Christchurch Cycle Design Guidelines

2013

Christchurch City Council

Acknowledgements

We would like to thank the contributions from ViaStrada and other contributors including Glen Koorey, Spokes, NZTA, Canterbury Public Health, Bike NZ and Ministry of Awesome.

Photographs have been supplied by Glen Koorey, ViaStrada David Falconer, Gemma Dioni, Jamie Reader and Neil Macbeth.

Christchurch City Council

Christchurch Cycle Design Guidelines

2013

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ISBN *978-0-9922462-7-3*

Foreword

Kia ora koutou

The council has a unique opportunity following the Canterbury earthquakes to make Christchurch a cycle city by developing a safe and connected cycle network.

Mayor Bob Parker and Mayoress Jo Nicholls-Parker in a bike race along Madras Street Christchurch.

The Christchurch Transport Strategic Plan (2012) recognises that investment in safe cycling is a priority for the city. It proposes the development of an extensive network of cycleways, along with supporting programmes to encourage Cantabrians to cycle as part of their every day travel and activities.

The guiding principle of these guidelines is that we need to consider catering for cycling in every street. Having said that, these guidelines focus on streets that are part of the future cycle network (in the Christchurch Transport Strategic Plan), which will provide the best opportunity to encourage more people to cycle more often.

These guidelines illustrate how new cycleways should look and feel. They include recommended design principles and design concepts of how cycleways can fit into different types of street environments in Christchurch.

I am pleased to be able to take this first step in seeing our ideas come to fruition and working towards placing Christchurch as a premiere cycling city.

Kind regards

Mayor Bob Parker

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1. Introduction

How do we encourage more people to cycle more often?

Research shows that 15 per cent of people regularly cycle, and a further 32 per cent seriously think about cycling[1]. In a nationwide study, potential cyclists strongly stated that they wanted to travel separately from motor vehicles and to be able to cross safely at intersections[2]. Improving the visibility of cycling and providing good cycling facilities is needed to achieve high levels of cycling.

The vision of the Christchurch Transport Strategic Plan is to keep Christchurch moving forward by providing transport choices to connect people and places. To achieve the vision, the Christchurch Transport Strategic Plan makes a strong statement about the importance of cycling in the city as it is rebuilt by creating a connected cycle network to make it easier for residents to cycle. The Accessible City chapter of the Central Christchurch Recovery Plan also promotes enhancements to the quality and connectedness of cycling opportunities in the Central City as one of the key measures crucial to recovery.

The guiding principle of these guidelines is that all streets need to cater for cycling, however the focus is on the routes that are part of the Christchurch Transport Strategic Plan's future cycle network in Figure 1.1.

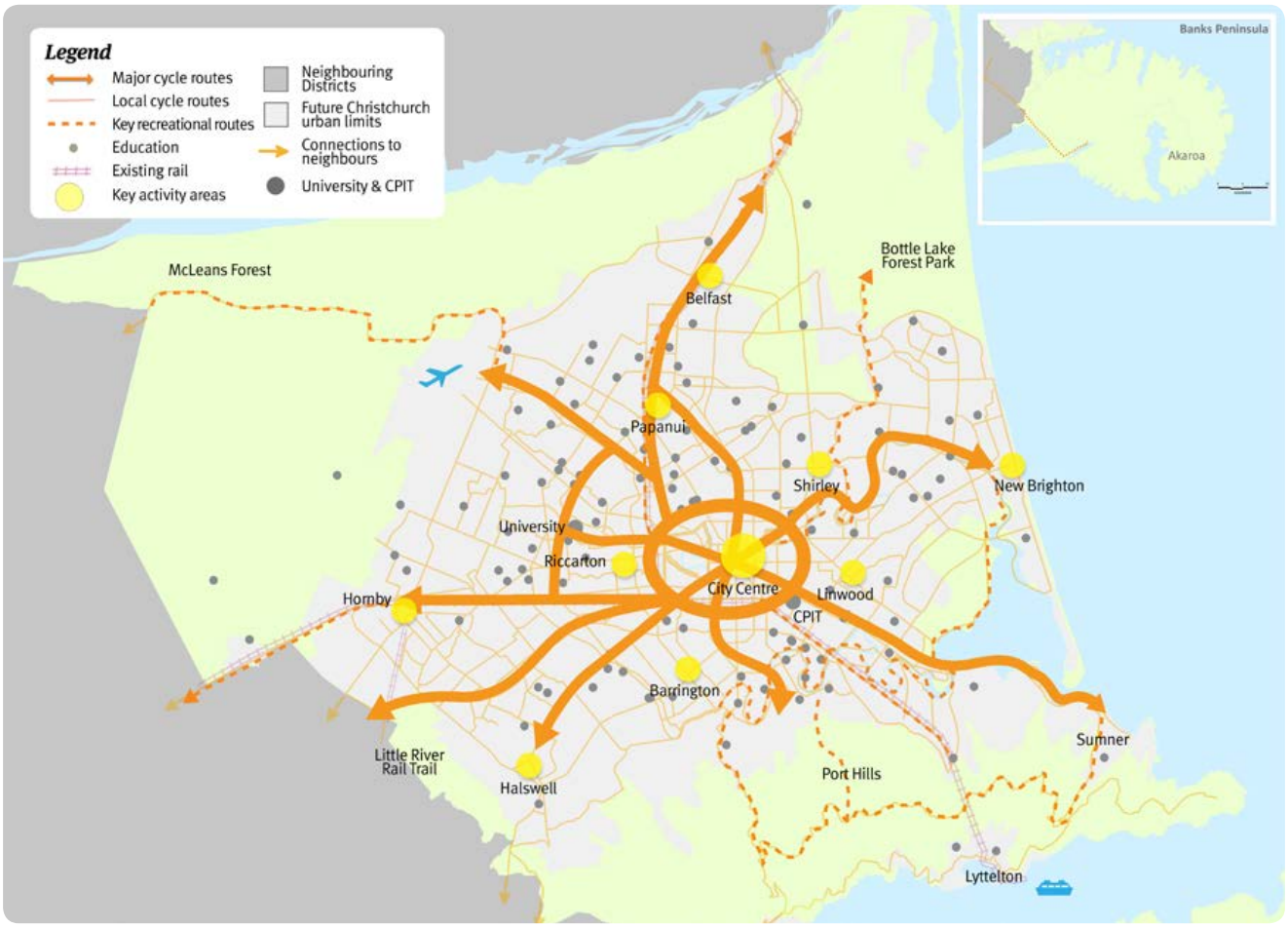


Figure 1.1. Future cycle network: major, local and recreational cycleways (Christchurch Transport Strategic Plan).

[1] *Land Transport New Zealand (2006) Research Report 294: Increasing cycling and walking: an analysis of readiness to change.*

[2] *New Zealand Transport Agency (2011) Research Report 449: Assessment of the type of cycling infrastructure required to attract new cyclists.*

1.1. *Purpose and use of the guidelines*

The purpose of these guidelines is to influence both the design of new cycle facilities in Christchurch and future reviews of the detailed engineering standards in the Infrastructure Design Standards, the SCIRT[3] Infrastructure Recovery Technical Standards and the City Plan.

The guidelines outline the design principles and design concepts that will guide the implementation of the future cycle network outlined in the Christchurch Transport Strategic Plan. The principles represent best practice in cycle design and provide a starting point for all designs. The actual design (detailed design) of each cycleway may change based on the local environment and context. The guidelines are not technical engineering standards, nor do they provide details on where cycleways will be located. However, the guidelines will be used to inform an addendum to technical engineering standards in the City Council's Infrastructure Design Standards (June 2010). The guidelines will also be used to inform the future review of the transport provisions in the City Plan.

These guidelines include recommended widths for some cycleways, although it is acknowledged that it may not always be possible to achieve these. Ultimately a good design takes into account contributing factors, such as who uses the cycleway, safety and the local context of the street. Further details are outlined in section 2 (page 14) of this document.

The guidelines have been developed to follow six main criteria to:

- Deliver the cycling actions within the Christchurch Transport Strategic Plan
- Encourage more residents to cycle
- Be specific for the needs of Christchurch
- Be safe, realistic and achievable for Christchurch
- Be based on best practice examples (national and international)
- Adhere to the New Zealand road user rules.

Encouraging more people to cycle.

Research into cycling policy, cycle guidelines and infrastructure from both New Zealand and overseas was carried out in developing these guidelines. This was done to ensure that Christchurch's cycling network will take advantage of international best practice.

While some of the proposals in this document are aspirational and may be new to New Zealand, these guidelines are realistic and achievable. Experts in urban design, transport planning and engineering, safety and signal engineering all contributed to the development of the guidelines, as have key stakeholders including the New Zealand Transport Agency, Sports Canterbury, Spokes and the Ministry of Awesome.

Because some of the proposals contained within the guidelines are new to New Zealand they will be trialled in the Christchurch context in close cooperation with New Zealand Transport Agency, before any permanent decisions are made on their wider application.

[3] *Stronger Christchurch Infrastructure Rebuild Team*

1.1.1. *How to use this document*

In order to ensure that the guidelines are as user friendly and as easy to navigate as possible each of the four main sections (major, local and recreational cycleways and parking facilities) have been designed to be independent of one another. This approach will make it easier for users to use the document, with all the relevant information for a particular cycleway type or facility being found within a single section.

