Cycle parking planning and design

Cycling Network Guidance technical note

ViaStrada Limited

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WAKA KOTAHI
NZ TRANSPORT AGENCY

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More information

Waka Kotahi NZ Transport Agency
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Contents

1. Introduction

This document summarises best practice provision of parking and end-of-trip facilities for people who cycle. This augments advice in the Cycling Network Guidance [1]. Note that New Zealand does not have a cycle parking standard and the Australian Standard *AS2890.3 Bicycle Parking Facilities* [2] has substantial gaps. For additional information, readers are encouraged to refer to the Austroads research report *Bicycle Parking Facilities: Guidelines for Design and Installation* [3].

1.1. Why cycle parking?

Central and local government are investing in cycling as a transport choice, creating bicycle lanes and other infrastructure in public spaces.

Private and commercial design and development should reflect the changing transport patterns and demand for cycle parking that results from this investment.

Cycle parking is much more space efficient and affordable than car parking. Ten or more cycles can fit in the same space as one car.

Cycle parking is now required by many councils under District Plan rules. Although supply rates differ, cycle parking should be considered as essential as car parking.

E-scooters are also putting pressure on cycle parking capacity in some NZ cities. More scooter and cycle parking is likely to be required as scooters and other low-powered devices grow in popularity.

Key principles

Good cycle parking is:

1. appropriate for different trips and groups (Figure 1)
2. sufficient in quantity to support expected demand for cycling as an active transportmode (section 2)
3. of high-quality design and installation (section 3)
4. located in safe, convenient and accessible locations, close to the destination of the user (section 4)
5. suited to different types of cycles, including cargo cycles, trikes and e-bikes (section 4.2)
6. well managed and maintained (section 5)

Cycle parking needs to cater for short or long stay users, or both.

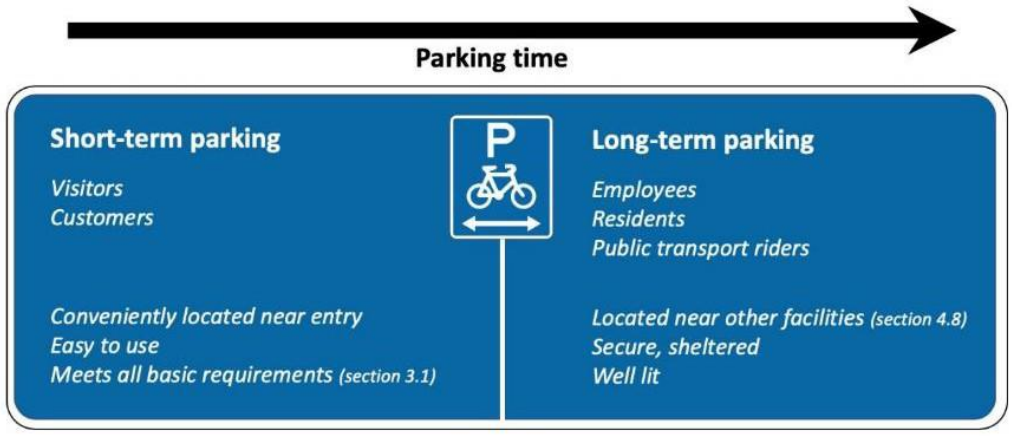

Figure 1: short-term vs. long-term parking

1.2. Key steps in cycle parking provision

The steps in providing cycle parking begin with assessing the existing supply of cycle parking and deficiencies that have been advised by the public, specific stakeholders, or through field audits. For councils, conducting an initial survey and putting the data into RAMM and/or GIS is a key preliminary step. Residential and commercial developers and managers may be able to skip to the planning stages shown in Figure 2.

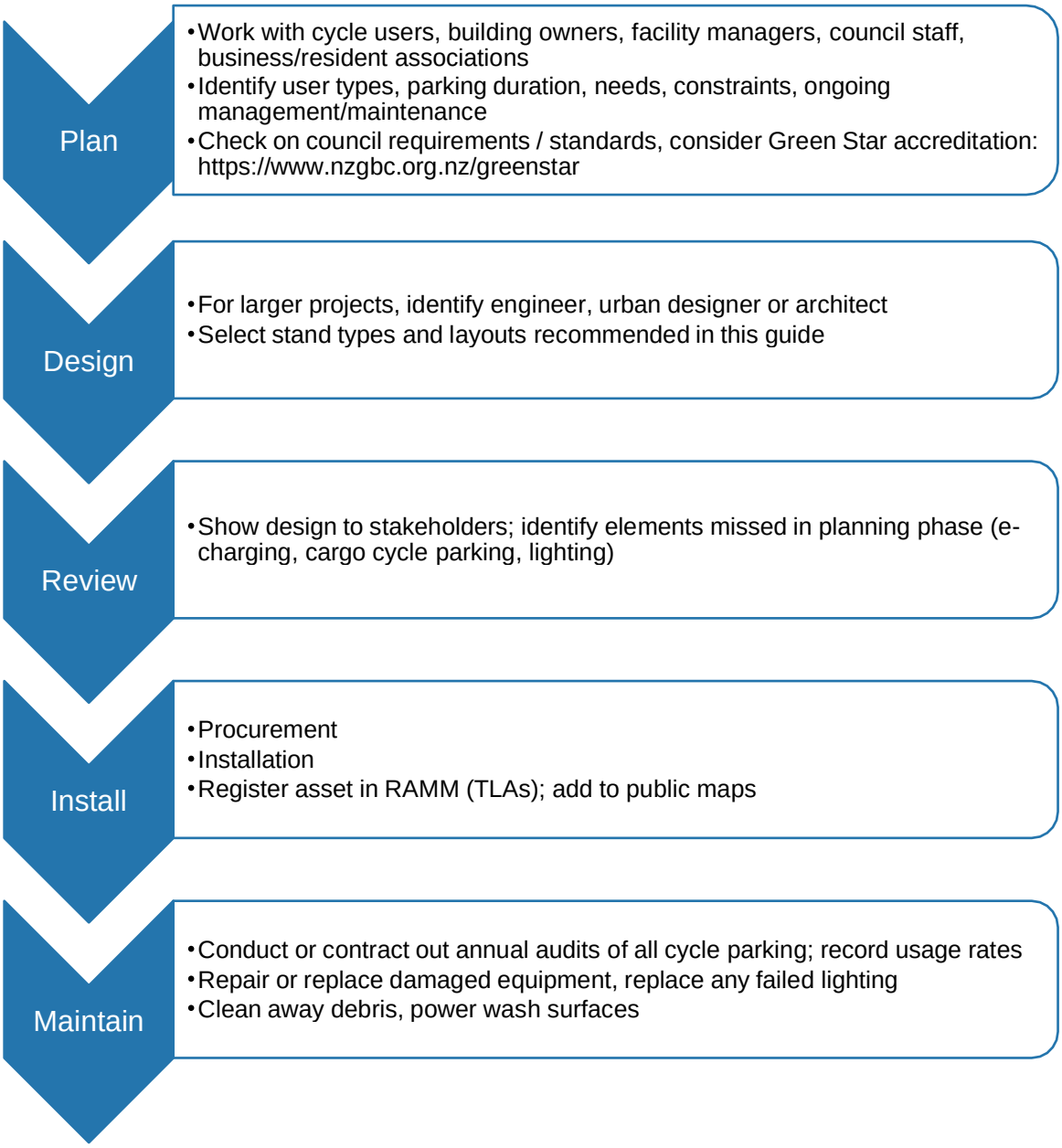

Figure 2: steps in providing cycle parking

2. Planning guidance

When determining the amount of cycle parking to provide there are a number of aspects to consider. There may be a District Plan minimum requirement that will be applicable where a development requires consent. However, these requirements may also help give an idea of quantity needed even if no consent is being sought. Appendix 1 provides examples of current district plan cycle parking requirements from three New Zealand jurisdictions of various population and cycling mode share.

