised in New Zealand by the presence of M2-3 white cycle symbols (as per Schedule 2 of the TCD Rule) marked in the lane. 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 care should be taken to avoid visual clutter.

The M2-3 cycle lane symbol to be used is as shown in Figure 57, with a symbol at the start of each block, a maximum spacing of 100 m between symbols and with symbols used more frequently in more complex traffic situations such as intersections or around parking.

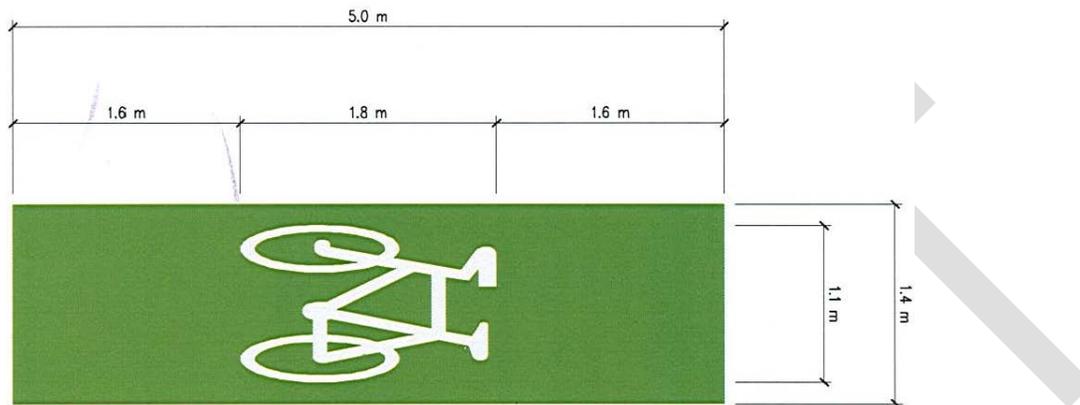


Figure 57: Cycle lane symbol

A green surface should be applied to cycle lanes in locations where drivers may be unaware of or need to be reminded of the presence of cyclists, at conflict points or at other locations where cyclists may feel vulnerable. It is commonly used at intersections, side roads, busy commercial driveways, pinch points, sharp bends and shared bus/cycle lanes. The colour guides cyclists through the intersection, makes cyclists' behaviour more predictable to motorists and reinforces the potential presence of cyclists to motorists. Coloured surfacing is described more fully in MOTSAM Part 2 Section 2.

Note: 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.

13.2.3 Wide Kerbside Lanes

(See also Cycling Aspects of Austroads Guides Section 4.2.3)

Definition: A general traffic lane on the left side of a carriageway of sufficient width to allow cyclists to travel beside the main traffic stream and to permit motorists to overtake cyclists without having to change lanes.

Wide kerbside lanes do not provide as good a level of service as cycle lanes or other cycle facilities as some people may feel uncomfortable cycling in the same lane as motor vehicles.

There are two ways of operating wide kerbside lanes as a measure to support cycling. The more usual is to prohibit parking at all times, in which case the lane needs to be wide enough for motor vehicles to pass cyclists with safety and without intimidating people cycling. If enough



width exists, a separate cycle lane (or protected cycle lane) should be created instead of a wide kerb lane.

The second type of wide kerbside lane is one in which parking is authorised for some portions of the day or week (but not at all times). If this is to be of use to cyclists, then it needs to be wide enough for them to pass parked cars and to avoid potential opening doors.

The minimum width for wide kerbside lanes is as shown in Table 40

Table 40: Wide kerbside lane minimum widths

Without parking		
Speed limit or 85 th percentile speed	50 km/h	70 km/h
Minimum width	4.2 m	4.5 m
With parking allowed at some (not all) times		
Speed or 85 th percentile speed	50 km/h	70 km/h
Minimum width	4.2 m	4.8 m

1. The speed limit is used unless 85th percentile speeds are significantly higher.
2. Interpolation for different speed limits or environments is recommended. If the speed limit or speed environment is below 50 km/h, the minimum width for 50 km/h applies.
3. The minimum lane width may be reduced by 0.2 m at “pinch points” over a short distance when it is not possible to achieve a wider lane, but such pinch points are undesirable.
4. Where greater width is available than identified here, consideration should be given to providing a cycle lane. If traffic lanes are too wide, car drivers may attempt to travel faster and may travel two abreast.

Wide kerbside lanes should not have kerb extensions that leave inadequate room for cycling. The *Pedestrian Planning and Design Guide* (Section 15.81) should be used for designing pedestrian refuges or kerb build-outs in terms of width. This may result in kerb extensions or refuge crossings being identified as inappropriate for the location (unsafe for cyclists due to the creation of pinch points) and to be reduced in width or replaced in the design by other features.

13.2.4 Sealed Shoulders

(See also Cycling Aspects of Austroads Guides Section 4.2.4)

Definition: Part of a sealed carriageway to the left of an edge line (typically on a rural road) which is of sufficient width to provide adequate space for cycling.

¹ <http://www.nzta.govt.nz/resources/pedestrian-planning-guide/>

Adequate width shoulders should be provided to provide adequate protection against high speeds and high proportions of trucks and buses.

Sealed shoulders might be used for emergency stops and may serve as space for cyclists if sufficiently wide. If feasible the widths should be similar to the widths as shown in Table 41 for cycle lanes at the appropriate speeds. If these widths cannot be achieved the minimum widths should not go below 1m.

This is typically a rural treatment where the expense and formality of creating a cycle lane may not be considered appropriate. If the sealed shoulder is to be available for cycling, then parking in areas with ad-hoc parking and around sharp bends should be prohibited through broken yellow lines or no stopping at any time signs.



Figure 58: Sealed shoulder, SH16, Akl

Where sealed shoulders form part of a cycle route particular attention needs to be paid to the quality and maintenance of the shoulders.

13.2.5 Bus, Transit / Cycle Lanes

(See also Cycling Aspects of Austroads Guides Section 4.2.5)

Definition: A special vehicle lane identified by markings and signs for cycles and buses (and / or motorcycles) but not general traffic.



Figure 59: Part time wide shared bus / cycle lane, Auckland

Bus/cycle lanes may form critical links on the cycle network. In addition, if cyclists are prohibited from using bus/cycle lanes they would need to cycle in the adjacent general traffic lane which would not be desirable for safety reasons. Therefore, the design of bus lanes must incorporate the needs of cyclists. Designers should acknowledge that they are not perceived as quality cycling infrastructure by many cyclists (particularly by novice and non-confident cyclists)

Kerbside bus/cycle lanes must be a minimum 4.2m wide so that buses and cycles can overtake one another without conflict.

If adequate width cannot be provided, then the bus lane needs to be sufficiently narrow (3.2 m) so that it is unambiguous that it is not possible for cyclists to overtake buses within such lanes.

Most importantly, the intermediate dimensions (3.3m to 4.1m) must be avoided. These intermediate widths lead to confusion of both cyclists and drivers. Where intermediate dimensions cannot be avoided, cycle facilities that are separate from the bus lane should be provided along the same road corridor.

Wide bus lanes (4.2m or wider) can operate part time and at other times they may be used for parking. The width allows safe operating space for cyclists in both operating modes.

Table 41: Width of Kerbside Bus/Cycle Lanes

Wide bus/cycle lane	
Speed limit (km/h)	50 km/h
Minimum width	4.2 m
Narrow bus lane (not preferred)	
Speed limit (km/h)	50 km/h

Maximum width (m)	3.2 m
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Bus/cycle lanes are appropriate for a 50 km/h speed environment. For higher speed limits, a cycle facility separate from a bus lane is required along the same road corridor, e.g. a protected cycle lane or a cycle path. For marking and signage see drawing CD007.

13.2.6 Clearways Catering for Cyclists

(See also Cycling Aspects of Austroads Guides Section 4.3.4)

Clearways can be provided in a way which is reasonably cycle friendly in the mid-block, but they introduce problems at intersections with side streets, as cycle facilities crossing the side streets cannot be marked (cyclists travel in a kerbside position during clearway operating times, but outside of parked vehicles at other times). A more desirable solution is to combine a protected cycle lane with a clearway.

If the additional width required for a protected cycle lane is not available, the following concept of a clearway including provision for cycling (Figure 60) should be implemented:

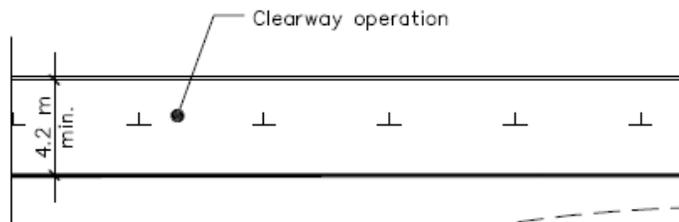


Figure 60: Clearway catering for cyclists with parking during off-peak hour

Minimum width for lane of clearway is 4.2 m; parking ticks are 2.0 m. See also drawing CD007.

13.2.7 Shared Zones

Definition: A street or place accessible to most road users but designed to operate at very low speeds to enable pedestrians to move freely and to have right of way over vehicles (including cycles). See also *ATCOP Chapter 5 Section 5.5*.

Shared zones or shared spaces provide a means for reinforcing pedestrian priority in intensely-developed shopping streets or town centres. Use by cyclists and motorists at speeds appropriate for pedestrian comfort is tolerated and therefore can provide a comfortable environment for cyclists.

Cycle racks should be provided and form part of the street furniture in shared zones.



13.3 Road Intersections

13.3.1 Cycle Lanes at Intersections

MOTSAM has comprehensive and definitive advice on pavement marking for cycle lanes at intersections (MOTSAM Part 2 Section 3.18) under the heading Cycle Lanes at Intersections (pages 3 - 59 to 3 - 70 inclusive). This includes discussion, commentary and drawings on intersection layouts. As MOTSAM is steadily being replaced and superseded by the TCD Manual, designers are referred to the current version of MOTSAM from the NZTA website: <http://www.nzta.govt.nz/resources/motsam/part-2/motsam-2.html>

Designers need to remain alert to the revision of this section of MOTSAM and its eventual replacement by new sections of the Traffic Control Devices (TCD) Manual.

Specific advice is provided in MOTSAM, the various Austroads guides and under the Cycling Aspects of Austroads Guides for (amongst other things):

- Roundabouts (note that cycle lanes should not be provided on the approaches to or within roundabouts)
- Traffic Signals
- Advanced Stop Boxes (ASBs)
- Hook Turns

The following sub-sections provide additional guidance.

For marking and signage see drawing CD011.

13.3.2 Advanced Stop Boxes

Advanced Stop Boxes (ASBs) are a priority measure aimed at increasing the safety and visibility of cyclists by providing them with a designated area at the limit line of signalised intersections. Cycle lead-in lanes should be provided on the approach to the intersection wherever possible to support ASBs. The implementation of cycle lead-in lanes maximises the benefits of ASBs.