1.2. *Design context*

The context for each proposed cycleway is integral to developing an appropriate cycleway design. These guidelines establish a set of principles to ensure a consistent design approach for each type of cycleway.

- **Major cycleways** should aim to cater for both adults and children (10 years and over). They should provide safe links to popular destinations and key activity centres and offer the highest level of service to cyclists. Some major cycleways will seek to include 'flagship' elements that will make a strong statement about the city's cycle status and will encourage people to take up cycling.
- **Local cycleways** will improve cycle connectivity across the city, especially to schools and within residential neighbourhoods. Initiatives may include: improving the standard of local cycle lanes and carriageway surfaces, speed and traffic management, introducing shared paths, slow streets and neighbourhood greenways, to improve safety and amenity for cyclists on local streets.
- **Recreational cycleways** will provide safer leisure routes for recreational, family cycling and sport.

They also recognise that flexibility is important in allowing each cycleway design to reflect the environment through which it passes. For the purpose of this document a cycleway is defined as a route which is prioritised for cycling.

One of the first steps in the design of cycle facilities is to understand the design context. This should take into account four key factors: cycleway design objectives; the type of cycleway (major, local and recreational) and corresponding primary cycle users; the spatial environment around the cycleway; and how the cycleway fits within the wider transport system and road user hierarchy (the transport context). In addition, the design should also consider other relevant standards. These are illustrated in Figure 1.2.

Top: Example of a flagship element in New Plymouth.
Bottom: Safe cyclists are happy cyclists.

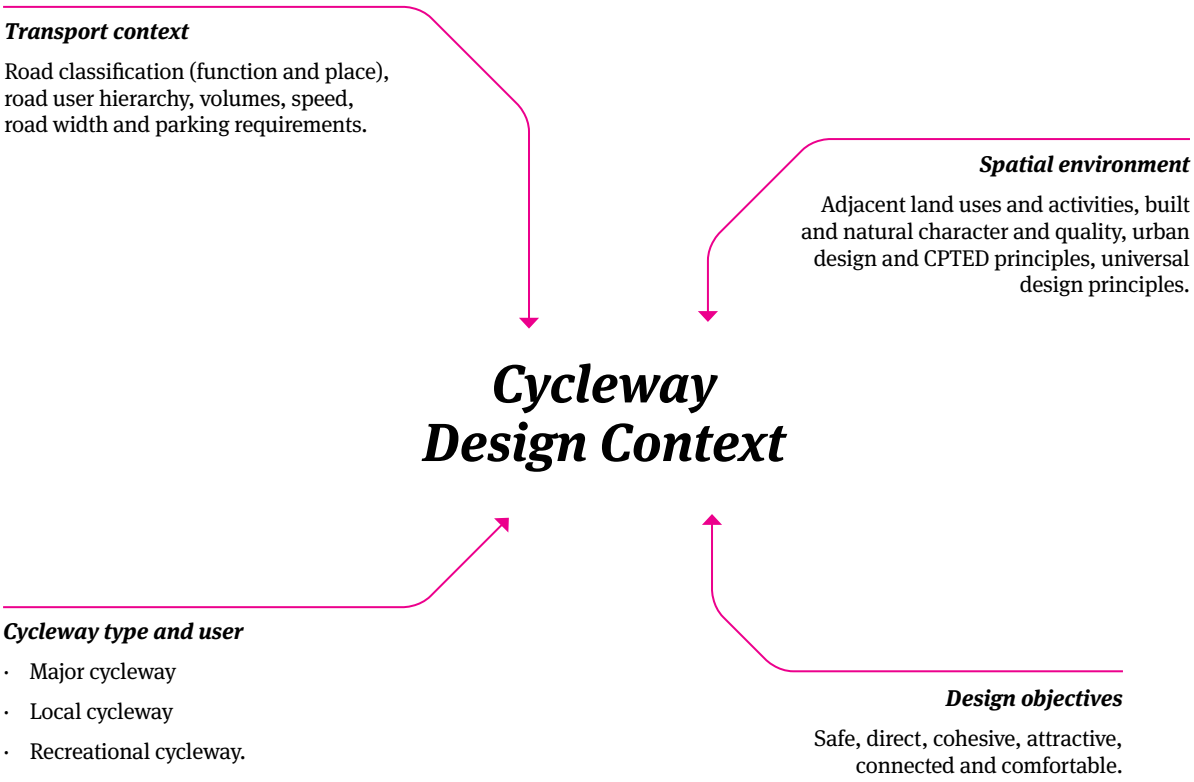


Figure 1.2. Cycleway design context.

1.3. Design objectives[4]

All cycleway designs should provide:

- Safety: cycle routes should be safe and be perceived as safe, provide personal security and limit conflict between cyclists and other users.
- Directness: cycle routes should reasonably be direct, based on desire lines and result in few delays door to door. Cycle parking facilities should be in convenient locations.
- Connected: cycle routes should be continuous and recognisable, link all potential origins and destinations and offer a consistent standard of protection throughout.
- Attractiveness: cycle routes should integrate with and complement their surroundings, enhance public security, look attractive and contribute positively to a pleasant cycling experience.
- Comfort: cycle routes should be smooth, non-slip, well maintained and free of debris, have gentle slopes and be designed to avoid complicated manoeuvres.

1.4. Spatial environment

Designs need to consider the streetscape and street character. This is made up of the legal road and the land use next to the road including buildings, local activities (eg: schools, parks, houses and shops), property access and landscaping.

To achieve high quality cycleway designs a number of additional principles need to be considered: the New Zealand Urban Design Protocol design qualities (the 7 'C's) Crime Prevention through Environmental Design (CPTED) and mobility access. The principles are wide ranging but include achieving high levels of cycleway safety by making them direct and with good sightlines, consideration of vulnerable users (including those people with mobility impairments), using materials that reflect the character of the local environment and ensuring that the cycleway has a high level of accessibility to both cyclists and those encountering or crossing the cycleway.

Consideration should be given to low impact urban design, incorporating swales, rain gardens and permeable surfacing where possible.

[4] *Land Transport NZ (2005) Cycle Network and Route Planning Guide*

The width of cycleways will depend on the expected number of users, the environment and other streetscape elements. Another factor to be considered in any width investigation is the growing numbers of cargo and electric bicycles.

These guidelines give example design concepts using the typical 20 metre road widths in Christchurch, while also recognising that designs need to be flexible enough to accommodate the space constraints imposed by narrower local streets or wider arterial roads. A balance is required to accommodate the desirable area for all streetscape elements within the road corridor width.

The following elements are important to all designs:

- Cycle, pedestrian, traffic and public transport movement (including the needs of mobility impaired)
- Property access
- Parking
- Street trees and garden planting
- Places to stop and interact with the environment.

Other spatial elements which also need to be considered are:

- Cycle and pedestrian crossings
- Intersections
- Driveways or entry and exit points to properties
- Bus stops
- Street lighting
- Paving and surface materials
- Wayfinding (signs and markings)
- Landscaping, street furniture or artwork
- Fencing
- Storm water drainage
- Maintenance and refurbishment.

Generally wider cycleways are needed for safety reasons in areas with:

- Major cycleways and/or
- High cycle volumes and speeds and/or
- High pedestrian volumes or areas where pedestrians stop on the path and/or
- High vehicle volumes and speeds and/or
- High recreational cycling use.

All new streets, or any street undergoing improvement, need to try and achieve the recommended cycleway widths. The calculation of cycleway widths excludes the additional space needed for drainage (guttering or kerb and channel). On existing streets there is often limited width available for cycleways. Therefore a reallocation of road space may be required. Space can be allocated to a cycleway by reallocating existing space such as moving on-street car parking to an alternative location, using berm widths for cycleways, and/or reducing the width of traffic lanes or footpaths. It is not ideal to have each element of the streetscape at minimum width for significant distances. If this is likely in an emerging design then another route for the cycleway needs to be investigated.

Top: Example of street trees and plantings.
Bottom: Example of a shared cycle and pedestrian path.

1.4.1. *Wayfinding, signs and markings*

Good cycle signs and markings (independent to road signs) need to identify cycle lanes for both visiting and local cyclists. Signs and markings need to be an integral part of all cycleway designs.

Signs inform road and pathway users about destinations, routes, street and suburb names, distances and other useful information. Signs or markings should help direct cyclists to key destinations around the city with short, clear messages or maps.

It is intended that a separate wayfinding plan will be developed to support this document.

Example signage.

1.5. *Transport context*

On major cycleways, the priority needs to be providing space for cycling and as a result alternative routes may need to be provided for other road users.

This principle is supported by the Christchurch Transport Strategic Plan which promotes the use of a road user hierarchy (prioritising different road users on different routes). On some routes cycling has priority and on others motor vehicles or public transport might have priority. This approach acknowledges that it is not always possible to achieve desirable widths for all road users on one road.

When preparing a cycleway design, consideration of the transport context is important. This includes the classification of the street, how it functions, which user has priority, and the places the street passes through.