District Plan requirements are generally a ‘minimum’. Consider any projected increase in cycling due to new and improved cycleways or other system changes. Future-proofing the cycle parking provision will ensure that space is allocated at the design stage (even if some parking facilities are not built immediately), rather retro-fitting later.

In addition to District Plan requirements, visiting similar land use activities to observe or survey the demand for cycle parking may help assess the number required. Depending on the nature of the activity, the survey may need to be undertaken at various times of the day or week, to see whether there are more short-term visitors throughout the day or more tidal patterns with people generally arriving in the morning and leaving in the afternoon. Consider that demand may be suppressed due to factors such as weather, holidays, adjacent construction, or poor existing network accessibility.

Note that schools with a Bikes in Schools track and/or cycle skills training programme are likely to have significant demand for bicycle parking.

Basic planning principles

- Set supply rates based on targeted cycling mode share, not historic data.
- All activities should provide cycle parking. For small developments even the provision of two inverted U stands with room to add more later ensures that people who cycle are catered for.
- Minimum requirements should be consistent with city or regional targets for cycle mode use. Where local targets do not exist, consider a target of 10% cycle mode share in urban areas
- Separate staff/resident and customer/visitor cycle parking supply rates and facilities are required, and the provisions should reflect the different needs of short/long stay users.
- End-of-trip facilities for staff should include sufficient showers and lockers, with an allowance for use by non-cycling staff. Drying facilities should also be considered.
- Medium to high density residential developments that are/were subject to car parking requirements should also be subject to cycle parking requirements for both residents and visitors.
- Where a residential development excludes on-site car parking, demand for on-site secure cycle parking for residents and visitors may be particularly high.
- If minimum rates cannot be met on site, cash developer contributions to fund public cycle parking nearby should be considered.
- Convenient placement is critical. Public bike parking should be no more than 25m from the entrance to key destinations; otherwise riders may seek closer informal parking places.
- Endeavour to have supply exceed peak demand by 10-25%.

3. Cycle stands

3.1. Six key design requirements

A cycle stand should:

1. Support the cycle frame, not only the wheel, with more than one point of contact. This means it won’t roll away or be knocked over, damaging the cycle and causing a trip hazard.
2. Be secure and enables secure locking. Opportunistic thieves may steal any part of the cycle that isn’t locked. Stands should be securely attached to the ground and enable, if desired, locking of frame and wheels with a rigid ‘D-lock’, a cable lock or both.
3. Be safe for all users and cycles. Cycle parking should not cause injury or obstruction for pedestrians, staff or cycle users, or damage cycles. Suitable cycle parking:
    - Should not create glare – stainless steel should have a brushed finish.

- Should be visible / detectable by vision impaired (or inattentive) pedestrians – use colour that contrasts with the surroundings and a horizontal element near ground level.
- Should not have sharp edges that could injure someone or damage the cycle finish.
- Should meet the minimum dimensions for size and spacing (refer section 4.2)

4. Work for many types of cycles; including cargo, e-bikes, mobility trikes, children's cycles.
5. Work for users of all ages and abilities. Users may not have the strength or height to lift cycles, especially heavier e-bikes. Alternatives to wall-mounted / multi-tier cycle parking should be available. Smaller stands or mid-level rails should be provided for children's cycles.
6. Look and work like cycle parking. There are some great artistic and decorative options, but functionality and safety are essential. It needs to look like parking for cycles.

3.2. Preferred stand type: the inverted U (Sheffield)

An inverted U, (also known as a staple or Sheffield) is a highly functional stand design and is the recommended type for most applications. A Sheffield has slight curvature at the top corners and a hoop has a continuous curve. These stands are typically 0.8 m high and 1.0 m long (refer section 4.2).

A crossbar or similar element that visually impaired persons can detect with a cane should be provided at least on the end stand or wherever the stand is immediately adjacent to the pedestrian through zone [2]. To be detectable by a person with a cane, the crossbar needs to be within 150 mm of the ground surface [5].

Higher crossbars may not be detected by a visually impaired person but do enable the locking of children's and "step- through" style bicycles as well as stabilising the front wheel.

Figure 3: Sheffield with crossbar (J. Lieswyn)

3.3. Acceptable alternative stand types

Alternatives to the inverted U stand may be acceptable, providing the basic requirements are met.

Hoop stands are similar to the inverted U but do not have the right angle bend at the top. They are common in Christchurch but experience has shown that bikes slide off in strong winds.

The continuous curve means a hoop is unlikely to be fitted with a crossbar.

Hoop stands are a good option for enclosed spaces where wind is not a key issue and vision-impaired pedestrians are not likely to walk into them.

Figure 4: hoop stands, Christchurch (J. Lieswyn)

Custom stands almost always have sharp edges that can damage paintwork. If the edges are wooden (Figure 5) then this risk is lessened.

Figure 5: laser cut custom stand (Bikes Welcome)

The classic **bicycle shape** stand (Figure 6) is another popular type with an immediately obvious function. This style is used in several NZ cities.

Figure 6: bicycle shape stands, Hastings (J. Lieswyn)

Sign-posts are ubiquitous elements of the streetscape and often used by cyclists when there is no better alternative. However, a thief has only to pull the post out of the ground (or lift the bike over the top of a small sign) to abscond with the cycle. By adding a **sign- post hoop** (Figure 7) to the post, security is improved. If the hoop is not welded, tamper proof hardware is required. Ideally the hoop should be at least 0.6m wide and there may be a risk of a cycle parked on the kerb side being hit by a passenger opening a car door.

In contrast to the simple custom stand, the art stand (Figure 8) takes many forms and each one is usually a unique artwork.

In this example, the key shaped stand is not long enough to provide support for cycles that do not have a kickstand and has sharp edges that can damage paintwork. The lock shaped stand meets the six key requirements, including multiple points of contact.

Figure 7: sign-post mounted hoop (Cyclehoop)

Figure 8: artistic stands (Bikes Welcome)

Simple galvanised **pipe rail** stands (also known as “triathlon racks” can be portable and used as temporary **event stands** or at destinations where cyclists frequent in large numbers (Figure 9). As the cycle must be lifted, they are not ideal for heavier cycles. They should only be used where there is passive surveillance nearby.

A **portable** inverted U (Figure 10) is welded to a floor rail and is made of lightweight alloy. Because it is easy to cut, such stands are best used for events with plenty of passive surveillance.