Figure 61: Advanced stop box

The length of the ASB should be 3m, the width should be the same as the traffic lane. Detector devices for cyclists should be installed in the ASBs (particularly in front of right turning lanes).

ASBs should be considered on all legs of intersections in the following cases:

- On roads forming part of the Auckland Cycle Network, and
- When intersections are proposed to be upgraded.

ASBs should be implemented when:

- Maintenance programmes involve resealing, road reconstructions, and intersection upgrades,
- Corridor upgrades, major projects, road safety improvements and other capital improvement works are carried out, or
- New collector or arterial roads are constructed.

There will be some circumstances or locations where a cycle lane cannot be accommodated to support an ASB, which should not influence the decision to implement the ASB. The (relatively small) cost for implementing these facilities should be included in the overall project budget.

Care should be exercised in implementing ASBs, to ensure that cyclists are not compromised by combining through and turning traffic where dedicated turning phases are signalled.

Designs for ASBs must be reviewed by the AT Traffic Systems Team.



13.3.3 Hook Turn Boxes

At busy multi-lane signalised intersections, it may be difficult for less confident cyclists to move to the right turn lane and a hook turn facility (see Figure 62) can be provided to assist with the manoeuvre. This allows cyclists to make a right turn in two stages:

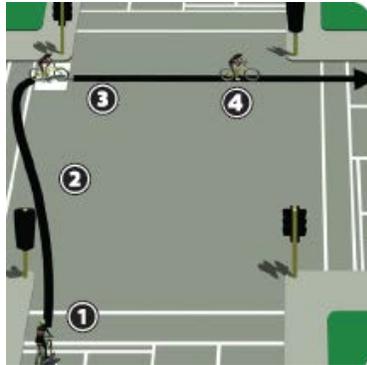
- ◆ The first stage involves moving to the far side of the intersection, keeping as far left as possible.
- ◆ The cyclist then waits there (in the hook turn box) until the side street gets a green light and then moves with side street traffic across the intersection.

Hook turns can be provided in addition to providing ASBs in front of right turn lanes. Where the traffic environment (during traffic peaks) is such that it is difficult to reach the right turn lane on the approach, then hook turns should be provided by default. Where the main cycle moves are turning right, hook turn boxes should also be implemented. Hook turns are, after some public education, easier and safer to use for young or inexperienced cyclists than turning right from a right turn lane.

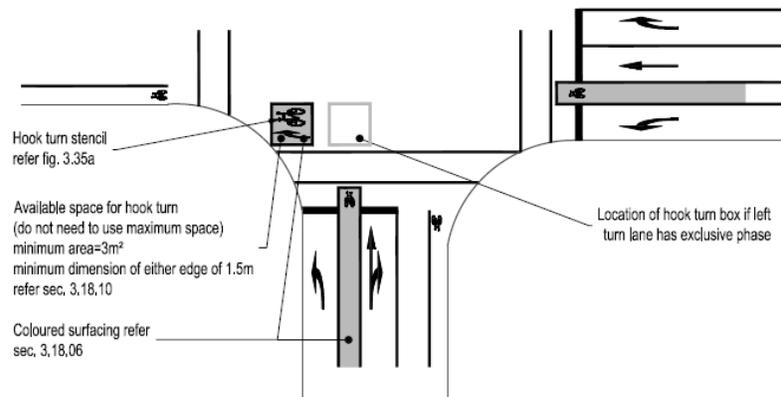
Hook turn boxes should be placed clear of the trajectory of through cyclists. The location of a hook turn box must consider the phasing of the side street phase, e.g. it needs to be clear of left turning vehicles if these have an exclusive left turning phase.

The size of the hook turn box will depend on the space available and the number of cyclists that should be accommodated at any one time. It should provide an area of at least 3m², with each of the edges being at least 1.5m long.

A cycle symbol and directional arrow should be marked within the hook turn box as shown in MOTSAM. The cycle symbol and the arrow should be aligned with the direction of travel from which cyclists access the box, to avoid cyclists travelling straight through from the adjacent approach confusing the box with an advanced stop box.



Hook turn manoeuvre



A typical hook turn layout in NZ (from MOTSAM), Note that ASB's should normally be provided as well

Figure 62: Hook turns

13.3.4 Protected Cycle Lanes at Signalised Intersections

When protected cycle lanes cross signal-controlled side streets, the separating island, if any, should terminate about 5 - 15m before the near kerb line of the side street and be replaced by a painted buffer if feasible. The exact design would require a check of the tracking path using the appropriate design vehicle.

13.3.5 Cycle Paths and Shared Paths at Intersections

Where cyclists cross a side street from a facility on the carriageway (i.e. a cycle lane or a protected cycle lane), the normal traffic priority rules apply so that cyclists proceeding straight ahead have priority over traffic turning into or out of side streets. Thus it may be desirable to convert cycle paths or shared paths alongside carriageways to cycle lanes (protected or not) prior to intersections, so that cyclists have priority through the intersection. Such a solution is illustrated in the illustrations below.



Figure 63: Examples of cycle path converting to cycle lane to give cyclists priority through intersection (from left to right; Christchurch, Melbourne, Auckland Ian McKinnon Drive)

Where cyclists cross a side street from a facility that is not on the carriageway (i.e. a cycle path or a shared path), cyclists proceeding across the side street and motorists turning across this movement are potentially in conflict (with priority in favour of motorists).

Where the crossing is laid out so that cyclists are required to give way, the facility provides a lower level of service to path users. This is generally not desirable.

Where turning traffic volumes are significant, the crossing can be signalised and movements are then separated in time. While cyclists have a green light, turning motorists must face a red turning arrow. While motorists turn (either on a green arrow, or “filter” turning on a full green light) cyclists must have a red signal.

At fully signalised intersections consideration should be given to accommodating the needs of both commuter and novice cyclists. Provision should be made to allow novice cyclists to cross at the pedestrian crossing by providing separate detectors and lanterns for cyclists and pedestrians.

13.3.6 Roundabouts

Designers should strive to design roundabouts to provide an acceptable level of safety and convenience for cyclists. Multi-lane roundabouts or high-speed/ large diameter single lane roundabouts increase the risk of crashes for cyclists and this needs to be taken into account when considering the adoption of a roundabout treatment at an intersection. Statistics show that cyclists are involved as circulating vehicles in a high percentage of entering or circulating vehicle crashes and this is likely to relate to entry speeds and motor vehicle drivers scanning behaviour on the approaches.

To support safe cycling, roundabouts should be designed to cater for the lowest practicable approach speed.

Reducing the relative speed between entering and circulating vehicles, minimising the number of circulating lanes, and maximising the distance between approaches reduces the entering or circulating vehicle accident rates at roundabouts and should also minimise entering or circulating vehicle crashes involving cyclists.

At small single-lane roundabouts on local streets where the geometry encourages low approach speeds (e.g. 30 km/h or lower) cyclists should be able to safely share the road with general traffic, as shown in Figure 64 (i.e. there are no special treatments for cyclists).

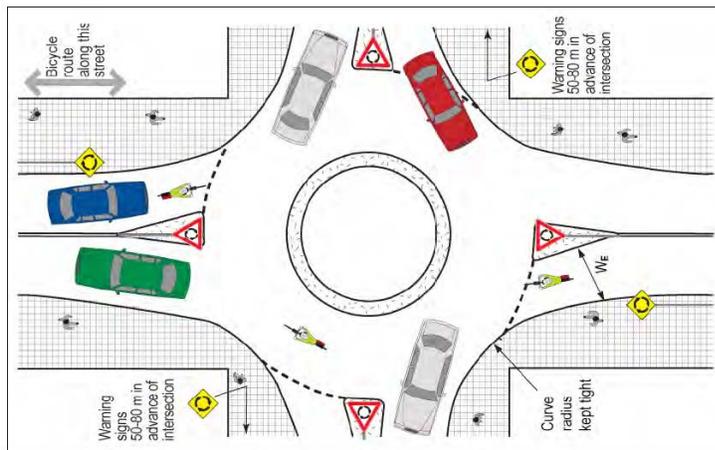


Figure 64: Roundabout treatment for slow speeds and low traffic flows (from Austroads)

A cycle path or shared path, located outside the circulating carriageway, is the safest design at roundabouts where there are high vehicle flows, but this is likely to compromise directness and convenience for cyclists and pedestrians (Figure 65). On designated cycle routes consideration should be given to the provision of signalised intersections instead of multi-lane roundabouts. Grade separation for the main cyclists movement may also be appropriate at some high-volume locations.

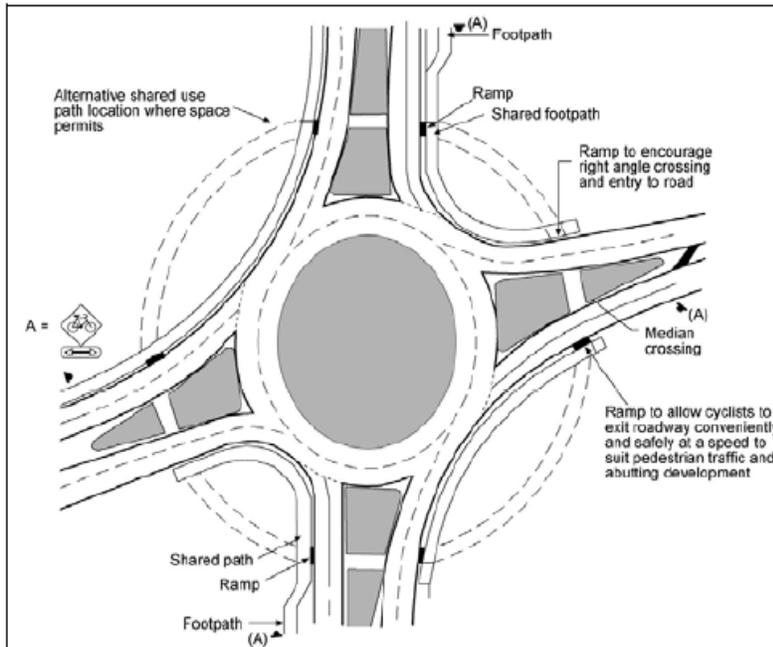


Figure 65: Roundabout Treatment for High Traffic Flows and Low Cycle Traffic Flows (from Austroads)

Where a bicycle path or shared path is provided around a roundabout, the intersection between the path and road should be designed to ensure that pedestrians and cyclists are able to safely cross the road and that cyclists are able to enter any cycle lanes that may exist beyond the roundabout.

The provision of bicycle lanes (as shown in *Cycling Aspects of Austroads Guides* Austroads Figures 5.22, 5.23, 5.24, 5.25) on the approach to and around the periphery of roundabouts are not usually used in NZ.