Figure 1.3 identifies which cycleway designs are likely to be suitable for different street environments and provides a reference to the relevant section in these guidelines. This links with the new road classification outlined in the Christchurch Transport Strategic Plan. The new road classification follows the 'link and place' philosophy. 'Link and place' acknowledges that streets have combined uses of both being transport corridors as well as places for people to shop, live and work. The development of the new road classification will also be promulgated into the review of the Infrastructure Design Standards.

In addition the Accessible City chapter of the Christchurch Central Recovery Plan includes more information about providing for cyclists in the Central City.

1.5.1. *Relevant standards, documents and good practice review*

There are a range of strategic plans, local standards and national standards which have influenced these guidelines. These include:

Cycle Planning

- Christchurch Transport Strategic Plan (2012) Christchurch City Council
- Christchurch Central Recovery Plan – An Accessible City – (2013) CERA

Design Standards – Christchurch City Council

- Infrastructure Design Standards (2010)
- Construction Standard Specifications (2002 and amendments 2012)
- Lane Design Guide (2007)

New Zealand Standards

- Traffic Control Devices Manual – NZTA
- New Zealand Road User Rules
- Land development and subdivision engineering (2010) NZS 4404
- New Zealand supplement to the Austroads guide to traffic engineering practice part 14: Bicycle: NZTA

		Link and place type – new road classification[5]						
		Routes	Routes	Street	Streets	Streets	Streets	Ways
Cycleway type	Cycle design concept	All place types	Rural	Urban commercial centres/CBD	Urban residential	Urban business / Industrial	Rural / Semi-rural	All place types
Major cycleways	**Shared paths**		Section 2.1.1					Section 2.1.1
	Neighbourhood greenway				Section 2.3.1			
	Slow streets			Section 2.2.5	Section 2.3.1			
	Separated cycle path	Section 2.2.1	Section 2.4.1	Section 2.2.1		Section 2.4.1		
	Intersections	Section 2.5		Section 2.5	Section 2.5	Section 2.5		
	Crossing treatments	Section 2.7.1		Section 2.7.2		Section 2.7.2		Section 2.7
	Bus stops	Section 2.6		Section 2.6	Section 2.6	Section 2.6		
	Transitional			Section 2.8	Section 2.8	Section 2.8		
Local cycleways	**Off-road shared paths**			Section 3.1.1	Section 3.1.1			Section 3.1.1
	Shared paths				Section 3.3.3			
	Neighbourhood greenway				Section 3.3.1	Section 3.3.1	Section 3.3.1	Section 3.3.1
	Slow streets			Section 3.2.2	Section 3.3.1	Section 3.3.1	Section 3.3.1	
	Cycle lanes	Section 3.4		Section 3.2.3 3.4	Section 3.3.2	Section 3.2.3 3.3.2 3.4	Section 3.4	
	Intersections	Section 3.5	Section 3.5	Section 3.5	Section 3.5	Section 3.5	Section 3.5	
	Bus lanes	Section 3.6		Section 3.6		Section 3.6		
Recreation cycleways	**Off-road leisure route**		Section 4.1		Section 4.1		Section 4.1	Section 4.1
	On-road sport route	Section 4.2			Section 4.2	Section 4.2	Section 4.2	Section 4.2

Figure 1.3. Cycleway design by street environment

[5] *New road classification in Christchurch Transport Strategic Plan*

2. Major cycleways

Major cycleways need to be designed to encourage all cycle users (aged ten years and over) offering a safe, enjoyable experience that will encourage more people to cycle more often. The proposed routes for the major cycleways are illustrated in Figure 2.1. The exact alignment (which roads they take) of these will be investigated further at the detailed design stage.

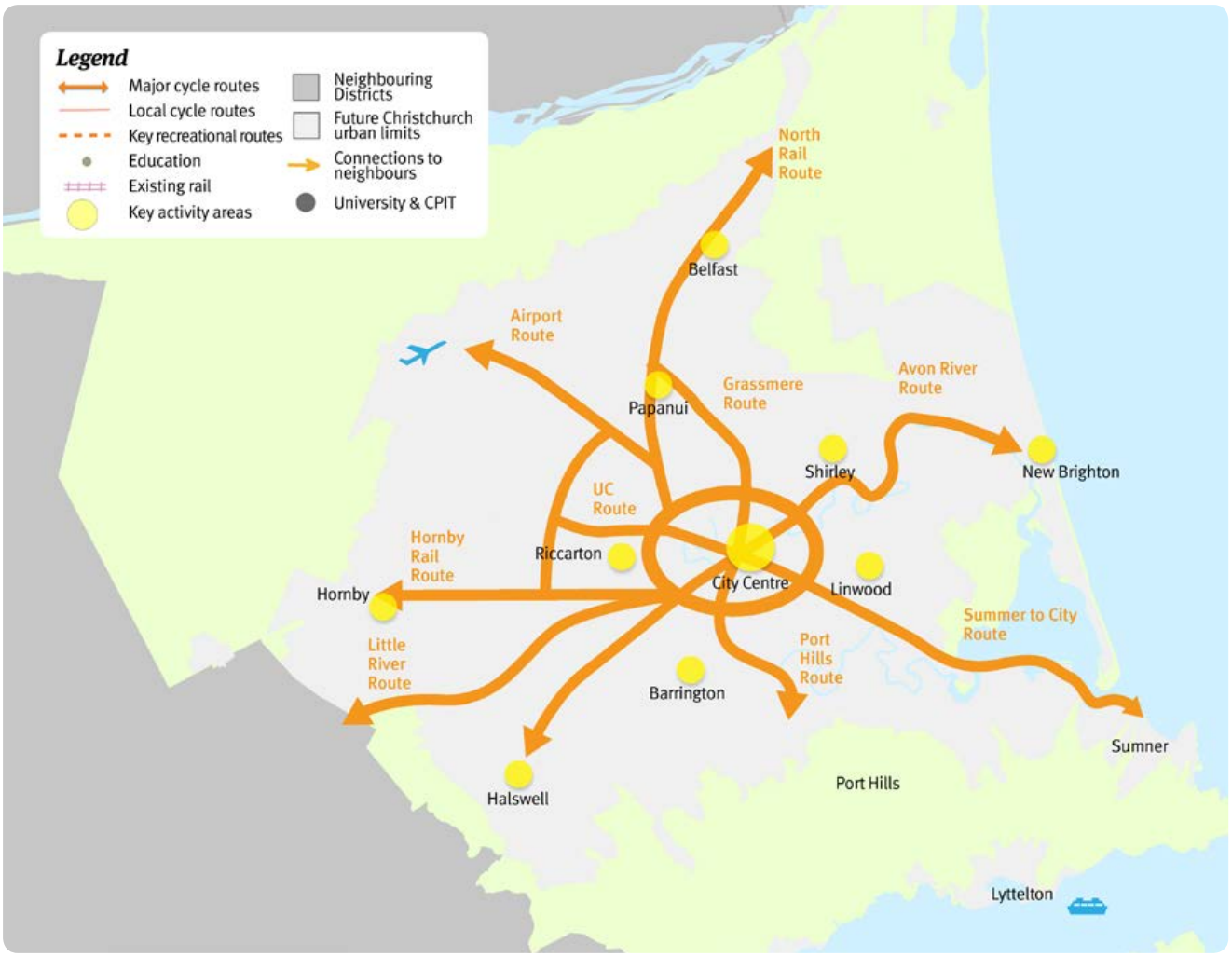


Figure 2.1. Future major cycleways (Christchurch Transport Strategic Plan)

The treatment of major cycleways (such as shared paths, separated cycle paths, neighbourhood greenways or slow streets) will change along the route as the cycleways pass through different environments. Electronic cycle counters should be incorporated on all major cycleways to monitor bicycle volumes and improve data. This section outlines the major cycleway design concepts and principles for each environment it encounters:

1. Parks, reserves and waterways
2. Urban commercial centres
3. Residential streets
4. Arterial roads and distributor streets (routes)
5. Intersections
6. Bus stops
7. Crossings busy roads.

2.1. *Major cycleways through parks, reserves and waterways*

Major cycleways in parks, coastal edge, greenspace, rail and river corridors are ideally wide, sealed, shared paths with some separation from pedestrians when located on high volume pedestrian or cycle routes. This design offers direct and highly visible connections, while providing a safe, high amenity environment.