Figure 9: pipe rail stand with pump at a café, Christchurch (J. Lieswyn)

Figure 10: portable event stand, Palmerston North (J. Lieswyn)

The **two-tier rack** (Figure 11**)** is a space-saving design useful in high-demand situations where space is limited (refer section 4.6). The design should include a ‘lift assist’ mechanism or be weighted so that rolling a bike on automatically lifts the bike, and signposted instructions for use. Lower quality racks are harder to use and don’t get as much use on the top tier.

Hitching rails mounted to a wall can provide an adequate support and locking point for short stay parking. They are particularly useful when there is insufficient path or frontage space for the preferred inverted U design. The rail in Figure 12 is mounted 75 mm (centre of rail) to the wall; a dimension of 200 mm allows for widerhandlebars and easier use of a D-lock.

Figure 11: two-tier parking, Wellington (J. Wratt)

Figure 12: hitching rail, Christchurch (J. Lieswyn)

3.4. Unacceptable stand types

A **slot stand** (also called a “wheel-bender”) is any stand that supports the cycle only by a single wheel. Some do not accept wider tyres. With no support forthe frame, the cycle may be inadvertently knocked over, buckling the wheel. They require a long (and easily cut) cable lock to secure the frame.

A **“toast” or “wave”** style rack (Figure 14) has a higher vertical element but doesn’t have two points of contact with the cycle and therefore is an inadequate support. Although typically designed for bikes to straddle the low parts perpendicularly, ridersmay elect to secure their bike side-on instead, thus blocking a large section of it.

Figure 13:slot stand, Christchurch (ViaStrada)

Figure 14:wave stand, Palmerston North (J. Lieswyn)

Compact stands, also known as staggered height stands, are similar to “wheel-benders” but have a higher bar for support and locking purposes. Such stands offset cycles by raising the front wheel of every other cycle so that the handlebars are separated vertically. Theoretically, this means that the spacing of main locking bar can be reduced (to 750 mm from the typical 1.0 m), increasing the cycle parking capacity of a given area.

Compact stands are therefore popular in public transport facilities and at some universities. However, a reduced spacing makes it difficult to reach between cycles for locking or accessing luggage panniers. The complex tangle of tubes at ground level tend to attract and retain debris and leaves. Many cargo cycles can only fit at the ends, which may already be occupied. The handlebar of a cycle being pulled out from a lower rack can damage the control cables of an adjacent cycle. For these reasons, compact stands are not recommended.

Figure 15: compact stand, Christchurch (J. Lieswyn)

3.5. Materials and specifications

The main considerations are durability, maintenance time and cost, non-damaging to cycles or people, and fitwith the local environment. In the New Zealand climate, UV stability and corrosion resistance are key considerations.

Table 1: stand materials and durability

Most durable ⟷ Less durable			
Stainless steel – marine grade 316	Thermoplastic or rubber coated steel	Powder coated double dip galvanised steel	Zinc galvanised steel

For more information on stand materials and coatings refer to Essentials of Bicycle Parking (APBP) or Austroads (2016). Use these specifications as guidance to help choose a supplier and specify stand requirements. Always talk to the supplier about where the stand will be located to ensure the stand supplied andproposed installation are suitable.

Table 2: component specifications (adapted from the Cambridge Cycle Parking Guide)

Tool resistance	All parts of the stand used for locking the cycle must withstand cutting by a 300 mm, 24 tpi hacksaw, at a rate of 1 stroke per second, for a minimum of 120 seconds.
Tube size	50 – 75 mm diameter tubing
Thickness of tube wall	2.5 mm minimum
Base plate	150 x 150 x 6 mm base plate welded to stand if bolted to surface or a base plate at the base of in - ground posts will help prevent it being pulled out.
Minimum service life	20 years (for asset management purposes)

Cycle parking stands are typically either surface mounted or embedded in concrete footings. Variations on these methods and common specifications are provided in Table 3.

Table 3: cycle stand installation specifications

Method	Variations	Typical applications	Typical specifications
Bolts (surface mount)	Stands are individually affixed to the floor with bolts and masonry anchors: easy to replace or relocate, but less secure and durable than other methods	Parking structures, buildings or cycle parking cages	Fixing hardware should be tamper - proof high security bolts of M10 minimum size; two or more per stand leg For outdoor applications, ensure all fixing hardware is the same material as the stand to avoid galvanic corrosion
	Stands are bolted to a floor rail, reducing the number of floor anchors required; easy to replace or readjust spacing		
Concrete footing (inground)	Stands are fitted to a concrete - embedded sleeve with tamper - resistant hardware	On - street corrals or kerb - less shared streets where stands are more likely to be damaged by motor vehicles	Each jurisdiction is likely to provide the requirements for a concrete embedment. Austroads (2016) cites Sydney's 350 mm post depth in a 450 mm diameter, approximately 600 mm deep footing [3] Christchurch does not specify post depth, but calls for a 250 mm diameter, 600 mm deep footing [6] Do not use quick - set concrete because it tends to swell and buckle the pavement
	Stands are directly embedded in the concrete footing: most secure but more difficult to replace or relocate	Public open spaces and street furniture zones of footpaths	

4. Layout and design

4.1. Location of cycle parking

Table 4 lists a range of factors that should be considered when siting cycle parking.

Table 4: cycle parking location best practices

Easy to find and access	Visitor cycle parking facilities should be clearly signposted or visible to cyclists entering the site. It is important that the location is in the direct line of travel (see "proximate" below). Preferably a location that can be ridden to and also provide convenient and safe access from surrounding cycle routes and main entry points. Surface markings work well to direct users to cycle parking and provide a clear route.
Pedestrian safety	Consider the safety of mobility or vision impaired pedestrians. Locate stands so that parked cycles do not block the pedestrian path. This may be off the footpath or in the 'street furniture zone'.
Protected	Cycle parking facilities should be located so that the cycle is at no risk of damage from vehicle movements within the site.
Unobstructed	Cycle parking facilities should be available during the hours of operation and shall not be diminished by the subsequent erection of any structure, storage of goods, or any other use.
Proximate	Cycle parking facilities should be located as close as possible to and no more than 25 m from at least one main pedestrian public entrance to the building/activity. An exception could apply to a building on a key pedestrian frontage that has no setback from the road frontage, which results in there being no space for the visitor cycle parking within 25 m of the main entrance.
Security and safety	As per Crime Prevention Through Environmental Design (CPTED) principles, avoid obscured locations where anti - social and/or criminal activity can occur. The location should enable adequate surveillance (passive or electronic) and/or physical security so as to deter and prevent cycle theft and assure personal safety. Security measures may include: CCTV cameras, location in well trafficked / highly visible locations, close to on - site security, locked/restricted access (e.g. cycle parking cages).
Lighting	Cycle parking areas should be well lit for theft protection, personal security, amenity and accident prevention.
Weather protection	Cycle chains and other components can rust quickly. Some e- bikes are susceptible to damage from heavy rain. Use an existing overhang, covered walkway, or construct a canopy or roof — either freestanding or attached to a building.
Contour / Slope	Cycle parking should be placed on level ground. Where this cannot be achieved, consider aligning the stands parallel to the contours so that cycles do not roll downhill.
Appeal	Attractive, obvious, clean and well - maintained cycle parking will deter anti - social behaviour, and make users feel safe and welcome.