13.3.7 Signalised Mid-block Crossings

Where a signalised mid-block crossing provides both for cyclists 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). 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. Consideration should be given to segregating cyclists and pedestrians on the crossing. See also *Cycling Aspects of Austroads Guides* section 5.3.10.)

13.3.8 Signalised intersection detection

At signalised intersections, with or without advanced stop boxes or lines, detector devices that are located and calibrated to detect cycles must be provided.

Where path intersections are signalised, pedestrian-style call boxes should be installed as illustrated below, however, they should be modified to illuminate when a cyclist has been detected, thus advising them of their detection. Another method is to provide the loops on the path, identified through diamonds (see white diamonds on cycle path surface shown within yellow circle in picture in the middle), which detects cyclists and activates the signal.

Designs of cycling detection needs to be reviewed by the AT Traffic Systems Team.



Figure 66: Cycle detectors and push buttons examples

Cycle detectors and push buttons examples

13.3.9 Cycle lanes at tram and train tracks

Cycle lane markings ought to be laid out so that cyclists cross rails as close to perpendicular as possible. Tram tracks should be installed parallel to kerbs and lane lines (unlike the photo below) so that cyclists do not have to cross tracks at an oblique angle, endangering their stability.



Figure 67: Cycle lane across tram track at oblique angle

13.3.10 Refuge islands

The minimum dimensions of refuge islands are provided in the Pedestrian Planning and Design Guide (PPDG). These set the minimum width (transverse to the direction of pedestrian travel) as 1.5 m with the depth (the distance within the refuge the pedestrian has to walk before encountering traffic again) as 1.8 m. Where significant numbers of cyclists are expected to use the crossing, the depth can be increased to 2m. The width may be increased to 3 m or more.

It needs to be ensured that by providing a refuge island it does not create pinch points for cyclists travelling along the road. The kerbside lanes of the road need to have a minimum width of 4.2m if it does not have cycle facilities (e.g. cycle lanes).

Holding rails or “resting rail” are recommended where cyclists are likely to have to wait for traffic at a road crossing, railway crossing or within the islands. Holding rails can also be installed in the centre of the crossing (parallel to the direction of travel of crossing users). One or more holding rails can be installed to help separate pedestrians and cyclists and to provide support for cyclists.

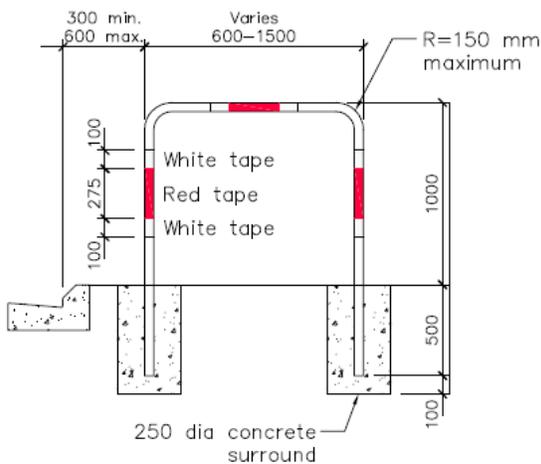


Figure 68: Cyclist holding rail detail (see also drawing CD012)



Figure 69: Example of holding rails left, Photo 15.8 from PPDG right

13.4 Paths

(See also Cycling Aspects of Austroads Guides Section 7)

13.4.1 Cycle Paths

Definition: A facility that is physically separated from pedestrians and motorised traffic and intended for the exclusive use of cyclists. If in a road corridor, a cycle path is at a different level than the vehicle carriageway.

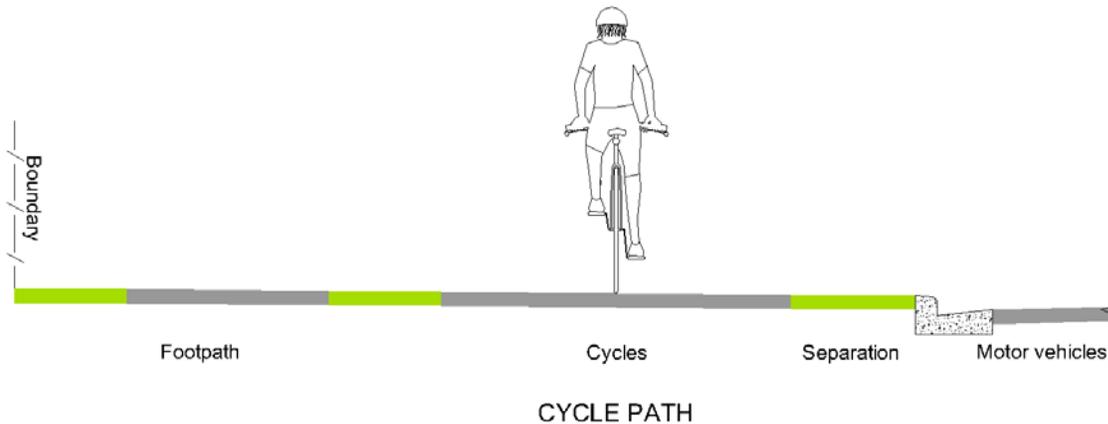


Figure 70: Cycle Path

It is not desirable to install cycle paths if there are frequent driveways close to the road as they may put cyclists at risk (e.g. reversing cars, poor visibility). A buffered cycle lane should be considered instead.

Cycle paths should be at least 2.0 m wide for one-way operation and 1 m wider for two-way operation or if high cycle traffic volumes are expected to use the facility.



Where cyclist and pedestrian volumes require additional separation, the cycle path could be separated by a low kerb from the footpath (also sometimes referred to as “Copenhagen cycle path”). A vertical separation like that between the footpath and cycle path may help to emphasise the different users of the two surfaces and can be useful on higher trafficked routes such as in more urban areas.

13.4.2 Shared Paths

Definition: A path provided for use by cyclists and pedestrians, either in a road corridor or elsewhere, such as in parks or alongside rail lines, motorways, rivers, coastlines or lakeshores.

Minimum width: 3 m

In some rare instances, a reduction of the minimum 3m width may be required due to topography, land use or other location based specific reasons. Any reduction in the minimum width will be reviewed on a case by case basis. Any such reductions should be to no less than 2.5m except in exceptional circumstances and for a short distance (e.g. 10m only).

Where a high number of users (including pedestrians) are expected wider path widths should be considered.

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Figure 71: Shared path along road with cycle lane, North Shore



Figure 72: Two-way shared path along Albany Highway



Figure 73: Shared path in reserve (source: Auckland Transport)



Figure 74: Shared path along road, Hamilton (source: NZTA)

13.4.3 Signs and Markings

As a general rule, no or minimal use of signs and markings should be employed on cycle paths and shared paths. Generally, separating cyclists from pedestrians or other path users by painted line is not preferred. A centre line may be useful in areas of poor visibility (e.g. around a corner). Arrow markings or “Keep left” marking may be useful as a reminder in areas where conflicts have been identified or may be expected.

If conflicts are frequent, consideration should be given to creating separate paths for each mode (i.e. a cycle path next to a footpath, but separated from each other by at least 1 m or other highly conspicuous features such as kerbing or different paving materials).

Signs advising of courtesy codes (encouraging sharing of facilities) may be considered if needed.

The start and finish of a shared path should be indicated through the appropriate signs.



For path marking see drawing CD010.

13.4.4 Pedestrian and Cyclist Access Ways

Definition: Access Ways are paths for cyclists and pedestrians, which provide shorter, more direct access to destinations (parks, shopping areas, schools and other destinations), than is provided for by the road network for general traffic.

A pedestrian and cycle connection should generally be required where it would provide a significantly shorter walking route between roads or from a road to a reserve, shopping centre, community facility or a bus route.

Pedestrian and cyclist access ways provide links where there is no road and should be provided where feasible at:

- cul-de-sac heads to provide a link to an adjacent road;
- parks and reserves where part of that reserve has no road frontage;
- schools and other community facilities where part of that facility has no road frontage; and
- any other location where the trip by road would be considerably longer than 'as the crow flies'.

Where a road connection would not be entirely necessary for traffic circulation, a pedestrian and cycle connection will often still be required to provide access for these active modes. Acceptance of a pedestrian- and cycle-only connection may be approved where Auckland Transport concludes that provision of a road is not reasonable or cannot physically be constructed.

Pedestrian and cycle access ways should have a minimum land width of 4 m (boundary to boundary), generally with a desirable minimum 3 m wide formed concrete or asphalt path (4 m minimum total width).

Pedestrian and cycle access ways should have a straight horizontal alignment, and a vertical alignment generally no steeper than 1 in 10 with an absolute maximum gradient of 1 in 8 in exceptional circumstances. In addition, the access way should be visible from end to end from an eye height of 1.5 m.

Pedestrian and cycle access ways shall have "security" style fencing erected on both sides of the access way to a height of 1.8 m. This fencing shall consist of diamond mesh galvanised steel fencing to allow full visibility and discourage graffiti. In areas where crime or issues of resident security are an issue, alternative security fencing may be considered.



Any entry barriers must allow for the convenient passage of mobility scooters, motorised wheelchairs, large baby buggies and cycles. For this reason, bollards are preferred as access control, rather than chicanes.

13.4.5 Path Lighting

Lighting of all cycle and pedestrian areas shall be in accordance with AS/NZS 1158 (or subsequent revisions) as described in the *ATCOP in Chapter 19 Lighting*.

All areas with cycle or pedestrian traffic shall be lit appropriately for the activity but in such a way as to provide no more illumination than is necessary for security and safety. Cycle and pedestrian access ways shall have lights located at each end and at not more than 50m centres along the length of the access way.

Cycle or pedestrian path lighting is to be located or mounted so as to minimise light shining upon residential windows or into the eyes of drivers, pedestrians or cyclists.

Cycling Aspects of Austroads Guides (Section 7.10) states:

“Where bicycle paths or shared paths carry a substantial number of cyclists during periods of darkness (i.e. dawn, dusk and at night) consideration should be given to the provision of path lighting. The decision to provide lighting is a matter for the relevant authority. If it is decided to light a bicycle path or shared path the lighting should be designed in accordance with AS/NZS 1158.3.1:2005, (e.g. lighting level P2 or higher depending on the jurisdiction, location and the circumstances).”

In determining whether paths “carry a substantial number of cyclists during periods of darkness”, consideration should be given to whether the route is likely to attract commuters and what growth in cycling is desired or anticipated through the strategic planning process over the next 20 to 30 years. In general, paths likely to be of use for commuters should be lit.

13.4.6 Path terminal/entry treatments

Simple end and entry treatments for shared paths or cycle paths at road intersections or park entrances are recommended, as entry to and exit from a path should be as easy as possible for cyclists. The main function of barriers should be to discourage or exclude access by unauthorised vehicles.