2.1.1. *Major cycleways/Parks, reserves and waterways/ Shared paths: Design principles*

- Be sensitive to the park setting and character of the path.
- Wider shared paths are safer and therefore major cycleways need to be as wide as possible. Additionally they need to cater for current and future cycle and pedestrian peak-time volumes.
- Where shared paths have higher volumes ideally there needs to be separation of pedestrians and cyclists. Separation can be achieved by a landscaped area or contrasting surface texture separating the cycle and pedestrian paths. When considering the appropriate treatment relating to volumes, path widths and separation then 'Vic Roads (2012) Cycle Note 21' should be referred. This provides further guidance on undertaking a path capacity and safety width assessment.
- The shared path should be wide and strong (construction depth) enough to allow service vehicles access for maintenance.
- Either side of the shared path should be clear of obstacles to allow for overtaking and to minimise the impact of any cycling errors especially at times of high use (approximately one meter either side of the path). This extra space can be provided by using more permeable surfaces at the edges such as turf cells.
- The design of the shared path should be appropriate to the expected speed of cyclists using the path (approximately 15 km/hr for expected users). Consideration to sight lines, signs, markings, path alignment and gradients is important.
- Surface types need to be smooth while retaining traction. Smooth sealed paths (using universal building materials such as asphalt or aggregate concrete) are preferred.
- The design should create awareness of other path users by providing good on-path markings (such as aluminium role markings) with messages to indicate the presence of both pedestrians and cyclists. Surface texture treatments can also be used to raise awareness of other users and encourage more considerate use of shared paths. For further guidance on conflict minimisation then 'Austroads (2006) Research Report: Pedestrian and cyclist conflict minimisation on shared paths' should be referred to.
- Consideration of Crime Prevention Through Environmental Design (CPTED) principles and ensure accessibility for all users (including suitability for young cyclists, visibility for hand cycles and older people) is important. A non-motorised user audit should be undertaken.
- The needs of mobility and visually impaired users needs to be considered in all designs.
- Where paths are located close to water, over water or along banks extra safety considerations need to be taken into account. For appropriate treatments designers should refer to the 'Austroads Guide to Road Design – Part 6A – Pedestrian and Cyclist Paths, Sections 7.7.1 and 7.7.2'.

From top to bottom: Example of a texture separated pathway, landscape separation and on-path markings.

Design concept
(Major cycleways – Parks, reserves and waterways)

2.2. *Major cycleways through urban commercial centres*

In commercial centres major cycleways are ideally separated cycle paths which offer an attractive and more comfortable environment for cycling. The design should allow for both free-flowing pedestrian movement and easy access for cycling to and through the centre. In areas with strip-shopping, parking should remain easy and accessible and where possible parking should be incorporated into the design. As commercial centres present many hazards and distractions for users, separated cycle paths help reduce the hazard.

Separated cycle paths can take a variety of forms depending on the individual centre's context. The preferred form of separation is the style of facility found in Copenhagen, which is discussed in more detail in section 2.2.2. Where this is not appropriate other options are kerbed, planter or painted separation (discussed in sections 2.2.3 and 2.2.4). In some commercial centres creating a slow speed (shared) environment can reduce the need for separation (discussed in section 2.2.5).

2.2.1. *Major cycleways/Urban commercial centres/ Separated cycle paths: Design principles*

These design principles apply to all forms of separated cycle paths: Copenhagen, kerbed, planter and painted separation.

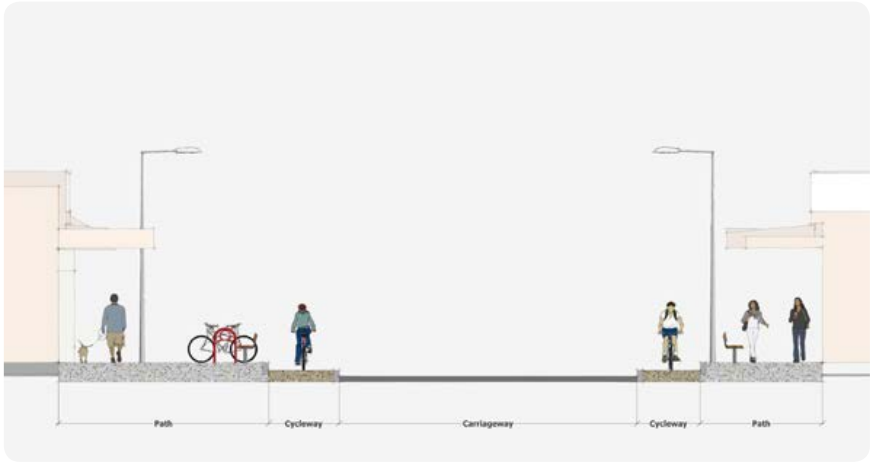
- In commercial centres pedestrians need to have the highest priority. Designs may be combined with other streetscape elements to create a slow speed environment which improves both pedestrian and cycle connectivity and safety.
- Separated cycle paths ideally need to be located between the footpath and traffic lane providing separation between the two different road users. Where the cycle path is located next to on-street car parking, a separation strip can be included to protect the cyclists from car doors opening.
- Two-way separated cycle paths, on one side of the street, may be considered on busier urban streets (distributors) which have infrequent crossing points or where urban development is on one side of the street. A wider path should be provided to make it more comfortable and easier for cyclists to pass each other. The design should consider where the contra-flow lane is placed, taking into account the location of on-street parking, intersection connectivity and consistency of infrastructure design along the cycle route. The design should be obvious to all road users that it is two-way. The position of the cyclists should be clearly marked.
- Contra-flow separated cycle paths may be considered on slow (30km/hr), one-way streets, with low levels of parking, to make the cycle route more direct. The contra-flow should be well marked and signed so that it is obvious to all road users.
- The design of the separated cycle path needs to be integrated as much as possible into the commercial centre so that the cycle infrastructure becomes part of the character of the centre rather than a through route. In commercial centres with distinctive character, the separated cycle path should reflect the unique character of the environment. An example of this may be to use alternative textures to improve visibility other than green surfacing.
- At T-intersections the separated cycle path needs to cross the side road on the carriageway to give through cyclists right of way over the intersection. Signs may be needed to emphasise who has priority.
- At main pedestrian crossings, platforms raised to footpath level indicate that pedestrians have priority at the crossing. The cycle path needs to cross over the platform using shallow gradient ramps.
- Coloured surface treatments increase the visibility of the separated cycle path at conflict points. In Christchurch the preferred colour is green.
- Mobility parking spaces could be incorporated into the design by introducing in-kerb ramp access from the parking space to the footpath.
- Designs could consider including cycle friendly features, such as hand and/or foot rails at stopping locations along the route.
- Separated cycle paths on either side of driveways or intersections need to be kept clear of obstructions (including parked cars) and provide a good visibility splay to improve inter-visibility.
- Separated cycle paths ideally need to be kept away from solid boundary fences to improve inter-visibility between path users and exiting vehicles. This is very important for vehicles reversing out of a driveway as the driver cannot see the path users. Permeable or open fences can improve visibility further.
- Designs should consider the network, safety and landscape implications where kerbs are moved to create separated cycle paths.


Bridge of
Remembrance

2.2.2. *Major cycleways/Urban commercial centres/ Copenhagen separated cycle paths: Design principles*

In addition to the design principles for separated cycle paths, Copenhagen designs also need to consider the following principles.

- Copenhagen style cycle paths have kerbs that separate the cycle path from both the traffic lane and the footpath. The footpath kerb height is smaller (approximately 20mm) than the traffic kerb.
- Copenhagen cycle paths ideally need to be wide enough for cyclists to pass one another (a desirable width of 2.4m on both sides of the road).
- A Copenhagen cycle path should have a limited number of vehicle crossing points along the street frontage. The number of driveways or entrances needs to be assessed and where there are multiple crossings which cannot be removed or adapted then another separation type (kerbed or painted) is recommended.
- Copenhagen cycle paths often need more space than other forms of separation. Therefore they are most successful where there is no on-street car parking or where car parking is only on one side of the street. The re-allocation of car parking and detailed design of any scheme design should seek community engagement and consultation.
- Where there is on-street car parking there should also be a separation strip (0.6 – 1m) between the parking and the cycle path. This offers the cyclist protection from car doors being opened. This separation may be textured (materials such as cobbles) to encourage cyclists to keep in the cycle path and not ride in the 'door zone' on the separation strip. Parking meters may also be accommodated in the separation strip if there is sufficient room.



Design concept major cycleways - urban commercial copenhagen cycle path cross section.

- The cycle path has a continuous grade over entrances and driveways to increase the inter-visibility of approaching cyclists.
- At T-intersections the cycle path crosses the side road on the carriageway to give cyclists right of way over the intersection. Signs may be needed to emphasise who has priority.
- In the lead up to and where the cycle path crosses an intersection a change in texture or green surfacing is desirable to increases the visibility of a potential conflict point.
- A mountable kerb or ramp provides easy access to cycle parking or information points where these are located on the footpath.
- Cycle path construction is strong enough to accommodate service vehicles or rubbish trucks on the cycle path.

Design concept
(Major cycleway – Urban commercial centre – Copenhagen separated cycle path)

Design concept
(Major cycleway – Urban commercial centre – Copenhagen separated cycle path)

2.2.3. *Major cycleways/Urban commercial centres/Kerb separated cycle paths: Design principles*

In addition to the design principles for separated cycle paths, kerb separated designs also need to consider the following principles.

- Kerb separated cycle paths are located on the carriageway with a kerb buffer (0.6 to 1m) to separate the cycle path from the traffic lane or on-street car parking.
- The separated cycle path ideally needs to be wide enough for cyclist to pass one another (approximately 2.4m on both sides of the road).
- Two-way separated cycle paths, on one side of the street, may be considered on busier urban streets which have infrequent crossing points or where urban development is on one side of the street. The contra-flow cyclist should be on the inside and furthest from traffic. A wider path should be provided to make it more comfortable and easier for cyclists to pass each other. The design should be obvious to all road users that it is two-way. The position of the cyclists should be clearly marked
- The cycle path is located on the carriageway to give through cyclists priority at T-intersections.
- Intermittent gaps placed in the kerb separation allow cyclists to make right hand turns, allows pedestrians to cross and facilitates drainage.
- To enhance the streetscape of the centre, plants or trees can be included in the kerbed separation. Where there is on-street parking, planting should be placed so it does not prevent cars doors opening or obstruct visibility. Trees are preferable to plants where there is adequate width in the kerbed separation for roots and good visibility. Designs should refer to Tree Planning in Streets Policy (Christchurch City Council).
- A mountable kerb or ramp provides easy access to cycle parking or information points where these are located on the footpath.