4.2. Site design: spacing and layout

An **envelope** is the space around a parked bicycle. Figure 16 (next page) presents envelopes, typical stand dimensions, and layouts for narrow and wide footpaths, with and without kerbside car parking, on-street corrals, and inside buildings. A 0.2 m spacing between parallel stand envelopes is desirable. For standard inverted U stands (or similar), the spacing between stands should be at least:

- Standard cycles: 1.0 m +/- 0.2 m; a smaller dimension increases capacity while a larger dimension is easier to use. Note that spacing of 1.2 m is specified in Australian Standard 2890.3 [2]
- Cargo bikes and trikes: 1.5 m minimum, 1.8 m desirable. If there is not enough space for an entire row of such stands, then the stands on each end of a row should be spaced more widely

There is often a need to provide clearance around the stand (and cycle envelope) for:

- Car doors (where stands are in the street furniture zone adjacent to parallel parking)
- A person to move around the cycle to lock or unlock it, or to access luggage panniers/cargo

When a stand is parallel to an external or internal building wall, there will usually be a need for 1.0 m of clearance between the stand and the wall (0.5 m for the cycle envelope and 0.5 m for a person). No clearance around the cycle envelope is required if the stand is perpendicular to a wall, or a kerb without adjacent car parking. The spacing to a wall or kerb should be adjusted for these clearances and the angle of the stand as per Table 5.

Table 5: minimum distance (in metres) from centre of stand to a wall or kerb

	Orientation				
	Parallel				Perpendicular
	0˚	22.5˚	45˚	67.5˚	90˚
With clearance	0.9	1.0	1.1	1.2	1.3
Without clearance	0.5	0.6	0.7	0.8	0.9

The minimum **aisle width** for manoeuvring cycles to/from parking, per Australian Standard 2890.3 should be 1.5 m. Allow 2.0 m for multi-tier parking or cycle lockers. The Cambridge Cycle Parking Guide [7] provides a complete set of turning paths for setting out indoor parking and the Christchurch City Council District Plan has a simple turning path diagram [8].

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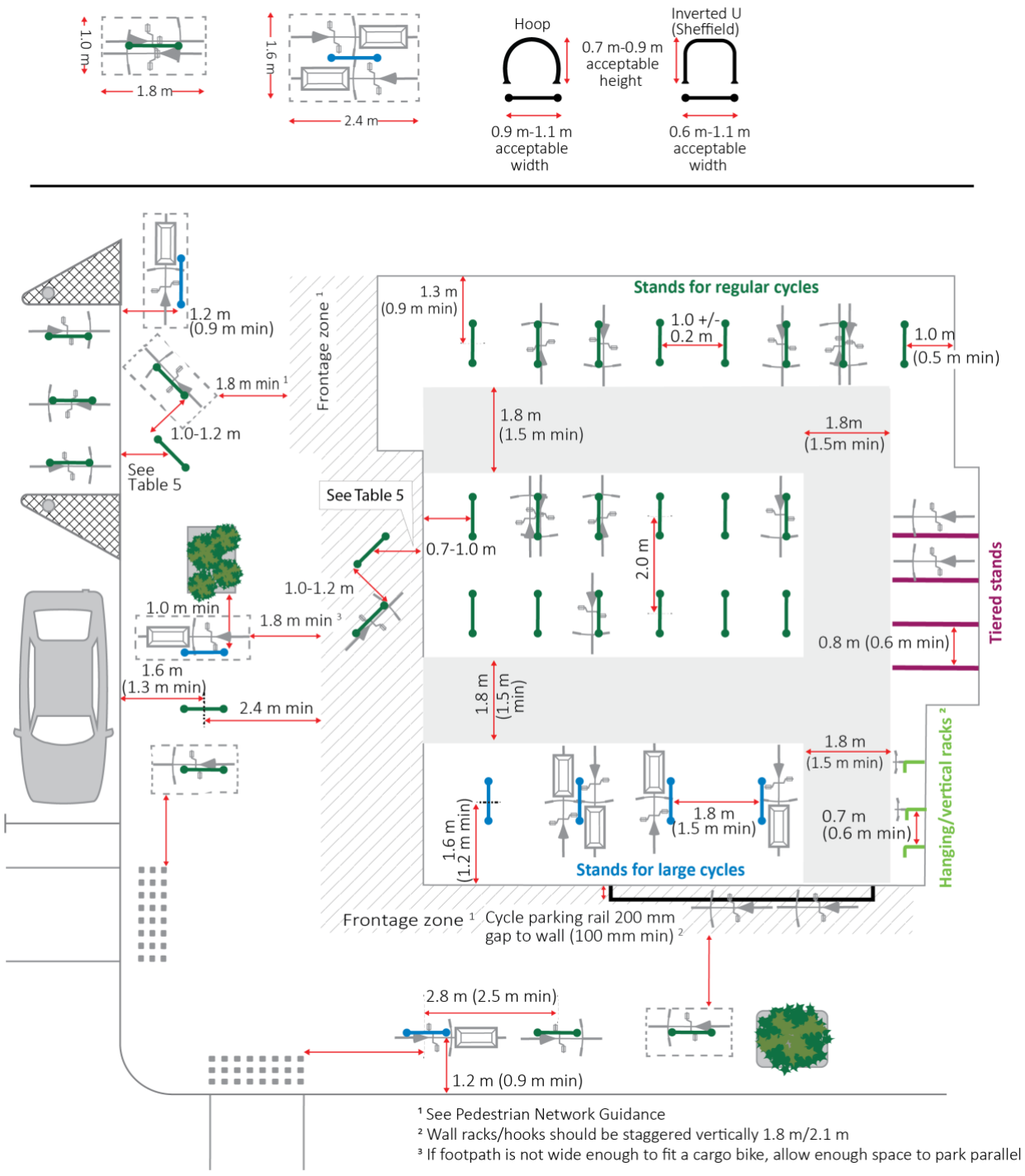

*Figure 16: cycle parking envelopes, typical stand dimensions and **layouts***

Note that all dimensions are based on cycle envelopes and a 1.0 m long cycle stand. Adjust if using different stands or if providing for different types of cycles. Where a range is given, the upper value is preferred for ease of use, and the lower value may be used if space is limited and/or greater capacity is required.

4.3. Higher capacity or weather protected solutions overview

The previous sections focused on the type of stand and layout design for stands. Table 6 illustrates typical configurations where stands are grouped together or other types of parking such as lockers and hangers.