Barriers should not be designed as a tool to slow down cyclists. If this function is required, the path design on the approach should provide for this. Bollards are the recommended end/entry treatment for shared paths and cycle paths. They should leave a gap of 1.4 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 and reflectorized so as to be

visible to pedestrians and cyclists. They may be internally illuminated on high-volume or high-profile paths.

Reflectorized white centrelines leading up to and around a central bollard help identify the bollard, as shown in Figure 75 and the first photo below, to prevent cyclists running into them (particularly if they are riding in a group).

If gates or staggered barriers are used, their layout should be arranged geometrically so that a cyclist can navigate through them at low speed without wobbling.

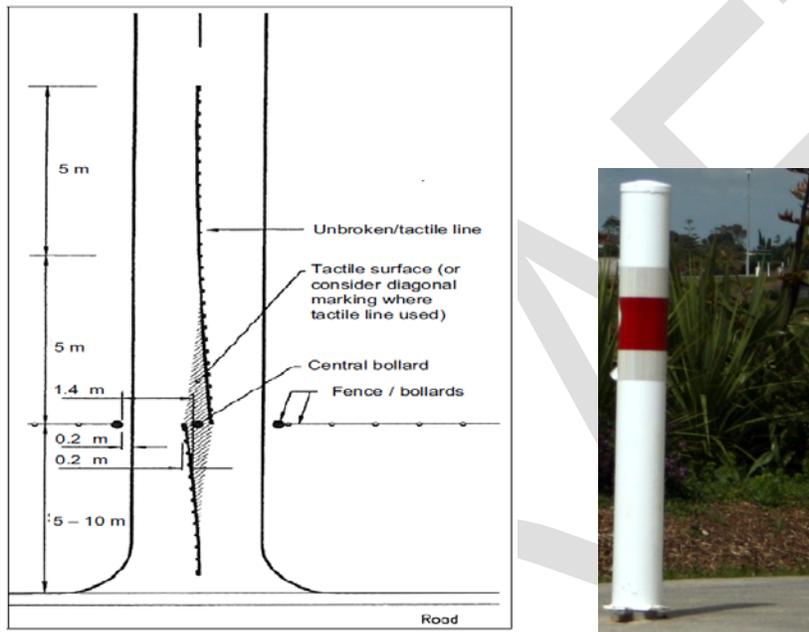


Figure 75: Layout and marking for the use of central bollard (Source: Figure 10.2 Austroads Part 6A 2009)



Figure 76: Examples of bollards on shared path from left to right: Austroads (2009m) SH 20 cycleway near Ketih Hay Park (Akl), Waikaraka cycleway (Akl)



13.5 Miscellaneous On and Off Road Issues

13.5.1 Surface Materials

13.5.1.1 General

The provision of good riding surfaces is a critical factor in ensuring safe and comfortable cycling conditions. Asphalt (or hot mix) surfacing is the surface most preferred by cyclists as it provides smooth, lower friction, comfortable and efficient travel. Chip seal is discouraged and should not be used on the Regional cycle network.

Cycle lanes and paths are to have a permanent all weather surfaces (usually concrete or asphalt), with a smooth transition between adjacent surfaces where cyclists may need to move laterally off the facility.

13.5.1.2 Cycle Lanes

Asphaltic concrete surfacing is typically used on heavily trafficked arterial roads, industrial roads and other roads where asphaltic concrete provides specific benefits (such as reduced road noise, often specified for cul-de sacs).

The specification for the green coloured Surface Treatments for Cycle Lanes should provide a surface texture and skid resistance suitable for bicycle use, including in wet conditions and limit differential skid resistance between the cycle lane and the adjacent traffic lane (from VicRoads Cycle Notes 14). For more details see *ATCOP Chapter 25 Section 25.10*.

Given that the majority of on-road cycle routes will be located along key arterial routes, these surfaces will typically be asphalt (or hot mix), the preferred surface material for cyclists. However, it is important to consider a good road surface for other key strategic cycle routes which do not have this kind of surface. Only finer grade chip seal should be considered if asphalt is not affordable. Road seal should be maintained to a high standard.

13.5.1.3 Paths

Shared paths and cycle paths should be constructed with weather-proof surfaces such as asphalt or concrete. Joints should be smooth and edges should be flush with adjacent surfaces where cyclists may need to move off the path (to avoid other path users, for example).

13.5.2 Transitions between Paths and Carriageways

Kerb crossings between on-road and off-road are to be designed to minimise any speed reductions for the cyclists whilst also ensuring the safety of cyclists and reducing potential conflict with other path users such as pedestrians (if applicable). The kerb entry should be designed with a radius minimum of 2.0 m with a maximum gradient slope of 1:10. Note: the

entry point and the crossing entry point must be smooth (with avoidance of a concrete 'lip'). Pram and pedestrian crossings shall also be lipless.



Figure 77: Example of transition between cycle lane and shared path (Central Park Drive AKL)

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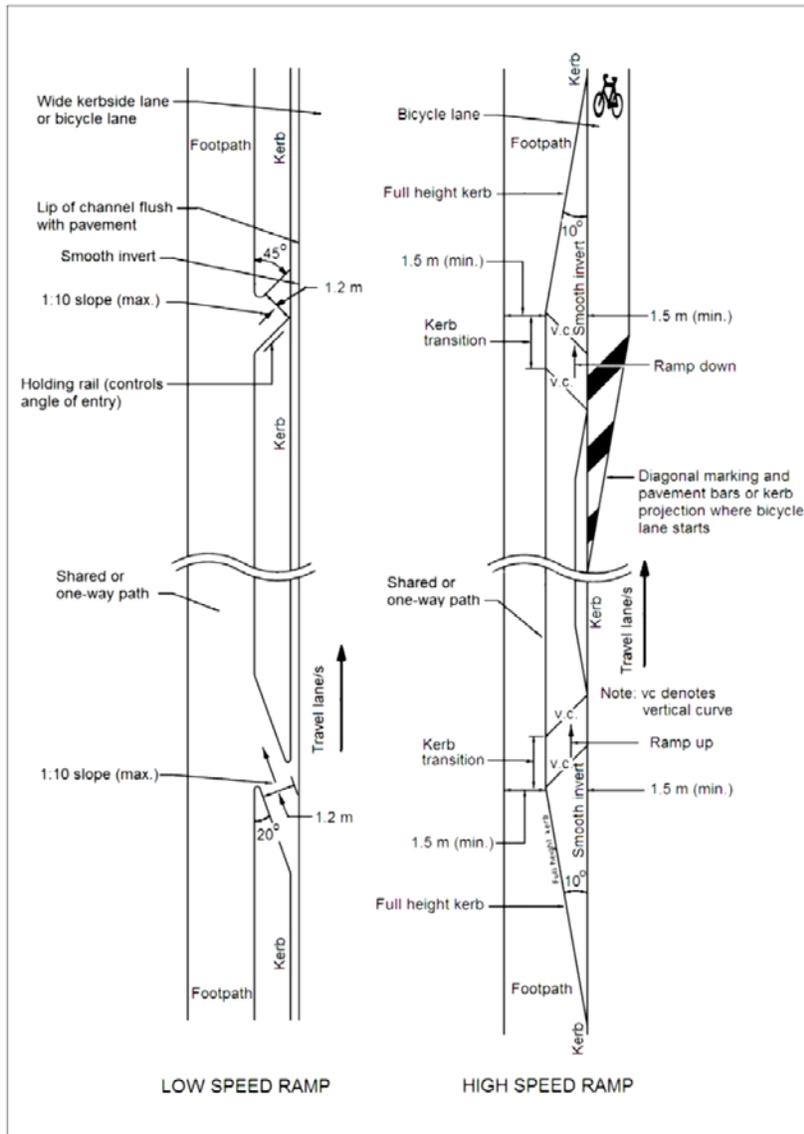


Figure 78: Low and high speed exit and entry ramps (Source: figure 4.10 Cycling aspects of Austroads)

Kerbs on to and off shared paths/cycle paths should be less than 10mm. Higher kerbs may pose risks of restraining bicycle front wheels at shallow approach angles and risk destabilising riders.

For other options of transitions see also drawing CD009.



13.5.3 Kerbs and Islands

Cycle lanes and wide kerbside lanes should be continuous and not compromised at kerb extensions or pedestrian refuges. The Pedestrian Planning and Design Guide (Section 15.82) should be used for designing pedestrian refuges and kerb extensions. Also see *ATCOP Chapter 7 section 7.7* for further design information.

13.5.4 Traffic Calming Measures

Well-designed traffic calming measures (where traffic operating speeds throughout the street or streets in question are 30 km/h or less and traffic volumes are low) cater well for cyclists without additional considerations, as cyclists will be able to mix with other traffic in safety and comfort. Refer to *ATCOP Chapter 8 Traffic Calming Devices and LATM*.

Where a traffic calming facility itself may result in a squeeze point for cyclists, the provision of a cycle bypass (or other concessions to cyclists) can be considered. Care needs to be taken that entry to and from the bypass does not get blocked by parked vehicles; this may be minimised by the use of yellow no stopping lines and assisted with coloured surfacing. Cycle bypasses are illustrated in Figure 77 and Figure 80

Other situations where bypasses may be considered are:

- where traffic signals across the head of a T-intersection may unnecessarily delay cyclists see Figure 79 below and Cycling Aspects of Austroads Guides Figures 5.8 and 5.9, or
- at 3-leg roundabouts.

A cycle bypass can eliminate such delays where significant pedestrian conflicts are not anticipated.

² <http://www.nzta.govt.nz/resources/pedestrian-planning-guide/>

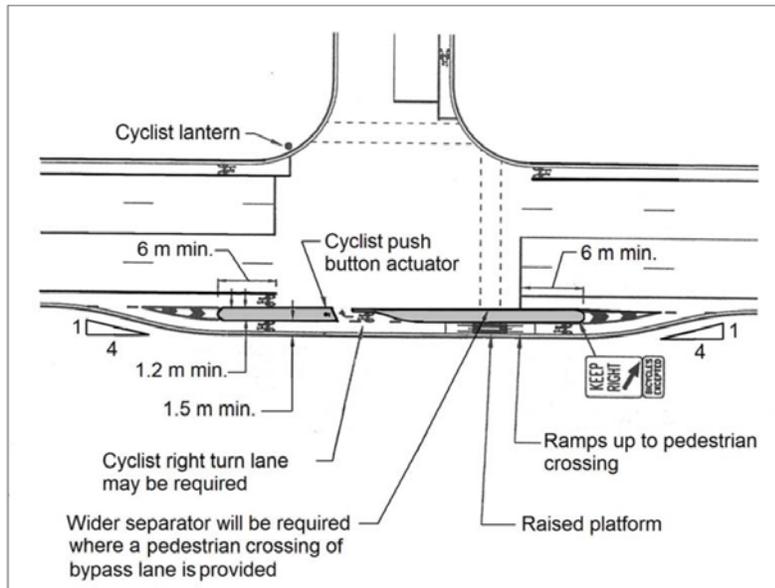


Figure 79: Cyclists bypass at signalised T-intersection (Source Cycling Aspects of Austroads Guides Figures 5.9)



Figure 80: Examples of cycle bypass of speed hump (left, source: Austroad) **and cycle bypass at kerb build outs** Ian McKinnon Drive Akl (middle), Summerland Drive Akl (right)

13.5.5 Bridges, Underpasses and Boardwalks

New road bridges and underpasses should be constructed to allow for a wide kerbside lane, cycle lane or sealed shoulder across the bridge or underpass.