Example of a kerb separated cycle path.

Design concept
(Major cycleways – Urban commercial centres/Kerb separated cycle paths)

2.2.4. *Major cycleways/Urban commercial centres/Painted separated cycleways: Design principles*

Copenhagen style or kerb separation is preferable to painted separation because it offers a higher level of protection for the cyclist from other vehicles. Painted separation, however, provides a good lower cost, retro-fit option. In addition to the design principles for separated cycle paths, painted separated designs also need to include the following principles.

- Painted separated cycle paths need to be located on the carriageway with a painted chevron (a saw-toothed painted section of around 0.6 to 1m) to separate the cycle path from the traffic lane or on-street car parking (the cycle lane will be located between the kerb and any on-street parking).
- The cycle path ideally needs to be wide enough for cyclists to pass one another (approximately 1.8m to 2m on both sides of the road).
- Two-way separated cycle paths, on one side of the street, may be considered on busier urban streets which have infrequent crossing points or where urban development is on one side of the street. The contra-flow cyclist should be on the inside and furthest from traffic. A wider path should be provided to make it more comfortable and easier for cyclists to pass each other. The design should be obvious to all road users that it is two-way. The position of the cyclists should be clearly marked.
- The cycle path needs to be part of the main thoroughfare to give through cyclists priority at T-intersections.
- Vertical edge markers, planters or sculpture could be considered in the painted separation to make it more visible, encourage vehicles to stay off it and improve safety on the cycle path. Where there is on-street parking, any physical features must be placed so they do not prevent car doors opening.
- A mountable kerb or ramp could be included to provide easy access to cycle parking or information points where these are located on the footpath.

Example of a painted separated cycle path in Melbourne.

Design concept
(Major cycleways – Urban commercial centres – Painted separated cycleways)

2.2.5. *Major cycleways/Urban commercial centres/Slow streets: Design principles*

Slow, shared streets with enhanced landscapes in commercial centres can support economic vitality as well as provide safe cycle and walking connections without the need for separation. Slow streets are most appropriate in the Central City or in some suburban centres. The design principles are:

- Slow streets often have low traffic speeds and volumes. They may often be single-lane two-way streets where cyclists (and pedestrians) can easily and safely mix with slower traffic.
- Slow streets should encourage walking, cycling and active shop frontages such as cafes and seating areas. The designs may seek to discourage unnecessary through-traffic to improve the safety and comfort of walking and cycling.
- Narrow roads, reduced sightlines and activities near the carriageway edge could be used to help reduce the speed and volume of vehicles using the slow street.
- Designs should reflect the local character of the street and building frontages.
- A high standard of design and quality features in its landscaping, surface treatment, street furniture and lighting are recommended.

Design concept
(Major cycleways – Urban commercial centres – Slow streets)

2.3. *Major cycleways through residential streets*

In urban residential streets, major cycleways will ideally be neighbourhood greenways which create a slow, safe environment where bicycles, vehicles and people can comfortably mix. The quality of the environment and amenity of the residential street is also enhanced through this design.

2.3.1. *Major cycleways/Residential streets/Neighbourhood greenways: Design principles*

Neighbourhood greenways are a form of street treatment where simple measures such as lower speeds, traffic restraints, wayfinding, crossing treatments and landscaping are used to create an environment that is friendly for walking and cycling. They need to be considered on routes which connect people to community facilities such as schools, parks, shops and other key destinations in a neighbourhood[6]. Designs need to consider the following principles:

- Neighbourhood greenways are ideally suited to slow speed and low volume residential streets.
- Cyclists and pedestrians will be given a higher priority in designs than other traffic, so that cyclists can comfortably share the full carriageway of the street.
- The design and appearance of the street is designed to encourage low traffic speeds (less than 30km/h) and low volumes, maximising safety for cyclists and pedestrians.
- Neighbourhood greenways can feature a range of different street treatments including: street entrance or exit restrictions; median islands at intersections with cycle gaps to prevent vehicles from continuing along the neighbourhood greenway; mid-block or street-end closures for vehicles with by-passes for cycling; diagonal diverters at intersections to prevent through traffic; contra-flow cycle lanes; lower speed limits; and other traffic calming measures (eg: raised platforms, narrow lanes, or chicanes with cycling bypasses etc).
- Clear signs or markings on the street are important to make wayfinding easier.
- Neighbourhood greenways ideally have priority at intersections so that they are well connected and are easy for cyclists and pedestrians to navigate. Where priority is not possible the route should be clearly marked to make sure cyclists can find their way.
- In some neighbourhood greenway designs, there may be reduced access to the street or reduced on-street car parking for landscaping. Each design will need to consider access and parking early in the scheme and where appropriate consult the community.
- Where neighbourhood greenways restrict vehicle numbers and flow, the network impact on the surrounding areas needs to be considered. Temporary road changes can be used to test the impact of re-routed vehicles and assist to move towards more permanent traffic calming.
- In new subdivisions a narrow residential street design can naturally slow the traffic.
- Vertical elements (trees or street furniture) can provide visual enclosure to the street reducing sight lines and therefore speed.
- Emergency vehicles still need access to the street so the design needs to include left in/ left out access or removable bollards.
- On busier residential streets, where it is not possible for volumes or speeds to be reduced, separated cycle paths, cycle lanes, shared paths or cycleways on the berm could be provided. See section 2.2.1 and 2.2.3 for further guidance on separated cycle paths.

Top: Example of a neighbourhood greenway crossing. Middle and bottom: Example of diverters for cycles and pedestrians only (Vancouver).

[6] *Koorey (2011) Neighbourhood Greenways: Invisible Infrastructure For Walking And Cycling*

Design concept
(Major cycleways – Residential streets – Neighbourhood greenways)

2.4. *Major cycleways through arterial roads and distributor streets*

On arterial roads and distributor streets there is often a greater priority on traffic movement which can discourage cycling by all but the most experienced. Major cycleways in these environments are ideally separated cycle paths to create an environment where all road users feel safe and more comfortable to cycle.

2.4.1. *Major cycleways/Arterial roads/Separated cycle path: Design principles*

- Separated cycle paths ideally need to be located at the carriageway level between the footpath and traffic lane. They should provide separation (0.6-1m) from the traffic and pedestrian movement by kerbs or painted separation (similar to section 2.2.1).
- The separated cycle path ideally needs to be wide enough for cyclists to pass one another, make corrective manoeuvres and allow for growth in demand (approximately 2.4m on both sides of the road).
- Two-way separated cycle paths, on one side of the street, may be considered on busier urban streets (arterial or distributors) which have infrequent crossing points or where urban development is on one side of the street. The contra-flow cyclist should be on the inside and furthest from traffic. A wider path should be provided to make it more comfortable and easier for cyclists to pass each other. The design should be obvious to all road users that it is two-way. The position of the cyclists should be clearly marked.
- Where the cycle path is next to on-street car parking, an extra separation strip needs to be included to protect cyclists from car doors opening.
- The design should consider putting planting, landscaping or artworks in the separation strip to enhance the streetscape.
- Coloured surface treatments can be used to increase the visibility of the separated cycle path at conflict points. In Christchurch the preferred colour is green.
- Separated cycle paths on either side of driveways or intersections need to be kept clear of obstructions (including parked cars) and provide a good visibility splay to improve inter-visibility.
- Intermittent gaps placed in the kerb separation allow cyclists to make right hand turns, pedestrians to cross and facilitates drainage.
- At main pedestrian crossings, platforms raised to footpath level indicate that pedestrians have priority at the crossing. The cycle path should cross over the platform using shallow gradient ramps.
- Separated cycle paths ideally need to be kept away from solid boundary fences to improve inter-visibility between path users and exiting vehicles. This is very important for vehicles reversing out of a driveway as the driver cannot see the path users. Permeable or open fences can improve visibility further.

Example of a kerb separated cycle path.

Design concept
(Major cycleway – Arterial roads – Separated cycle path)

2.5. *Major cycleways through intersections*

Controlled intersections and T-intersections are challenging for cyclists. Major cycleways that cross these intersections need to be designed to protect the cyclist and provide a greater level of comfort. Where possible, roundabouts should be avoided. A Dutch intersection or a cycle Barnes dance offer the highest level of protection and comfort at intersections. However these designs are a new concept in New Zealand and will need to be trialled before wider use.

In the meantime, other intersection treatments such as protected cycle lanes provide a level of increased safety and comfort for cyclists.