Table 6: overview of typical multi-bike parking or weather protected bike parking types

Corrals & docks	Lockers & hangers	Bike sheds & shelters	Bike cages & rooms	Bike stations
Relocatable; generally uncovered	Encloses one or two bikes. If more than one, then riders are travelling together	Bike parking within a stand-alone structure	Bike parking (only) within a building	Bike parking with other services (rental, servicing, café etc) in a building
Capacity (number of bikes per unit)				
5 – 10	1 – 2	10 – 60	25 - 100	50 – unlimited
Security				
Locking (inbuilt or user provided) per bike	Locking (inbuilt or user provided) per enclosure	May be open or have a gate/door	Limited access	Controlled access by station staff
				
Figure 17: relocatable stand units, Christchurch	*Figure 18: e-bike hanger, Napier*	*Figure 19: bike shelters, Auckland*	*Figure 20: bike room in West End Parking Building, Christchurch*	*Figure 21: BART Bike Station, Berkeley USA*

Figure 22: double-tier shelter with cargo stands and tool stand in foreground, Nelson (M. Edwards)

More information and variations of each of these types follows.

4.4. Corrals and parklets

A parklet is on-street car parking space re-purposed for any combination of café seating, landscaping, and cycle parking (often on a portable base). A cycle corral is a marked space in the carriageway with cycle stands. Cycle parking in the street should be clearly delineated with vertical elements that are high enough to be seen by a reversing motorist through the rear-view mirror and/or kerb extensions. The ideal parklet or corral will also provide space for longer cargo bikes and e-scooters. If there is a two-tier stand included, usage should be monitored to assess whether there is typically enough space on the lower tier, as the upper tier can be difficult to use for owners of heavier bikes (e.g. e-bikes). Operating instructions for use of upper tiers may be needed.

Figure 23: relocatable covered bike parklet, Palmerston North (J. Lieswyn)

Figure 24: bike corral, Wellington (G. Koorey)

4.5. Docks and high-security stands

A group of cycle or e-scooter stands can equipped with in-built locking mechanisms controlled by an app or swipe card. Such locking systems are more robust than most privately owned locks. Installation and maintenance costs may be covered through advertising revenue derived from a digital billboard attached to the end of the structure. The billboard can also present public service information such as active transport and recreation route maps. Each stand can be fitted with an e-bike charger locker and power point to address the potential for chargers to be stolen.

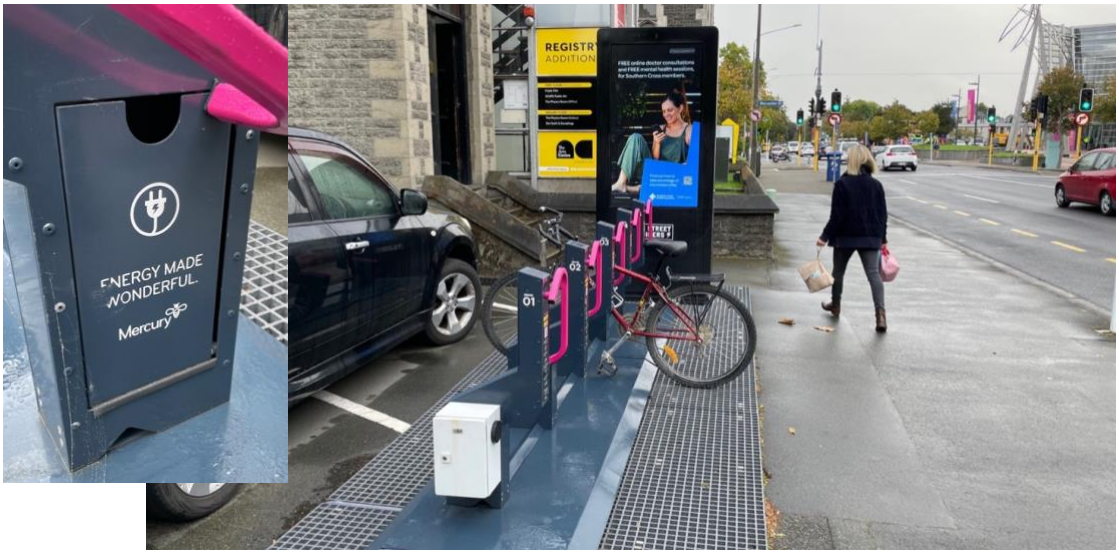

Figure 25: a high-security cycle park, Christchurch. Inset: e-bike charger locker and power point (J. Lieswyn)

4.6. Lockers and other small enclosures

A secure locker designed to accommodate a single cycle is a good long-stay cycle parking option particularly for transit hubs.

A visually permeable design is better for crime prevention, best suited to drier climates and indoor areas. Mostly solid sides are better for rainy climates, but some cross ventilation helps dry raingear that has been hung over the bike.

There are numerous access control choices, including coin-operated locks and subscriber keys/cards. Auckland experience has shown that key operated lockers are difficult to manage and have removed bike lockers as a result. In contrast, Greater Wellington continues to provide bike lockers at ten train stations.

Compared to multi-bike area enclosures, lockers are more costly and require more space per bike.

Figure 26: partially permeable locker, Bielefeld Germany (A. Wilke)

One of the original communal enclosures, the “Bikehangar” (Figure 27) was designed in the UK and thousands have been installed in residential areas. This solution gets around the lack of secure cycle parking within multi-unit residential developments. Such an enclosure fits in the same space as one motor vehicle but can store up to six bicycles (or scooters, prams, cargo bikes, etc.). Each unit can be assigned to particular residents or blocks of apartments, or be available to the general public. Access is usually secured by the user’s own lock or combination locks with a master key for local authority use. The latest generation of these structures have optional digital access with remote monitoring.

Figure 27: communal “Bikehangar” for up to six bikes or cargo bikes, London (Cyclehoop)

Figure 28: bike enclosures for one or two bikes, Napier (J. Lieswyn)

Enclosures for one or two bikes provide rain protection and higher security than a standard cycle stand, because accessories or parts cannot be easily accessed (Figure 28). These may be secured with a user-provided padlock or accessed via an electronic card lock.

4.7. Restricted access enclosures

NB: See section 4.2 for specific layout parameters.

Enclosures provide rain and UV protection and generally have electronic card access. They may utilise any acceptable stand type, again providing some spaces for longer cargo bikes and trailers. Such facilities are often called bike sheds or bike cages. Enclosures may be stand-alone or contained within a building.

Figure 29: enclosure with swipe card access, electric gate, security cameras – Univ. of Canterbury (G. Koorey)

Figure 30: a controlled access "bike shed" in Sydney (Transport NSW)

Cycle parking spaces within a building provide secure restricted access for commuters, residents of multi-family or apartment buildings, and public transport riders. They should:

- have power supply for charging e-bikes
- have sliding gates or doors, ideally motor-actuated for ease of use with automatic closure; a manual door release on the inside is required for safety
- have security cameras if the area in or around the enclosure is public
- not use chain mesh for a surrounding security layer, as it is easily cut
- ideally be located close to a changing area with lockers (or include them on-site)
- may require users to sign a contract to ensure they understand their obligations (e.g. what constitutes abandonment, security procedures, etc) or include signage to communicate this

Figure 31: cycle parking with motorised sliding doors and e-bike charging, Christchurch bus exchange (J. Lieswyn)

Figure 32: access-controlled public bike parking in a parking building, Christchurch (J. Lieswyn)