For existing 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 cyclists (and pedestrians) within budgetary constraints. Alternative solutions include building a “clip-on” bridge on one or each side 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) need to be provided.



The bridge, underpass and boardwalk widths on off-road paths need to be consistent with the overall path and therefore designed according to the path width requirements in Section 13.4.2 plus additional clearances for "shy space" due to handrails or walls etc. should be provided.

A short term solution to the inadequate provision of sufficient width for cyclists on a bridge, could involve providing detection and signing to warn drivers of the presence of cyclists on a bridge.

Generally underpasses for pedestrians and cyclist should only be considered if no other solution can be provided. If an underpass cannot be avoided in the design, then appropriate security and surveillance measures must be included.

Access to bridges and underpasses need to be provided by ramps to allow universal access.

As these facilities are usually shared with pedestrians, the ramp gradients should not exceed 1 in 14 (length of 9m between landings) or 1 in 12 (length of 7.5m between landings).

If the facilities are used by cyclists only, the approach ramp gradients should not exceed 1 in 10 (for a maximum length of 20m) or 1 in 14 (for a maximum length of 50m).

Bridge, Underpass and Boardwalk entries and exits should have wide radii and provide good visibility of the path ahead and around corners.

The usage of wooden surfaces for cycle paths should be avoided where possible. Wooden surfaces can be dangerously slippery when wet and make corners particularly difficult to negotiate for cyclists and runners. Skid resistant surfaces must be used to minimize that risk.

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](#) (PDF 4MB).

If access onto a bridge or underpass cannot be provided through a ramp with acceptable gradients and is only provided through stairs a cycle wheeling ramp should be considered to allow cyclists to push their bikes up/down the stairs, if appropriate (width available, cyclist volumes, pedestrian volumes, steepness of the stairs).

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



Figure 81: Examples of cycle wheeling ramps (sources: Bike Victoria and AT) 2 pictures on left - concrete wheeling ramps as integral part of stairways, 2 pictures on right - retrofitted cycle wheeling ramp options

13.5.6 Maintenance

The Code of Practice for Temporary Traffic Management (COPTTM) shall be followed for temporary traffic management, with particular attention to its requirements for cyclists. COPTTM notes that the contractor's responsibility while undertaking temporary works on a road includes "ensuring the safe and efficient movement of all road users through and around the site, particularly cyclists and pedestrians".

In particular, contractors should not use cycle lanes for siting temporary traffic management signs, and if cycle lanes are closed for road works, temporary cycle lanes should be provided using road marking cones where possible.

When roads (especially those with kerbside cycle lanes) are being maintained (e.g. resealed) the surface of the cycle lane and gutter must provide a flush riding surface, with no surfacing lip that would make cyclists unstable or unsafe.

All grates and cess pits should be adjusted in height after resurfacing of the road to ensure there is no lip or fall to grate or the cess pit level.



Figure 82: Examples of maintenance issues,, creating hazards to cyclists - through high asphalt lips at road edge (left) and sunken cover (right)

Road surface reinstatements should provide smooth riding surfacing.

Potholes identified in inspections or otherwise notified that present a danger to road users or where there is a likelihood of a rapid deterioration of the pavement must be repaired immediately. All other defects must be completed within the time frame identified in the maintenance contract. Contractors must give due priority to the safety of road users when programming and undertaking repairs.

The re-marking of road markings (including the re-marking and greening of cycle lanes and ASBs) should be incorporated in the maintenance programme.

Cycle lanes need to be swept regularly by the maintenance contractor to keep the lanes free of broken glass, debris and hazards.

13.5.7 Stormwater grates

Cycle-friendly stormwater grates (to prevent cycle wheels being trapped) are to be installed in all new road construction and progressively throughout the network (beginning with identified cycle routes, then arterial roads). The approved design is as shown in *ATCOP Chapter 17*.

The parallel grates, as shown in the the following photo, for cyclists is acceptable if the gap is no more than 17mm. The 17mm is critical and should be checked on each batch supplied.



Figure 83: Cycle lane with acceptable grate and lip-less road surface (left to right: Triangle Rd, Ian McKinnon Drive, example from Sydney)

Stormwater grates and cesspits should not be positioned at narrow exits from a roundabout.

Utility covers should not be located where they risk destabilising cyclists especially in wet weather (e.g. on curves, at braking points).

13.6 Cycle Parking

13.6.1 Good Practice

Why is Cycle Parking Important?

Provision of safe and convenient cycle parking is an essential element for promoting cycling and encouraging people to get on a bike. It's one of the cheapest and easiest infrastructural changes to support cycling as a travel choice. But it's also one that is easy to get wrong.

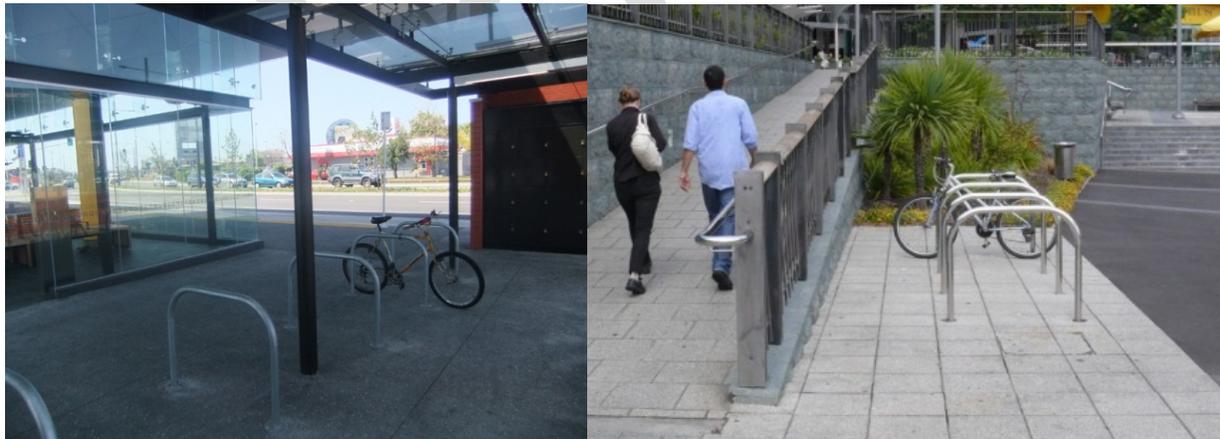


Figure 84: Cycle parking New Lynn Interchange (left) and Albany shopping centre (right)

Well placed and well used cycle parking not only provides an essential role for cyclists but also helps promote cycling as a mode. More bikes in public places will improve exposure and help cycling become a “norm” in the city.



Facilities for cycle parking should be given equal, and in some cases greater, attention to car parking - both in the public realm and private developments. On -site cycle parking both commuter parking for staff and readily accessible visitor cyclist parking, generally located closer to where users wish to go than car parking.

A list of recommended parking rates for different land use activities is attached in Appendix A.

To be effective all types of cycle parking must meet minimum criteria in terms of bicycle support, space, security and ease of use. The criteria include:

- Be located as close as possible to the destination
- Supporting the bicycle without damaging it (e.g. paint, tubing, wheels, derailleur etc.)
- Ability to lock the frame and both front and rear wheels to the same stand, without removing either wheel
- Located in a well-lit area with good passive surveillance (and/or CCTV) and protection from the weather
- Located so that the rack and a parked or manoeuvring bicycle does not block pedestrian movement – *special consideration should be given to visually impaired pedestrians*
- Located so that a parked bicycle, or manoeuvring bicycle is not impacted by a parked vehicle (e.g. an opening car door) or a moving vehicle
- Enough manoeuvring space to allow a bicycle to be moved without damaging other bicycles, street furniture, planting or forcing the rider to step onto the road
- Designed to be sensitive of the surrounding built environment including building and existing street furniture

Cycle parking should not be installed directly in grassed areas unless a concrete (or similar) pad is laid to make access and maintenance easier. Cycle parking should also be located away from the drip line of trees.

When providing cycle parking it is important to remember the basic dimensions of the bicycle. Although there are many different sizes of bicycle - child's BMX through to a full sized road bike – the parking should allow space, including manoeuvring space for the likely largest bike. The dimensions that should be provided for are length 1.9m and height 1.2m.

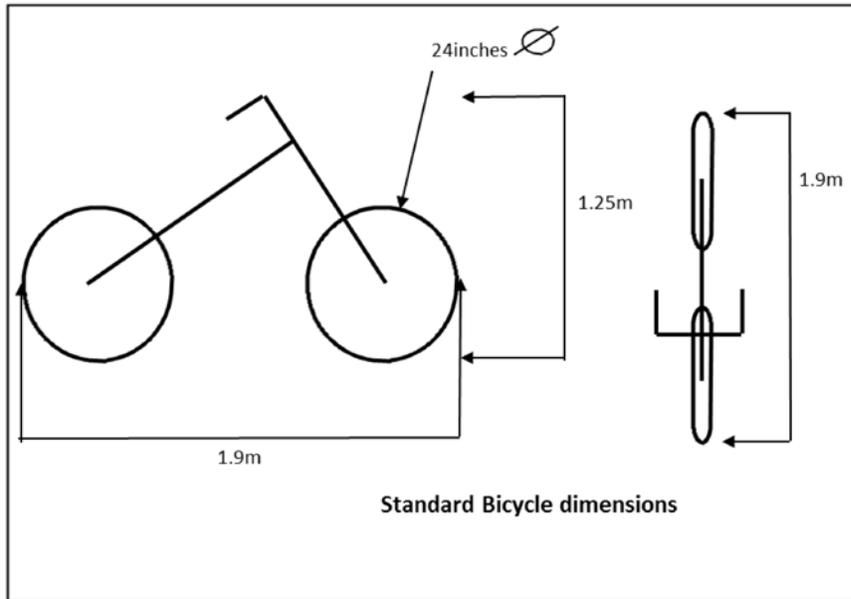


Figure 85: Bicycle Dimensions

13.6.2 Types of Cycle Parking

Two types of cycle parking are recommended, with the focus being on the function of cycle parking. Identified below are a set of requirements for the two cycle parking types and recommends the most appropriate form. However the approach is not restrictive and allows freedom to come up with clever and existing solutions to cycle parking, as long as they meet the stated functional requirements. It is hoped that this approach will allow flexibility for cycle parking providers while ensuring the parking meets the requirements of cyclists.