2.5.1. *Major cycleways/ Intersections/Dutch intersection: Design principles*

The Dutch intersection is a new approach to intersection design in Christchurch and potentially offers the highest level of protection to cyclists. The design principles are:

- Dutch intersection designs are appropriate where separated cycle paths approach an intersection. The design features corner islands to provide separation between cyclists and vehicles at the intersection. This separation also improves inter-visibility between drivers and cyclists. The pedestrian crossing facilities and signals are separate from the cycle path.
- The size of the corner island is variable depending on the size and angles of the intersection (corner splay). The corner islands size can help to slow turning vehicles which also improves safety for both cyclists and pedestrians.
- The design of the intersection needs to consider left turning vehicles. To allow larger vehicles to turn safely, the stop line for the entry lane may need to be set back. If this is needed, the intersection capacity and the pedestrian crossing placement can be affected.
- Green coloured surfacing can be used to improve the visibility and legibility of the cycle path on the approach and through the intersection.
- Ideally the design should include separate bollard-style cycle signals that provide a countdown to the cycle crossing phase. Signal phasing can also incorporate advanced cycle starts or exclusive vehicle turning phases to reduce the conflict.
- All Dutch intersection designs must be officially trialled and monitored in agreement with NZTA before implementation across the major cycleway network.
- Designing traffic signals is a specialised discipline. All designs need to engage a signal engineer for both the design and peer review. The signal design also needs to be reviewed by the Road Controlling Authority.

Top and bottom: Examples of Dutch intersections.

Design concept
(Major cycleways – Intersections – Dutch intersection)

2.5.2. *Major cycleways/ Intersections/Cycle Barnes Dance: Design principles*

An alternative design to the Dutch intersection is the cycle Barnes Dance. The pedestrian Barnes Dance is already used in New Zealand. However, the combined cycle and pedestrian Barnes Dance is a new concept in New Zealand and would need to be trialled in Christchurch. The design principles are:

- The cycle Barnes Dance gives an exclusive green phase for cycle movements at a signal controlled intersection. The approach is similar to a pedestrian Barnes Dance but for those cycling. The design is suitable at intersections with large cycle volumes or where a number of cycleways come together at one intersection.
- The controlled intersection ideally has a separate signal phase for pedestrian crossing, which follows the cycle phase.
- The network impact of an additional cycle phase on the intersection capacity needs to be considered. If a high level of service for traffic is to be maintained on one route (for example on arterial), the pedestrian and cycle phase could be combined.
- Ideally the cycle Barnes Dance will use a separate cycle signal to the main traffic signals, such as a small bollard-style signal placed at cyclist height. This makes the green phase obvious to only cyclists and reduces confusion with drivers. The cycle signal can also include a timed countdown to cross.
- The cycle Barnes Dance designs must be officially trialled and monitored in agreement with NZTA before implementation across the major cycleway network.
- Designing traffic signals is a specialised discipline. All designs need to engage a signal engineer for both the design and peer review. The signal design also needs to be reviewed by the Road Controlling Authority.

Example of a cycle Barnes Dance.

Design concept
(Major cycleways – Intersections – Cycle barnes dance)

2.5.3. *Major cycleways/ Intersections/Intersections with protected cycleways: Design principles*

Before official approval of Dutch Style and cycle Barnes Dance intersections (sections 2.5.1 and 2.5.2) or in instances where they are not possible to implement then protected cycle lanes should be used. The design principles are:

- Protected cycle lanes offer the cyclist improved protection by providing temporary separation from vehicles on the approach to the intersection. This is especially recommended at known conflict points such as left-turning traffic lanes.
- Temporary separation can be achieved by vertical edge markers (such as uprights), raised delineators (such as rumble strips or small kerbs) or painted chevrons.
- Where a protected cycle lane is introduced it is important not to reduce sightlines of pedestrian crossings and any vertical edge markers need to be carefully maintained.
- Introducing an exclusive cycle signal phase or delaying the left-turning and/ or the on-coming right-turning vehicles to allow the cyclist a head start at intersections can provide further priority and safety for cyclists.
- Designing traffic signals is a specialised discipline. All designs need to engage a signal engineer for both the design and peer review. The signal design also needs to be reviewed by the Road Controlling Authority.

Example of a vertical edge marker.

Design concept
(Major cycleways – Intersections – Intersections with protected cycleways)

2.5.4. *Major cycleways/ Intersections/T-intersections: Design Principles*

Major cycleways that encounter T-intersections ideally will give continued priority, inter-visibility and protection for cyclists. The design principles are:

- Approaching a T-intersection, on the through route, the separated cycle path needs to be as wide as possible and to improve inter-visibility, parking around the intersection should be restricted. A small kerb radius (3-5m) could also be used to slow turning vehicles. This is shown on design concept 1 (Separated cycle path at T-Intersection).
- A green coloured surface across the intersection will improve visibility and awareness of the cycleway. The green surface should begin on the approach and end after the intersection.
- At the top of the T-intersection, where traffic signals already exist, a separate cycle signal should be considered to allow cycles to continue through the top of the T-intersection when the main traffic signals are red. A green phase for pedestrians will trigger a red cycle signal. This is illustrated in design concept 2 (T-intersection cycle signals allows cycles to continue through the intersection). The cycle signal must be officially trialled and monitored in agreement with NZTA before implementation across the major cycleway network.
- The design needs to consider the potential conflict with driveways or entrances across the T-intersection.
- At the top of the T-intersection, if cycle signals are not appropriate then a cycle by-pass on the footpath can allow cyclists to continue to cycle through, even when the main vehicle signals are red. However, the space required for pedestrians/cyclists waiting to cross the intersection needs to be considered.
- Other ways to reduce conflict at T-intersections are by only allowing left in/ left out manoeuvres to reduce the vehicle volume, installing traffic signals, or using corner islands to slow down turning vehicles and provide space for cyclists.
- Major cycleway T-intersection treatments need to consider the implications of slowing or restricting vehicles on the surrounding streets.

Top: Example of a cycle bypass. Bottom: Example of a cycle signal.

Design concepts
(Major cycleways – Intersections – T-intersections)

1. Separated cycle path at T-Intersections.

2. T-intersection cycle signals allow cycles to continue through the top of the intersection.

2.6. *Major cycleways through bus stops*

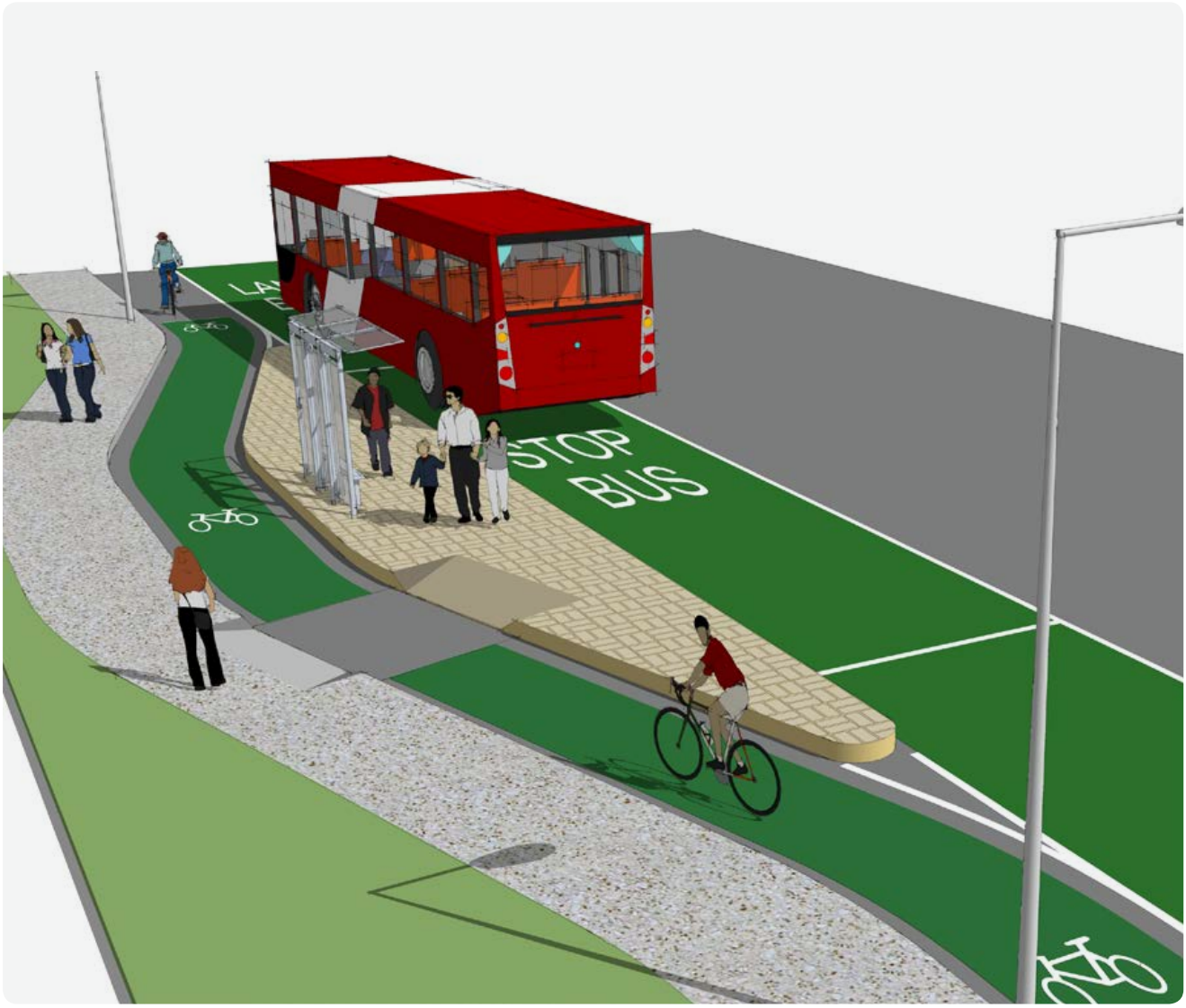
Major cycleways that share part of their route with bus services will ideally have a separated cycle lane at bus stops. The frequency of bus services will influence the design. On high frequency routes an island bus stop design is ideal. On lower frequency routes an inline bus stop design is appropriate.