Within the enclosed space, vertical hooks or wall racks may help increase capacity and control internal parking at relatively low cost. If public access is possible, ensure the cycle can be securely locked to the wall by providing a locking point. The hooks need to be wide enough to accommodate fat tyres, appropriately spaced, and mounted at suitable heights, to suit the range of cycles expected (e.g. road, commuter, mountain, hybrid). For example, after three iterations the Greater Wellington Regional Council cycle shed has hooks that are:

- 100 mm wide, with 110 mm entry gap, angled about 35 degrees downward from the horizontal, for strength and ease of hanging
- covered with a polyurethane sheath to avoid damage to rims, spokes and valves
- mounted at alternating heights of 1.8 and 2.1 m, with 550-650 mm between hooks

Figure 33: wall hooks, GWRC (S. Kennett)

New medium and high density developments including apartments and town homes should have resident and visitor cycle parking. Figure 34 shows a good example, with the following features:

- two entrances (one at each end) provide for busy periods and personal security
- ceiling mounted lights are motion activated (reducing power consumption and light spillover) and pathway bollard lights
- a water tap for bike washing
- sheffield stands appropriately spaced
- visitor parking outside the structure

Figure 34: a bike enclosure in the East Frame residential development, Christchurch (J Lieswyn)

Figure 35: interior view of Figure 28; the red long tail cargo bike fits without impeding passage (J. Lieswyn)

Figure 36: galvanised steel mesh and frame; pushbutton lock (A. Heins)

4.8. E-scooter parking

The growth of e-scooter usage has resulted in numerous e-scooters being parked throughout urban environments with potential risks for blind or low vision pedestrians. [11]

Designated parking areas can be formed with street furniture (Figure 37) or markings. Micromobility rental operators can then use in app parking instructions to direct users to these parking areas.

Figure 37: quick-build e-scooter parking, Auckland (J. Lieswyn)

4.9. School cycle and scooter parking

Traditionally, many New Zealand schools provided bike sheds for weather-protected parking. In recent decades, the provision of quality cycle parking has declined in parallel with a decline in cycling to school. As this trend is reversed through upgraded cycleways in the neighbourhood and/or Bikes in Schools tracks, schools should provide fit-for-purpose cycle parking to support students and staff who are getting back on their bikes.

For new schools, cycle parking for students and staff should be considered at the same time as car parking and site access – not as a minor component of a landscaping plan. Existing schools may take advantage of other campus improvements to upgrade cycle parking at the same time.

Covered parking helps protect rubber components (tyres, handgrips, seats) from UV damage and keeps rain from rusting brake cables, fasteners and chains. School cycle parking should comply with the planning and design guidance of this technical note, including stand types and aisle widths. Many bikes ridden to primary and intermediate schools will often be small size but relatively heavy for the child using it, so large racks and solutions that involve lifting the bikes should be avoided.

Separate skateboard and scooter parking should also be considered. This can be a simple wheel stand (Figure 38 shows CNC machined stainless steel racks), wall rack with hanging cables for locking, or a more substantial rail stand.

Figure 38: metal scooter stands, Frimley School Hastings (J. Lieswyn)

School travel plans typically include an audit that can reveal infrastructural barriers to walking and cycling to school. If cycle and scooter parking is prominent, weather protected, and high quality, then students are given the impression that active travel is a valued travel choice.

5. Supporting infrastructure

5.1. Signs and markings

When cycle parking has been well located, it should not require signage to find it. However, **wayfinding signage** may be needed at large sites such as town centres, shopping malls and bus stations. Signs should enable a first-time visitor to easily locate the cycle parking regardless of their approach direction or entry point. The standard sign to indicate cycle parking is defined in the Traffic Control Devices Manual [9] and illustrated in the sign specifications [10].

Class restricted cycle stand				
Variation	Standard	Right arrow	Left arrow	Dual arrow
Code	PP2	PP21		
Rule	R6-52	R6-52.1		
Components	R6-1C-2C	R6-1C-4		
MOTSAM	RP-9	RP-9.1		

Figure 39: class restricted cycle sign

Site maps with cycle parking marked can also assist way-finding.

Instructional signage may be required if providing multi-level racks, wall hook parking or secured access. Signs can also cover abandoned and lost property policies.

Pavement markings can inform riders about safer locking practices. These are in use in Wellington and Christchurch.

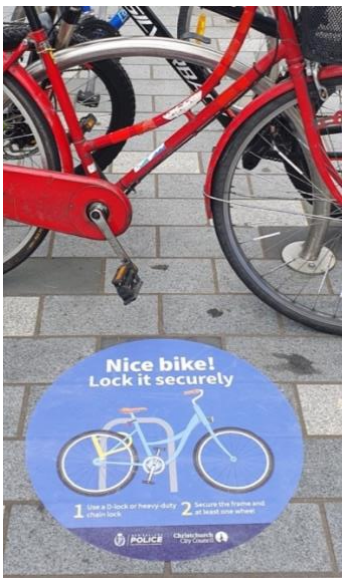

Figure 40: pavement sticker advises how to lock your bike (A. Heins, Christchurch City Council)

Figure 41: for multi - tier racks, provide signs to explain use, Christchurch (J. Lieswyn)

5.2. Lighting

Where parking is at a destination that is located internally or has longer than daylight hours of operation, the parking should be well lit artificially. Consult the NZ Building Code requirements for artificial light (clause G8) for acceptable solutions.

Figure 42: lighting at extended hours locations, Huia pool, Hutt City (Bikes Welcome)

5.3. Other end-of-trip facilities

Tool stations typically include a bar to hang the cycle while making quick repairs, and a set of tools hanging from stainless steel braided cables inside the post (Figure 43). A pump with a universal valve head is secured in an adjacent post. The pump will need to be serviced one to four times per year depending on usage.

Although secured with stainless steel cables, tools are occasionally stolen or damaged and require periodic replacement. Councils or owners of tool stations need to budget for maintenance.

Airports can provide tool stations with signs and pavement marking to establish a cycle assembly area ideal for tourists arriving or departing with their own cycle. Commuters and airport employees who ride may also find the tools and pump handy. Christchurch, Nelson and Rotorua airports have such assembly areas.

Figure 43: tool station, High Street Christchurch (J. Lieswyn)

Showers and changing areas are important for every building. A best-practice facility is located between the secure parking area and the public areas (e.g. elevators or lobby / reception spaces) and includes:

- Clotheslines or hooks to hang gear to dry on
- Hair dryers and hair straighteners
- Iron and ironing board
- Towels
- Noticeboard
- Lockers for clothing, towels, toiletries
- Optionally a drying room for wet gear

Gear lockers are needed at workplaces and transport interchanges, as modern cycles have numerous detachable items such as seats, lights and pannier bags but no lockable space in which to store them (refer section 4.5). These also provide space for clothing, towels, and toiletries. In a private building, they may be simple units such as shown in Figure 44. In public spaces, lockers should have an electronic payment or transit system card reader for secure access.

E-bike charging. Most e-bikes have sufficient range so that charging away from home is not necessary, but when the building is located in outlying areas (e.g. airports, remote business parks) or commuters ride from an outlying area, charging points may be needed.

If only one or two charging points are provided, then signs or markings should be included (i.e., E-BIKES ONLY) to maximise the opportunity for e-bike rider use. In unrestricted public access areas, a key consideration is the security of the charger itself. A charger left unsecured is likely to be stolen.