In general the two types of parking relate to likely length of stay. This has an impact on two main factors – convenience and security. Convenience and security are inherently important for both short and long stay cycle parking, but their importance relative to each other changes. Figure 85 shows the relationship between cycle parking short stay/long stay and convenience/security and examples of different parking types



Figure 86: Cycle Parking – Convenience Security Continuum

13.6.2.1 Short Term Cycle Parking

Locations:

- Neighbourhood stores (e.g. dairies or takeaways)
- Local shopping centres
- Commercial buildings
- Community Facilities - including libraries, swimming pools, community centres
- Playgrounds and beaches
- At key points along popular cycle routes (e.g. public toilets or cafés)

Function of Short Term Cycle Parking:

Although termed “short stay” parking a bicycle may be kept in this type of parking for a minute or many hours. This depends on the type of destination the parking is being applied to e.g. a dairy vs. a library. In general the functional requirement of short stay parking does not change in relation to length of stay.

Short stay cycle parking is all about convenience. If a rider is stopping at a destination for a short time, e.g. calling into a dairy for milk and bread, the most important feature of cycle parking is convenience. A number of things make cycle parking convenient but the key one is proximity to the entrance. In general, the shorter the stay the closer to the entrance the cycle parking needs to be.

In most cases putting cycle parking as close to the destinations entrance as possible has the added benefit of good surveillance. Surveillance is a vital part of bicycle security for short stay parking.



However, physically securing a bicycle is still important, particularly as the length of stay increases. The ability to quickly secure a cycle should always be provided. Practically, this means providing a loop of metal attached to something that cannot be cut through e.g. the ground or a column.

Key Features of Short Term Cycle Parking:

Short stay cycle parking must be:

- As close as practical to the business entrance but out of any pedestrian thoroughfare
- Self-explaining; designed and located in the streetscape to clearly identify itself as cycle parking
- Sheltered - this is particularly important if cyclists may be stopping for longer (e.g. a library, supermarket, or playground)
- Suitable for leaning a cycle against
- Strong and of a material that cannot quickly be cut through (e.g. steel)
- Free of sharp or square edges that may scratch a bicycle paint or dent the tubing
- Well lit if in a location likely to be used at night
- Located to avoid hazards to pedestrians, especially sight impaired..
- Under good surveillance

Design of Short Term Cycle Parking:

The recommended design for short term cycle parking is the “Sheffield” stand. Where space is constrained it is acceptable to use a narrower design of stand, known as the “Harrogate”:

There are many different design opportunities with both the Sheffield and Harrogate stands, however the core features are important to maintain. Figure 87 and Figure 88 show the basic design requirements of these stands. For detailed drawings refer to CD013 and CD014.

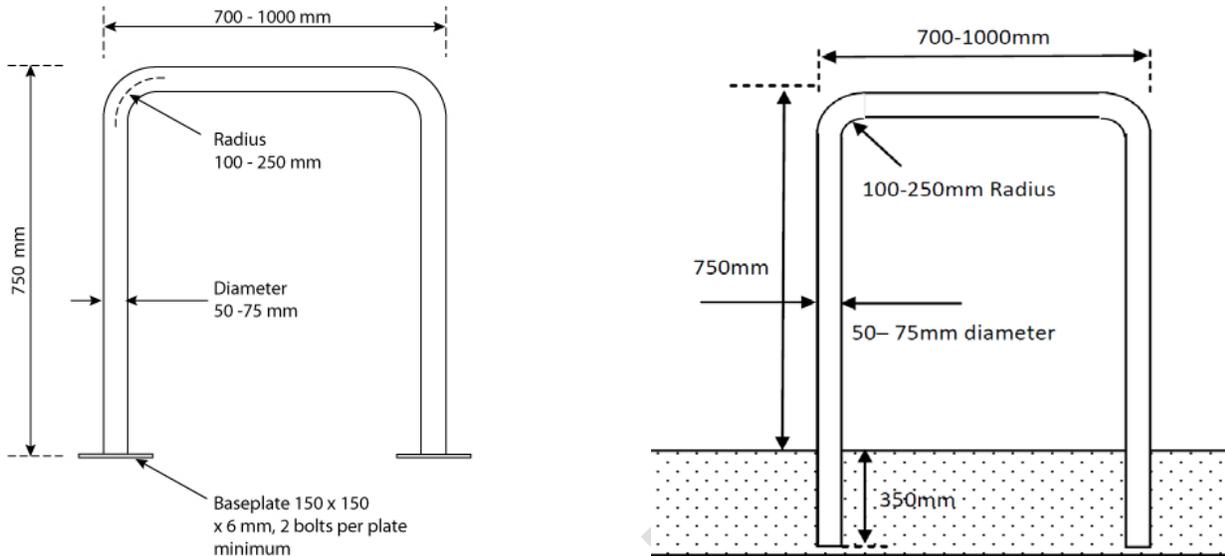


Figure 87: Sheffield Stand Design (Left: Surface Mounted, Right: In Ground)

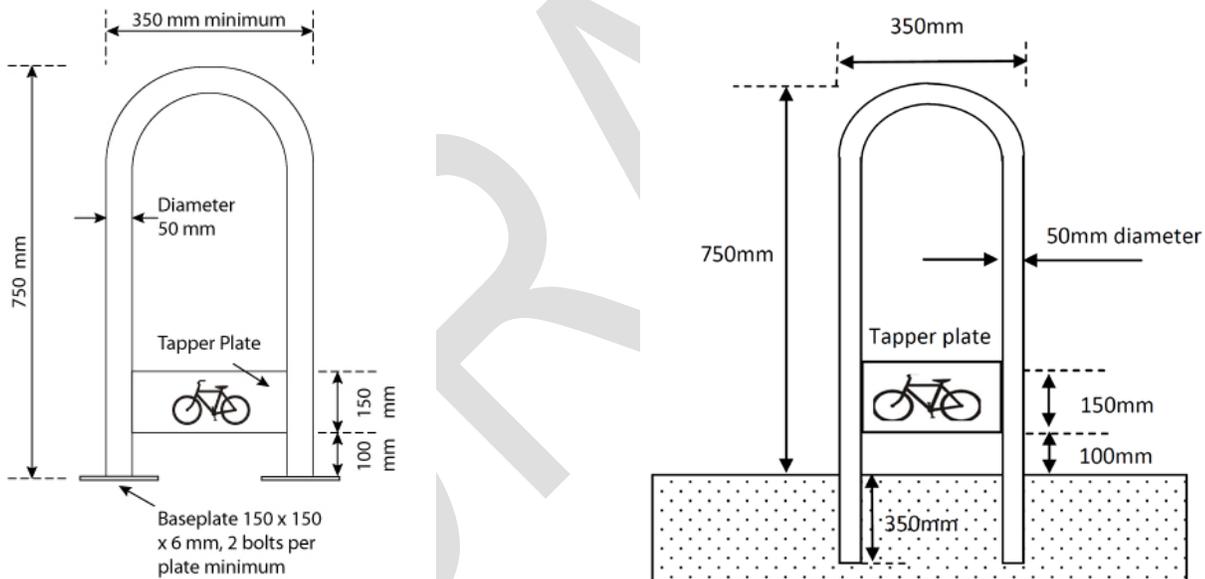


Figure 88: Harrogate Stand Design (Left: Surface Mounted, Right: In Ground)

In areas where space is particularly constrained or where there is likely to be greater numbers of visually impaired pedestrians (e.g. Newmarket near the Foundation for the Blind) Harrogate stands with “tapper plates” at the bottom should be used. The tapper plate will help partially sighted pedestrians identify that the pole is part of a hoop, rather than a single pole.



Figure 89: Harrogate Stand Variation - Ponsonby (K McLean)

There are also many excellent examples from around New Zealand and the world where interesting or playful designs have been used to incorporate cycle parking and street art. This type of approach is encouraged as long as all of the “key features” identified above are provided.



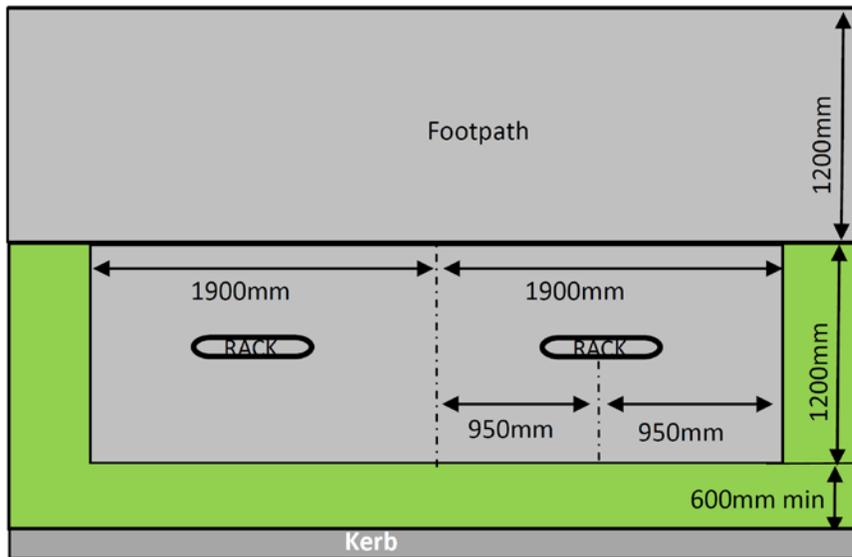
Figure 90: "Bikerakk" Stands - Hastings (I Stenzel)

Irrespective of the stands design it is important to remember its core function is to provide somewhere for a bicycle to be locked in a convenient location out of the thoroughfare. As such clearance around the stands, from walls, cars and pedestrian movement area is vital.

Figure 91 shows examples of Sheffield stands in different locations and arrangements in relation to a wall or kerb. The same dimensions would be true for separation from kerb side parking, traffic lanes and pedestrian movement areas. Dimensions are also provided from the centre of the bike rack so these dimensions can be used for the Harrogate too.



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Nose to tail parking on verge (for double sided racks)

Figure 91: Bike parking dimensions for different layouts

Examples:

There are many suitable options for short stay cycle parking. The following examples would be suitable for destinations where space is required for only one or two cycles (e.g. a dairy or a fuel station). As this type of cycle parking takes up little space in most cases it can easily be located near an entrance.

When the short stay parking facility needs to provide for many bikes the functional requirement doesn't change, just the amount of space required. The photograph shows an example of short stay facilities for many bikes.



Figure 92: "Retrofit-able" Cycle Hoop*, Sydney

* It is not currently legal in NZ to attach a cycle hoop to a regulatory sign.