2.6.1. *Major cycleways/Bus stops/ Island concept: Design principles*

On high frequency bus routes island bus stop designs are recommended. The design principles are:

- On high frequency bus routes (where buses run every 10 to 15 minutes during peak times) a cycle by-pass around the bus stop using an island provides both cycle priority and increased safety (illustrated in the design concept). The design needs to consider space for pedestrians and waiting bus passengers and be large enough to accommodate expected numbers.
- The design (including signage and markings) needs to encourage pedestrians to look for and give way to cyclists when crossing between the bus stop island and the footpath. The signs, markings and surface treatments need to encourage cyclists to slow down through the bus stop. Any potential conflict between cyclists and crossing pedestrians need to be addressed.
- The size of the island ideally will be large enough to accommodate current and future waiting passenger numbers.
- The width of the bus stop island needs to take into account the size of any shelter, slope of ramps, the location of kerbs and the number of bus passengers.
- This design requires space. Where there is not enough footpath width to accommodate an island then ways of expanding the space should be investigated such as land purchase, reducing the width of the main carriageway, or a shared by-pass.

Design concept
(Major cycleways – Bus stops – Island concept)



2.6.2. *Major cycleways/Bus stops/ Inline concept: Design principles*

Major cycleways sharing routes with low frequency bus services (less than one bus every 15 minute) can use an inline concept rather than a bus island. The principles are:

- The inline concept provides cyclists with a choice of ways to navigate around a bus that is stopped. Cyclists on a major cycleway approaching a stopped bus can use a shared (with pedestrians) by-pass, overtake the bus using the main traffic lane or stop and give way to the bus.
- The design, signage and markings needs to encourage cyclists to slow down and give way to buses entering the bus stop.
- The design needs to consider the level of conflict between cycles, buses and waiting pedestrians.
- The length of the bus bay needs to be long enough (approximately 26m) to allow for the full entry and exit of buses but also allow confident cyclists to overtake any stationary bus.
- The draft Christchurch City bus stop guidelines 2008 need to be considered.

Design concept
(Major cycleways – Bus stops – Inline concept)

2.7. *Major cycleways crossing busy roads*

Cyclists on major cycleways that cross at busy roads should be provided with bridges, underpasses or signalised crossings. These treatments are safe for the cyclist and provide a good level of service for both the cyclists and other road users.

2.7.1. *Major cycleways/State highways and motorways crossings: Design principles*

- Overbridges or underpasses provide the safest way of crossing and the best level of service for both the major cycleway and the state highway or motorway.
- When designing the bridge or underpass it is important to apply Crime Prevention Through Environmental Design[7] (CPTED) principles. NZTA guidelines on underpass design[8] also need to be taken into consideration.
- Bridges and underpasses need to be wide enough to accommodate cyclists going both ways and high enough for safe head clearance.
- Underpass entries and exits need to be visible (good corner splays), open and be clear they are only for cyclists (not motorbikes).
- Underpass designs ideally need to incorporate as much natural light as possible using light wells, for example. If this is not achievable, then artificial lighting may be required.
- Underpass drainage needs to be considered and in some cases a pump station may be required.
- On bridges, hand rails and railing needs to comply with the Austroads Guide to Road Design – Part 6A – Pedestrian and Cyclist Paths, Sections 7.7.1 and 7.7.2.
- Designs of both bridges and underpasses need to consider typical weather conditions (particularly strong winds, storm drainage).
- Bridges can offer an opportunity to create a flagship structure at city gateways. Attractive, landmark infrastructure can help promote and enhance cycling and walking. The bicycle bridge in New Plymouth is a great New Zealand example of this principle in action (page 9).

From top to bottom: Examples of a light well, landscaping and widths.

[7] *Ministry of Justice (2005) Crime Prevention Through Environmental Design Part 1 and 2.*

[8] *New Zealand Transport Agency (2009) Urban design principles – Underpasses.*

2.7.2. *Major cycleways/Arterial, distributor and local streets crossings: Design principles*

Major cycleways crossing arterial, distributor and local streets need to consider if a bridge or an underpass is feasible (following the principles in section 2.7.1). If these options are not feasible, then signals are likely to be the next best option (at grade, signalised cycle crossings with induction loops). Dedicated signals provide cyclists with a safe way to cross. The design principles are:

- Signalised crossings with separate facilities for pedestrians and cyclists (cycle bollard style signal) will provide a safe crossing facility for pedestrians and cyclists. The separation allows for the shorter cycle phase to run separately from the pedestrian signal phase, which can improve traffic capacity.
- All signalised crossings need to consider the capacity and network implications of the crossings on the arterial road.
- Green coloured surfacing through the crossing should be considered to improve visibility and legibility of the cycle path through the crossing.
- The design should minimise waiting time for cyclists at crossings. Induction loops detect cyclists and trigger the signals and can be used on both the approach and the finish of the crossing.
- Cycleways that cross low volume, local streets can be programmed to rest on green as this gives a high level of service and priority to cyclists. Induction loops on the street are used to trigger the traffic signal to green and the cycle signal to red.
- Designing traffic signals is a specialised discipline. All designs need to engage a signal engineer for both the design and peer review. The signal design also needs to be approved by the Road Controlling Authority.

Example of a signalised crossing facility.

Design concept
(Major cycleways – Arterial, distributor and local streets)

2.7.3. *Major cycleways/Railway crossings: Design principles*

Major cycleways crossing a railway line that can't be separated should instead provide a safe flat (at grade) crossing point. The design principles are:

- Providing a high level of safety is paramount. Where the predominant cycle users are young, the ideal is an alarmed automatic gate which closes (and bells ring) when a train approaches but is open all other times. This design makes cycling through the crossing easy and manoeuvrable.
- The basic design for major cycleways crossing a railway line is a maze fence with signage. This has the disadvantage that cyclist have to slow and tightly manoeuvre across the railway line, they are also more exposed when a train approaches.
- The cycleway (or footpath) should be level with the train rails (rubber pads are used to level the surface). Narrow gaps between rails and the abutting carriageway surface help all users to cross safety and smoothly.
- Cycleway crossings should be perpendicular (or as close to perpendicular as practicable) to the train rails with fencing along the rail reserve to make sure the sanctioned rail crossing is used.
- Rail crossings should be well lit at night to improve safety.
- All designs and works on or immediately next to a railway line require approval from the rail access provider. Early consultation with local Kiwi Rail representatives is essential.

2.8. *Major cycleways and transitional treatments*

Interim or transitional treatments provide a temporary, lower cost option to show a change in priority on major cycleways before making any permanent changes. A temporary treatment can also be appropriate where an existing cycle lane is likely to become a major cycleway in the future.

2.8.1. *Major cycleways/ Transitional treatments/ Temporary separation: Design principles*

- Temporary separation can be used to improve the safety of cyclists in sections where vehicles frequently encroach on cycle lanes. This may include known conflict points on bends, high traffic speed routes or encroached sections of the cycle lane on the approach to busy intersections.
- Vertical edge markers (such as uprights), raised delineators (such as Riley kerbs) or painted chevrons are examples of temporarily providing separation.
- The temporary introduction of contra-flow cycle lanes on one-way streets can increase the connectivity of the cycle network. Contra-flow lanes could form part of a traffic management scheme during the rebuild. The design needs to carefully consider the safety of contra-flow cycle lanes at intersections and access onto and off of the facility.
- A contra-flow route is not appropriate if there are a high number of driveways and intersections next to the cycleway.
- The use of signage, markings and colour surfacing can highlight and reduce potential conflict areas.

Top: Examples of a vertical edge marker.
Bottom: raised delineators.

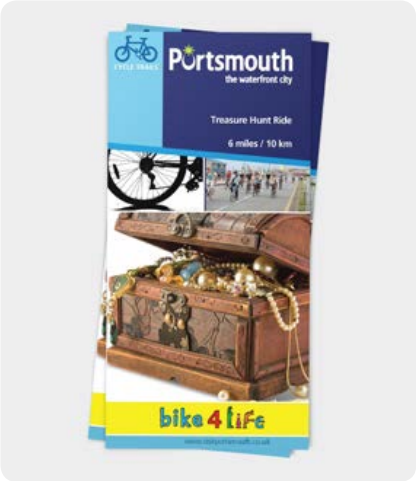
2.9. *Major cycleways with a themed identity*

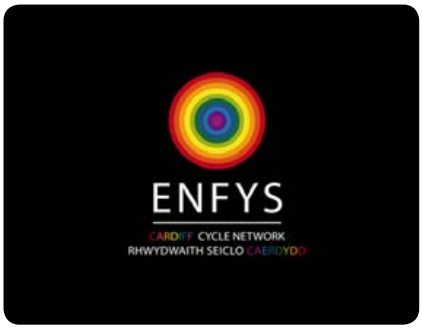
A strong theme or brand for the major cycleway network can improve the image of cycling and create an attractive environment that encourages more people to cycle. Branded or themed cycleways will improve legibility making it clear to people when they are on a major cycleway and the direction the route follows. Themed cycleways can also have a unique appeal for tourists and residents.