E-bikes are difficult to sell without the charger, and thieves will take the charger even if they cannot easily take the bike. Solutions include building charging points into some or all of the spaces with a lockable compartment.

Figure 44: gear lockers should be near the cycle parking area

6. Management and maintenance

Councils and large institutions should keep an up-to-date inventory of cycle stands and other facilities. For road controlling authorities, this will usually be within the scope of Road Assessment and Maintenance Management (RAMM) systems. Councils should consider publicising the location of cycle parking through existing public- facing integrated transport or cycling-specific maps online. A good example is Wellington City Council's web map [13]

A network or campus-wide inspection should be conducted at least annually. The elements of the audit should include:

- Condition: identify any damaged or corroded stands for replacement; tighten hardware if necessary.
- Cleanliness: assess whether the cleaning regime is sufficient. Periodic cleaning of cycle stands is especially important for stands that are floor mounted on a rail where debris can be trapped. A clean floor helps users keep their clothes clean if they must kneel (e.g. when locking their cycle).
- Occupancy survey. Stands that appear to have no cycle parking activity should be programmed for one or two more surveys to confirm the finding, and after consultation with nearby stakeholders could be relocated. Sometimes, problems preventing usage (inadequate lighting, security, or wayfinding) can be rectified to encourage use rather than relocating the stands. Those that are full or near-full should be augmented.
- Removal of abandoned cycles, locks and other property.

Councils and large institutions can also support cycling by helping educate riders. Auckland Transport has a web page dedicated to cycle parking including tips on how to lock your cycle securely and how to record the serial number in the event of theft [14].

References

1. NZ Transport Agency. *Cycling network guidance - planning and design*. undated [cited 2018; Available from: https://www.nzta.govt.nz/walking - cycling -and -public-transport/cycling/cycling - standards- and -guidance/cycling -network -guidance/
2. Standards Australia, 2015. *AS 2890.3 - 2015 Parking facilities - Part 3: Bicycle Parking Facilities*.
3. Barber, H., et al., 2016. *Austroads research report 527: Bicycle Parking Facilities: Guidelines for Design and Installation, Austroads.* https://austroads.com.au/publications/active -travel/ap -r527-16
4. Association of Pedestrian and Bicycle Professionals (APBP), 2015. *Essentials of Bicycle Parking.* https://www.apbp.org/assets/docs/EssentialsofBikeParking_FINA.pdf
5. Waka Kotahi NZ Transport Agency, undated. *Pedestrian network guidance* https://www.nzta.govt.nz/walking-cycling-and-public-transport/walking/walking-standards-and-guidelines/pedestrian-network-guidance/
6. Christchurch City Council, 2017. *Construction Standard Specifications Part 6 Roads.* https://ccc.govt.nz/assets/Documents/Consents-and-Licences/construction-requirements/CSS/Download-the-CSS-2022/CSS-2022-PART-6-ROADING-STANDARD-DRAWINGS.PDF
7. Transport Initiatives and Cambridge City Council, 2010. *Cycle Parking Guide for New Residential Developments.* https://www.cambridge.gov.uk/media/6771/cycle-parking-guide-for-new-residential-developments.pdf
8. Christchurch City Council, undated. *District Plan Appendix 7.5.2 Cycle parking facilities.* https://districtplan.ccc.govt.nz/pages/plan/book.aspx?exhibit=DistrictPlan
9. Waka Kotahi NZ Transport Agency. *Traffic Control Devices Manual*. https://www.nzta.govt.nz/resources/traffic -control -devices-manual/
10. NZ Transport Agency, undated. *Sign specifications.* https://www.nzta.govt.nz/resources/traffic-control-devices-manual/sign-specifications/
11. Waka Kotahi NZ Transport Agency, 2021. *Mode shift to micromobility.* https://www.nzta.govt.nz/assets/resources/research/reports/674/674-Mode-shift-to-micromobility.pdf
12. Wellington City Council, undated. Bike parks and fix-it stands. https://www.bikethere.org.nz/im-riding-in-traffic-free-places/bike-parks-and-stands/
13. Auckland Transport, undated. *Bike parking and gear storage.* https://at.govt.nz/cycling - walking/advice - support/bike -parking -gear -storage/

APPENDIX 1: EXAMPLE DISTRICT PLAN CYCLE PARKING AND END OF TRIP FACILITY REQUIREMENTS

The following table presents example cycle parking requirements from three New Zealand jurisdictions. Local conditions and topography will have a substantial impact.

To present the information concisely, some text has been omitted. The source district plans should be consulted if in doubt. These are a starting point for consideration when developing or revising requirements.

Activities that are not well covered by these plans include parks and public transport stations, both of which can be major cycle parking demand attractors.

Central city cycle parking demand is typically higher than suburban locations. The Christchurch District Plan has different cycle parking rates for the central city and outside the central city. For simplicity, this table includes the rates outside of the central city only. Refer to the District Plan directly for central city rates.

	Large City – Low to med cycle mode share (Auckland)		Medium City – Med cycle mode share (Christchurch)		Town – Semi rural – low cycle mode share (Rangiora)	
Activity type	**Visitor**	**Long Stay**	**Visitor**	**Staff/residents/student**	**Visitor**	**Long Stay**
Food and beverage	Up to 350m^2 GFA: Nil required Greater than 350m^2 GFA: 1 per 350m^2 GFA	1 per 300m^2 GFA	1 per 300 m2 PFA	1 per 100 m2 PFA (2 min.)	1 per 250m^2 net floor area	1 per 100m^2 net floor area
Other retail and commercial activities	Up to 500m^2 GFA: Nil required Greater than 500m^2 GFA up to 5000m^2 GFA: 1 per 500m^2 GFA Greater than 5000m^2 GFA: 1 per 750m^2 GFA	1 per 300m^2 GFA of office	Commercial Services: 1 per 500 m2 GFA Factory shops: 1 per 1000 m2 GLFA Service stations: 1 per 1000 m2 GLFA Other retail: 1 per 300 m2 GLFA	Commercial Services: 1 per 200 m2 GFA Factory shops: 1 per 750 m2 GLFA Service stations: 1 per 750 m2 GLFA Other retail:1 per 750 m2 GLFA	General retail: Except for sites with frontage to a principal shopping street, 1 per 500m^2 GFA Supermarket: 1 per 500m^2 GFA Large format retail: 1 up to 500m^2 GFA plus 1 per 1000m^2 GFA thereafter	General retail: Except for sites with frontage to a principal shopping street, 1 per 500m^2 GFA Supermarket: 1 per 5 FTE employees Large format retail: 1 per 1000m^2 GFA