Figure 93: Group of short stay cycle parks under cover

13.6.2.2 Public Long Term Cycle Parking

Locations:

- Major public transport facilities i.e. stations and large bus stops
- Car park buildings
- Major sporting and concert venues

Function of Public Long Term Cycle Parking:

On the convenience/security continuum security is most important when a cyclist intends to leave their bike in one place for more than four hours. This is particularly true if the bike is in the same location frequently such as outside a train station, at a school or place of work.

Long stay parking will have the potential for two stages of physical security – initial limited entry to a secure area (e.g. locked limited access cycle cage, or swipe card access to a car parking area), then cycle parking suitable for locking a bike to. The additional level of physical security makes this type of cycle parking inherently less convenient. Given the space requirements it's also likely to be further from the final destination (e.g. in a rail station car park rather than on the platform).

Passive surveillance is also an important safety consideration, particularly for public long stay cycle parking. In the interest of convenience and good passive surveillance the long stay facility should be located as close as possible to the entrance of the destination.

Long stay private cycle parking is also likely to attract cyclists who have travelled further so a number of complementary facilities should be considered. This includes a bike tool station and pump, showers and lockers. These are addressed in *Section 13.6.4*.



Key Features of Public Long Term Cycle Parking:

Public long stay cycle parking must:

- Be in a secured “limited access” compound that can only be accessed by registered users or
- Be as close as practical to the destination (i.e. train platform) given its significant size and requirement for a concrete base – it’s important to retain good passive surveillance (and/or CCTV)
- Be located where the cycle does not need to be carried up or down stairs.
- Be sheltered and well lit
- Be fitted with a mixture of Sheffield stands and wall hangers suitable for securely holding bicycles of different sizes. Wall hangers require less space, but don’t suit all bicycles so some Sheffield stands should always be provided
- Be well maintained and administered to ensure a high quality and safe facility
- Regularly monitored to check usage
- Increasingly make possible and introduce public showers

Design of Public Long Term Cycle Parking:

Public Transport Stations, Interchanges and Major Stops

A lockable cycle cage with a mechanism for selective entry is the preferred long stay cycle parking facility for PT stations. Rates for cycle parking spaces are discussed in Appendix A, but a standard cage sizes should be developed for all major PT stations. This will make the cages easy to implement at different locations. Figure 94 shows an example of a cage using two car parking spaces. This facility, providing space for 16 bikes, should be a minimum for major PT stations.

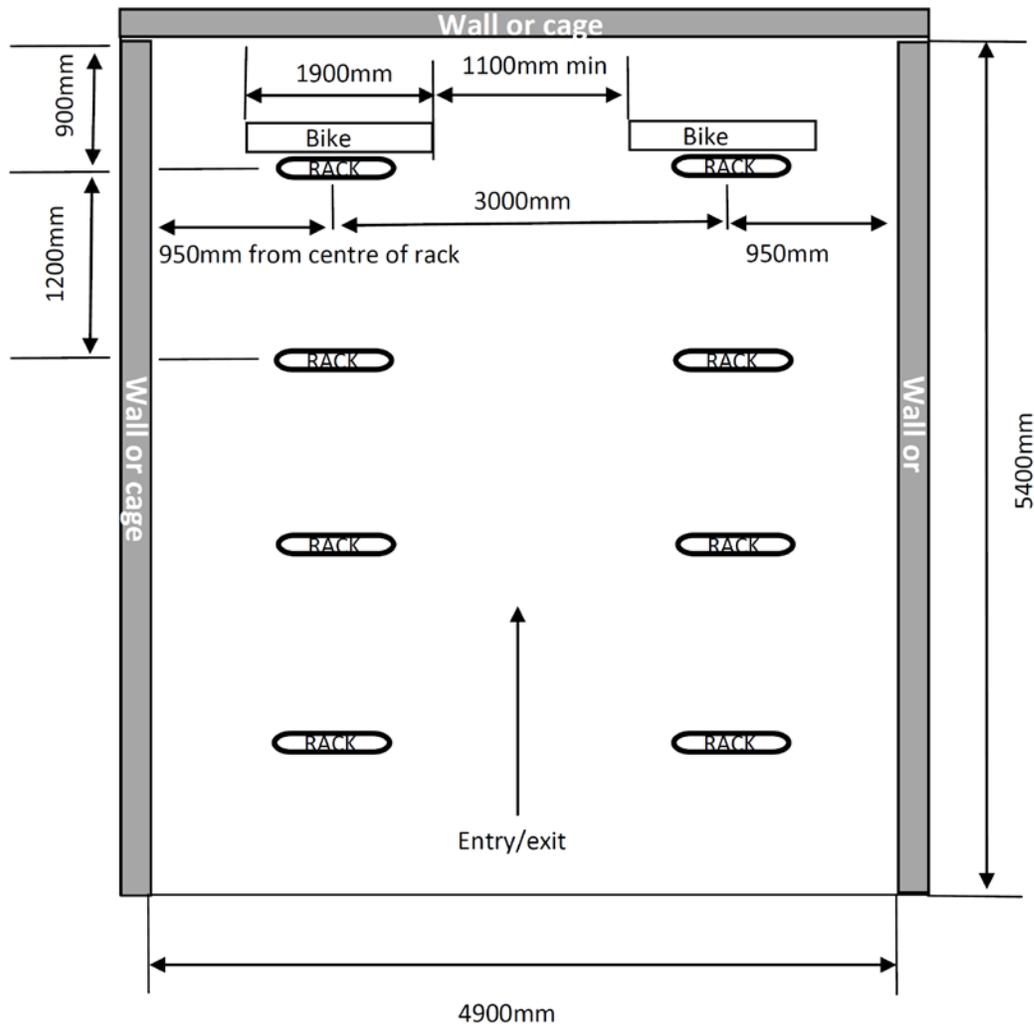


Figure 94: Public Long term parking (for double sided racks, Sheffield only) Layout for 16 Bicycle

In key locations provision of personal lockers for gear should be considered. This has been implemented recently at the New Lynn Interchange (illustrated in the following photo).



Figure 95: Gear Lockers - New Lynn

Car park Buildings

Provision of long stay public bicycle parking facilities in car parking buildings differ from those at a PT station. Car parking buildings will usually have limited entry (barrier arms), already be protected from elements and be regularly monitored by security staff. As such provision of a sheltered, locked, weather protected cage is unlikely to be necessary. However the same general layout in terms of stands and separation and the use of a generic floor plate based on car parking spaces is recommended.

Where possible, particularly if not protected by a locked cage, long stay cycle parking in a car parking building should be located close to a manned security or ticket booth. Alternatively if the car park doesn't have on-site staff the spaces should be in a well-lit area near a main entrance. This will increase security by ensuring good passive surveillance.

Examples of Public Long Term Cycle Parking:

A comprehensive purpose built facility will likely be necessary for public long stay cycle parking. In public locations where significant numbers of long stay parking spaces are required, such as major bus interchanges or rail stations, a lockable cage is favoured.

Individual cycle lockers were trialled across a number of the old Auckland local authorities. Results from the trial were mixed, but based on maintenance, management and cost factors groups of individual cycle lockers are no longer favoured by Auckland Transport.



Figure 96: Public Long Stay Cycle Parking - New Lynn – left, Wall hanging cycle racks within a “Parkiteer” Station – Melbourne (Bicycle Network Victoria) - right

A major barrier to the uptake of cycling is the lack of showers and changing areas. These can be provided in public car parks near to staffed pay booths for example.

13.6.2.3 Private Long Term Cycle Parking

Locations:

- Workplaces
- Schools
- Tertiary institutes

Function of Private Long Term Cycle Parking:

On the convenience/security continuum security is most important when a cyclist intends to leave their bike in one place for more than four hours. This is particularly true if the bike is in the same location frequently such as outside at a school or place of work.

Long stay parking will have the potential for two stages of physical security – initial limited entry to a secure area (e.g. swipe card access to a car parking area), then cycle parking suitable for locking a bike to. The additional level of physical security makes this type of cycle parking inherently less convenient. Given the space requirements it's also likely to be further from the final destination.

Long stay private cycle parking is likely to attract cyclists who have travelled further so a number of complementary facilities should be considered. This includes a bike tool station and pump, showers and lockers. These are addressed in *Section 13.6.4*.

Key Features of Private Long Term Cycle Parking:

Private long stay cycle parking will usually be maintained by the business or activity that the spaces are associated with. Private long stay cycle parking must:



- Be in a secured area (passive surveillance and/or CCTV) that is not open to the general public, preferably behind a locked access gate or similar
- Be as close as practical to a specified building entrance. This will often be a basement or staff only entrance
- Be located where the cycle does not need to be carried up or down stairs.
- Have other trip-end facilities such as lockers and showers. Consider providing a cycle maintenance area with basic bike tools (e.g. allen keys, screw drivers, spanners) and a large floor mounted pump.
- Be sheltered and well lit
- Be fitted with stands or wall hangers suitable for securely holding bicycles of different sizes
- Be well maintained and administered to ensure a high quality and safe facility

Design of Private Long Term Cycle Parking:

Workplaces

The term “workplaces” covers a huge range of businesses; type of work, location, building size, building type and number of employees all make businesses demands for cycle parking different. As a result it’s difficult to identify a single solution to suit all workplaces.

However, in general the core features of long stay cycle parking remain the same; a group of cycle stands provided in an area of limited entry. Depending on the size of the workplace this could be in an underground car park, a service room or similar, but the location should not require the cyclist to carry their bike up or down stairs and preferably not through a closed doorway.

Wall mounted cycle racks are often favoured in workplace locations due to limited space. Standard cycle racks such as Sheffield stands are preferred over wall mounted systems. It is difficult to provide a wall mounted system that suits all bicycle types (e.g. BMX, road bike, mountain bike). If a wall mounted system is provided consideration should be given to providing a few alternative spaces for bikes that don’t fit on the wall system and for users who are physically unable to lift the bikes to mount on the hooks.



Figure 97: Wall hanging cycle racks (S Mills)

Schools

In general long stay cycle parking at schools should be provided in a cage similar design to that shown in the PT station section. A key difference would be the need for a user-accessible locking mechanism. These will be an expensive addition to a cycle cage and are unlikely to be necessary if a staff member from the school unlocks and locks the facility at the beginning and end of each school day.

Again, depending on the size of the school it may not be practical to provide a full sized lockable cage. There are other simpler and smaller types of cycle parking (see Figure 97). A weather protected area to park bicycles may be appropriate if there is good passive surveillance of the facility e.g. near a staff room or maintenance shed.



Figure 98: Alternative cycle parking at schools, not lockable

Tertiary Institute

Tertiary institutes generally cover large areas of land and a number of secure cycle parking facilities will be required. A number of secure cycle cages located conveniently to major departments, particularly if the facility is separated by public roads, are preferred rather than a large centralised facility.

Other than the size and locational aspects in general the core features of long stay cycle parking remain the same; a group of cycle stands provided in an area of limited entry.

Examples of Private Long Term Cycle Parking:

There are many options available for long stay cycle facilities. For private facilities (e.g. a large business or university) it may be appropriate to retro fit a number of cycle stands or wall brackets within an existing locked garage or car park. A mixture of Sheffield stands and wall hangers suitable for securely holding bicycles of different sizes should be provided. Wall hangers require less space, but don't suit all bicycles so some Sheffield stands (or similar) should always be provided. Some people are physically unable to lift bikes to mount on hooks.



Figure 99: Cycle Parking Cage - Middlemore Hospital (K Hancock)

13.6.3 Signage and Way finding

Generally if a cycle parking facility is well designed and located it should be easy to find and simple to use. However in large areas such as Tertiary institutes, car park buildings or shopping malls it may be necessary to use signage to inform cyclists where cycle parking is located. Signage should be provided in order to promote the presence of the bicycle parking and define the parking area.

Directional signage should be installed at large sites such as PT stations, town centres or shopping malls in order to direct cyclists to secure bicycle parking.



Figure 100: Directional and area defining cycle parking signage

Cycle enclosures, of which the purpose may not be immediately obvious, must have instructional signs. The following photo shows an example of the signage used on a cycle cage in Melbourne.



Figure 101: Parkiteer signage - Melbourne (Bicycle Network Victoria)

13.6.4 End of Trip Facilities

13.6.4.1 Showers

Showers should be provided in all places of employment and education for all employees and students who wish to cycle to work or their place of study. The shower facilities need to be provided so that they can be easily accessed by cyclists without disturbing other staff members or students.

In the situation for schools or educational facilities, the recreation centre/gymnasium should be available for use by cyclists. If the recreation centre/gymnasium are not located in a central location for education facilities, then showers should be provided in each building/department.

13.6.4.2 Lockers

It is desirable that lockers be provided for all staff and students who would like to cycle to work/ their place of study. However, it is important that lockers are provided for staff/students that do not have an individual secure work stations in order to securely leave the equipment/ clothes etc. The lockers should be located close to the showers.



13.6.4.3 *Drying Room*

It would be desirable for all employees to have access to a drying room/clothes rack which would allow for cyclists to hang up and dry their cycling clothes, helmet, gloves, jackets and shoes before the cycle home at the end of the day. This could be in the form of a designated, secure, well ventilated room/closet that can only be accessed by the same staff as those accessing the bicycle enclosure.

12.6.4.4 *Bicycle Maintenance Facilities*

It is desirable to provide basic bicycle maintenance facilities and equipment in employee and student secure enclosures. This includes:

- Good quality floor pump
- Tools for emergency repairs
- Puncture repair kits
- Covered space to undertake repairs.

In school situations, where it is not possible to supply sheltered bicycle parking, an area could be provided for students to store plastic bags, or similar, in order for them to cover their bicycle seats on rainy days.

13.6.5 **References**

AS2890.3 – 1993 Parking Facilities Part 3: Bicycle Parking Facilities (1993), Standards Australia, New South Wales, Australia.

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New Zealand Transport Agency, Traffic Control Devices Rule

RTA NSW Bicycle Guideline – Issue 1.2 (2005), Roads and Traffic Authority NSW, Australia.

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Appendix 13A – Cycle Parking Rates

The rates used in the original ARTA guideline were based on providing facilities for 10 % of employees to cycle to work. This is based on the fact that recent business travel plan surveys indicate an average of 3 % to 5 % of employees currently cycle to work.

The Auckland Plan includes a goal of increasing non-car based mode share to 37 % of trips during peak times within 30 years³. To help cycling make a significant contribution to this goal the rates below generally seek to provide cycle parking for around 10 % of trips to the site.

The following points relate to the development of parking rates⁴.

- All rates (except town centre car parks) will be based on GFA or people, not number of car parking spaces provided
- Small retail activities (less than 50 m²) located within urban centres and corridors should be excluded from the minimum cycle parking requirement if they can demonstrate that they are in close proximity to a public cycle park facility
- For some activities a limit on the minimum requirement is required, for example for large places of assembly or stadiums the cycle requirement can become excessive on a rate of 2 spaces per 50 visitors plus one spacer per 10-15 staff. For example a stadium with a capacity of 50,000 would require a minimum of 2000 cycle parks – this could be an appropriate long term goal, but forcing this level of parking provision while the cycle network is still incomplete is overly punitive.

The recommended cycle parking rates are outlined in Table 42. These rates should be considered as minimum rates only. They are practical levels of cycle parking given the current and anticipated levels of cycling in Auckland. There is potentially a negative impact on cycling if too much cycle parking is provided and it's significantly underutilised. However where there is good cyclists accessibility there is likely to be higher demand for cycle parking and this should be provided.

Table 42: Recommended Cycle Parking Rates

Land Use Activity	Visitor (Short Stay)	Secure (Long Stay)
Shopping malls/retail areas	1 space for activities up to 200 m ² For activities over 200 m ² - 1 space plus one space per 200 m ²	One space per 15 employees

³ Auckland Council, 2011, Auckland Plan

⁴ They are based on a review of the cycle parking rates provided in the ARTA Guidance Note for Cycle Parking Facilities 2007 as well as other New Zealand and international examples.



Table 42: Recommended Cycle Parking Rates

Land Use Activity	Visitor (Short Stay)	Secure (Long Stay)
Cafe	1 space for activities up to 100 m ² For activities over 100 m ² - 1 space plus one space per 100 m ²	One space per 10 employees
Primary and Intermediate Schools	Min of 1 space + 1 per 400 students and staff at the school	1 space per 15 employees and students
Secondary School	Min of 1 space + 1 per 400 students and staff at the school	1 space per 10 equivalent full time staff and students
Tertiary Education facility	1 space per 800 m ² of office space to be located outside the main entrance of each department	1 space per 20 students and staff on site at the peak time. Spaces should be distributed around the campus
Residential Apartment	1 space per 20 units	1 space per unit
Visitor Accommodation	1 space per 20 rooms/beds	1 space per 15 employees
Office Building	1 space per 800 m ² of office space	1 space per 10 employees
Industrial	Min of 1 space + 1 space per 800 m ² of associated office space	1 space per 20 employees
Recreation Facilities	1 space per 10 visitors	1 space per 5 employees
Hospitals	1 space per 50 visitors	1 space per 15 employees
Consulting Room	1 space per 50 visitors	1 space per 15 employees
Places of Assembly (including stadiums)	2 space per 50 visitors (up to a maximum of 200 spaces or more if determined by the applicant)	1 space per 15 employees
Public gatherings, outdoor concerts	1 space per 50-200 people (per day or event) predicted to attend the event depending on the accessibility of the venue* (up to a maximum of 200 spaces or more if determined by the applicant)	
Town Centres	An average of at least 1 space	1 space per 20 car parking



Table 42: Recommended Cycle Parking Rates

Land Use Activity	Visitor (Short Stay)	Secure (Long Stay)
	every 50 m	spaces in commercial car parks to be located near the major destinations or main road frontages
Public Transport Stations	See below	

* Through the TMP process Council should work with event teams to ensure suitable levels of secure cycle parking is provided. The level of parking will vary significantly depending on the event, but where practical cycling should be promoted for travel to events.

Public Transport Stations, interchanges and Major Stops

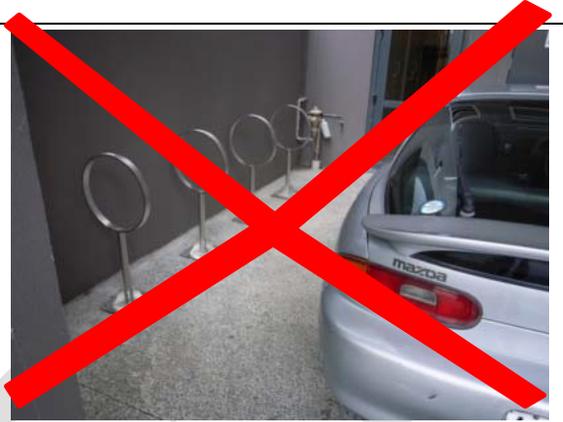
The number of long-term bicycle parks at PT stations will depend on a number of factors, including:

- Land use surrounding station, i.e. residential, commercial or industrial
- Cyclist accessibility
- Social economic area
- Perceived level of security
- Existing number of local residents using the PT station.

Where a PT station is located in a prominently residential area, the rate of long term (covered) bicycle parking should be in the order of one bicycle space per 30 boarding passengers in the AM peak (on an average day).

In addition at major stations a minimum of two short stay bicycle parks (Sheffield Stands or similar) should be provided in the vicinity of the main station entrance, in order to accommodate the bicycles of cyclists who wish to use the facilities.

Appendix 13B – Examples of Cycle Parking





Appendix 13C – Glossary of Terms

Advanced stop box (ASB)	A marked waiting area for cyclists in front of a general traffic lane on an approach to a signalised intersection.
Buffered cycle lane	A cycle lane with a painted buffer space (with no vertical elements) separating the lane from the adjacent motor vehicle travel lane.
Bus / cycle lane	A special vehicle lane identified by markings and signs for cycles and buses (and motorcycles) but not general traffic.
Contra-flow cycle lane	A cycle lane on a one-way street allowing cyclists to travel against the flow of other traffic.
Cycle bypass	A facility to avoid a local area traffic management (LATM) traffic calming device or intersection control.
Cycle facility	Generic term for a dedicated cycling infrastructure.
Cycle lane	A lane for the exclusive use of cyclists.
Cycle path	A facility that is physically separated from pedestrians and motorised traffic and intended for the exclusive use of cyclists. If in a road corridor, a cycle path is usually at a different level than the carriageway.
Hook turn facility	A hook turn is a two-stage right turn, made from the left side of the road. A hook turn facility is a marked box on the pavement which provides a waiting space for the second stage of the manoeuvre.
Protected cycle lane	A typically one-way cycle lane at carriageway level physically separated from parking or traffic lanes by an island with raised kerbs, bollards or other vertical features.



Sealed shoulder	Part of a sealed carriageway to the left of an edge line (typically on a rural road) which is of sufficient width to provide space for cycling.
Separated bicycle facility (SBF)	A general term describing a facility exclusively for cycling with physical separation from pedestrians and motor vehicles; includes cycle path and protected cycle lane .
Delineated path	A path where the section for cycling is delineated from the section for walking (e.g. by a painted line).
Shared path	A path provided for use by both cyclists and pedestrians, either in a road corridor or elsewhere, such as in parks or alongside rail lines, rivers, coastlines or lakeshores.
Shared zone	A street or place accessible to most road users but designed to operate at very low speeds to enable pedestrians to move freely and to have right of way over vehicles (including cycles).
Trail	A typically unsealed path intended for mountain biking, walking and/or tramping.
Wide kerbside lane	A general traffic lane on the left side of a carriageway of sufficient width to allow cyclists to travel beside the main traffic stream and to permit motorists to overtake cyclists without having to change lanes.

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