	Large City – Low to med cycle mode share (Auckland)		Medium City – Med cycle mode share (Christchurch)		Town – Semi rural – low cycle mode share (Rangiora)	
Activity type	**Visitor**	**Long Stay**	**Visitor**	**Staff/residents/student**	**Visitor**	**Long Stay**
Community facilities Places of assembly Entertainment and recreation facilities	Entertainment facilities: either 1 per 50 seats, or 2 plus 1 per 1500m^2 GFA Major recreation facilities: 1 plus 1 per 1000m^2 GFA of office and other accessory activities Community facilities: 1 per 200m^2 GFA Organised sport and recreational facility: 3 per hectare distributed in groups of 3-5 racks	Entertainment facilities: either 1 per 15 FTE employees or 1 per 1500m^2 GFA Major recreation facilities: 1 per 300m^2 of office and other accessory uses Community facilities: 1 per 500m^2 GFA Organised sport and recreational facility: 1 per hectare	Spiritual activities: 1 per 100 m2 PFA Pools: 1 per 10m^2 pool area Sports: 10 per ha pitch area or 1 per 150m^2 court area Gymnasiums: 1 per 50m^2 GFA Libraries: 1 per 100m^2 PFA Museums and galleries: 1 per 200m^2 PFA Cinemas and theatres (up to 500 seats): 1 per 30 seats Cinemas and theatres (over 500 seats): 1 per 60 seats Other entertainment /recreation: 1 per 50m^2 PFA	Spiritual activities: 10% of visitor requirement Pools: 1 per 500m^2 pool area Sports: 5 per ha pitch area or 1 per 500m^2 PFA Gymnasiums: 1 per 600m^2 PFA Libraries: 1 per 400m^2 PFA Museums and galleries: 1 per 1000m^2 PFA Cinemas and theatres (up to 500 seats): 1 per screen Cinemas and theatres (over 500 seats): 1 per 60 seats Other entertainment/ recreation: 10% of visitor requirements	Places of assembly: 2 plus 1 per 1000m^2 GFA Club houses on sports grounds: 2 plus 1 per 1000m^2 GFA Sporting grounds, playing fields: 3 plus 3 per hectare used for the activity Golf courses without a club house: 3 plus 1 per 10 hectares	Places of assembly: Nil Club houses on sports grounds, sporting grounds, playing fields, golf courses without a clubhouse: Nil
Care facilities	Residential care: 1 plus 1 per 30 units/apartments Care centres: 1 plus 1 per 50 people to be accommodated	1 per 10 FTE employees	1 per 50 clients (including a care home within a retirement village)	1 per 30 clients (including a care home within a retirement village)	Residential care home: 2 parks for greater than 20 beds	Residential care home: 1 per 5 FTE employees
Retirement village (excluding a care home within a retirement village)	1 plus 1 per 30 units/apartments	1 per 10 FTE employees	1 per 10 units, for developments with 10+ units	Nil	Not specified as an activity.	Not specified as an activity.

	Large City – Low to med cycle mode share (Auckland)		Medium City – Med cycle mode share (Christchurch)		Town – Semi rural – low cycle mode share (Rangiora)	
Activity type	**Visitor**	**Long Stay**	**Visitor**	**Staff/residents/student**	**Visitor**	**Long Stay**
Other residential activities	1 per 20 dwellings for developments with 20 or more dwellings	1 per dwelling without a garage for developments with 20 or more dwellings	Social housing complex: 1 per 10 units for developments with 10+ units Student hostel accommodation: 1 per 10 beds Other: 1 per 20 units for developments with 20 or more units	Social housing complex: 1 per dwelling without a garage Student hostel accommodation: 1 per 3 beds Other: 1 per dwelling without a garage	Nil	Nil
Industrial activities	1 plus 1 per 750m^2 GFA of office	1 per 300m^2 GFA of office	Warehousing and distribution: 1 per 2000m^2 GFA (1 min.) Trade and yard-based suppliers: 1 per 1000m^2 GLFA Other industrial: 1 per 1000m^2 GFA	Warehousing and distribution: 1 per 1000m^2 GFA Trade and yard-based suppliers: 1 per 750m^2 GLFA Other industrial: 1 per 500m^2 GFA	Nil	1 per 1000m^2 GFA
Offices	Up to 200m^2: Nil required. Greater than 200m^2 up to 10,000m^2: 1 plus 1 per 1,000m^2 above 1,000m^2. Greater than 10,000m^2: 10 plus 1 per 2000m^2 above 10,000m^2.	1 per 300m^2 of office	20% of staff requirement (2 min.)	1 per 150m^2 GFA	1 per 500m^2 GFA	1 per 500m^2 GFA
Hospitals	1 per 30 beds	1 per 15 beds	1 per 1000m^2 GFA	1 per 300m^2 GFA	2 plus 1 per 50 beds	1 per 20 beds

	Large City – Low to med cycle mode share (Auckland)		Medium City – Med cycle mode share (Christchurch)		Town – Semi rural – low cycle mode share (Rangiora)	
Activity type	**Visitor**	**Long Stay**	**Visitor**	**Staff/residents/student**	**Visitor**	**Long Stay**
Other health care facilities	Healthcare services: 1 plus 1 per 10 FTE practitioners Veterinary clinics: nil	Healthcare services: 1 per 8 FTE practitioners Veterinary clinics: 1 per 15 FTE employees	1 per 500m^2 GFA	1 per 300m^2 GFA	Medical centre: 1 per 3 health professionals	Medical centre: 1 per 5 FTE employees
Guest accommodation	1 plus 1 per 20 rooms/beds	1 per 10 FTE employees	1 per 20 bedrooms	1 per 5 FTE staff 1 per 80 beds	Nil	1 per 10 visitor accommodation units where there is no garage provided
Preschools	Care centres: 1 plus 1 per 50 people to be accommodated	Care centres: 1 per 10 FTE employees	1 per 10 children	1 per 3 FTE staff	1 per 20 children	1 per 3 FTE employees
Schools	1 plus 1 per 400 students and FTE employees	1 per 30 students in Year 1-5 plus 1 per 15 students in Year 6-8 plus 1 per 20 employees. Secondary schools: 1 per 15 students in Year 9-13 plus 1 per 20 FTE employees	1 per 30 students (year 1-8) 1 per 100 students (year 9+)	1 per 7 students (year 1-8) 1 per 5 students (year 9+)	1 per 10 students	1 per 5 FTE employees
Tertiary education and research activities	1 per 800m^2 GFA office	1 per 20 FTE students and FTE employees on site at the peak times.	1 per 100 FTE students	1 staff space per 4 FTE staff and 1 student space per 4 FTE students	1 per 10 students	1 per 5 FTE employees

End of trip facilities	Large City – Low to med cycle mode share (Auckland)	Medium City – Med cycle mode share (Christchurch)	Town – Semi rural – low cycle mode share (Rangiora)
Showers	Offices, education facilities and hospitals: • Up to 500m^2: No requirement • Greater than 500m^2 up to 2500m^2: 1 • Greater than 2500m^2 up to 7500m^2: 2 • Every additional 7500m^2: 2	If 1-10 staff cycle parks are required: none required If 11-100 staff cycle parks are required: 1 per every 10 staff cycle parks required If >100 staff cycle parks required: 10 for the first 100 staff cycle parks required + 2 for each additional 52 staff cycle parks required	Nil
Lockers	Offices, education facilities and hospitals: • Up to 500m^2: No requirement • Greater than 500m^2: changing area with space for storage of clothing	If 1-10 staff cycle parks required: none required If >10 staff cycle parks required: then 1 per every staff cycle park provided	Nil