Involving the community in developing the brand or themes for each major cycleway route will result in a strong sense of public ownership in the cycle network. This is a critical factor for successful implementation of the major cycleways. The brand or themes may be communicated using:

- Signs and markings of a particular design or theme (while still fitting in with the continuity of the wider network signs).
- Painting along the route in particular colours and/or designs reflecting the overall theme.
- Installation of art and sculpture along the route, and even in the cycleway itself, which has relevance to the theme.
- Interactive information points on the route which will educate people about particular aspects of the route and given theme.

Branding or themes for cycle routes and networks have been successful internationally. For example in Germany, the 'Berlin Wall Trail' follows the path of the old Berlin wall with information, art and historical artefacts relating to the history of the Berlin wall along the cycle route. In Portsmouth (UK) there are a variety of themes for individual cycle routes with sculpture and artwork relevant to the theme along the route. The themes include 'The Funky Bike Racks Ride', 'The Treasure Hunt Ride and the 'Famous Person Cycle Ride'. In Cardiff (UK) a public competition held to name and design the network logo of their cycle network was hugely popular and widely praised.





Top: Example of cycle branding[9]. Bottom: Example of cycleway sculpture[10]. Left: Example of themed routes[11].

[9] *www.keepingcardiffmoving.co.uk/cycle/enfys-cardiff-cycle-network*

[10] *www.theage.com.au/travel/activity/active/from-death-strip-to-worlds-most-fascinating-bike-trail-20110811-1inrd.html*

[11] *www.portsmouth.gov.uk/media/Treasure_hunt_leaflet.pdf*

3. Local cycleways

Local cycleways provide safe connections to major cycleways and local destinations across the city. They help create a safe environment for current and new cyclists, as well as catering for local needs. The proposed routes for the local and recreational cycleways are illustrated in Figure 3.1.

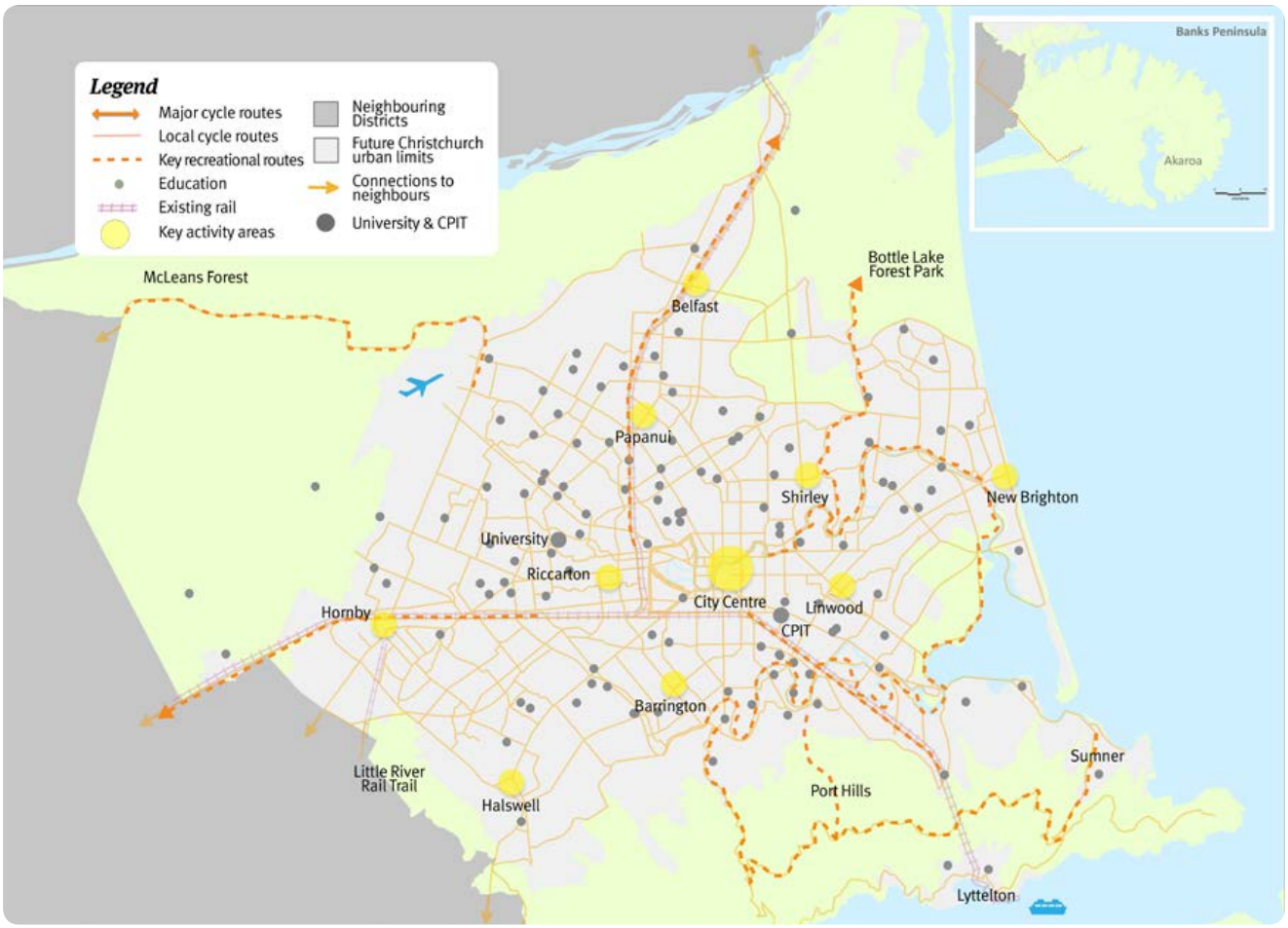


Figure 3.1. Future local and recreational cycleway network (Christchurch Transport Strategic Plan).

Local cycleways will be used by different types of cyclists and can take many different forms as they pass through different local environments or situations. Local cycleways, like major cycleways can consist of shared paths, separated cycle paths, cycle lanes, neighbourhood greenways or slow streets. This section outlines the local cycleway design concepts and principles for each situation, including:

1. Parks, reserves and waterways
2. Urban commercial centres
3. Residential streets
4. Arterial road and distributor streets
5. Intersections
6. Bus routes.

3.1. *Local cycleways through parks, reserves and waterways*

Local cycleways through parks, reserves, greenspace and along rail or river corridors will generally be wide, shared paths.

3.1.1. *Local cycleways/Parks, reserves and waterways/ Shared paths: Design principles*

- Designs need to reflect the park setting and character of the path.
- Shared path widths need to cater for current and future cycle and pedestrian peak volumes. On local cycleways where volumes are low a wide shared path without separation is appropriate. Where volumes are high then it would be appropriate to separate cyclists and pedestrians. A painted line provides the simplest form of separation (yellow paint is better for the visually impaired). Refer to Vic Roads (2012) Cycle Note 21 provides for further guidance on undertaking a path width assessment.
- Either side of the shared path should be clear of obstacles to allow for overtaking and to minimise the impact of any cycling errors especially at times of high use (approximately one meter either side of the path). This extra space can be provided by using more permeable surfaces at the edges such as turf cells.
- The design of the shared path should be appropriate to the expected speed of cyclists using the path (approximately 15 km/hr for expected users). Consideration to sight lines, signs, markings, path alignment and gradients is important.
- The shared path should be wide and strong (construction depth) enough to allow service vehicles access for maintenance.
- The design should create awareness of other path users by providing good on-path markings (such as aluminium role markings) with messages to indicate the presence of both pedestrians and cyclists. Surface texture treatments can also be used to raise awareness of other users and encourage more considerate use of shared paths. Further guidance on minimising conflict is in Austroads (2006) Research Report: Pedestrian and cyclist conflict minimisation on shared paths.
- Crime Prevention Through Environmental Design (CPTED) principles and accessibility for all users (including suitability for young cyclists, visibility for hand cycles and safety) should be considered.
- The needs of low mobility and visually impaired pedestrians must be considered in all designs.
- Where paths are located close to water, over water or along banks extra safety considerations need to be taken into count. For appropriate treatments designers should refer to the Austroads Guide to Road Design – Part 6A – Pedestrian and Cyclist Paths, Sections 7.7.1 and 7.7.2.

Example of a shared path with painted line separation.

Design concept
(Local cycleways – Parks, reserves and waterways – Shared paths)

3.2. *Local cycleways through urban commercial centres*

Local cycleways through commercial centres ideally will be separated cycle paths to provide a comfortable and safe environment for cyclists. Separation can be achieved in a variety of different ways depending on the individual centre and competing needs.

Where there is limited street space available other options such as wide cycle lanes or a slow street environment can be considered.

3.2.1. *Local cycleways/Urban commercial centres/ Separated cycle paths: Design principles*

The design principles for separated cycle paths are in section 2.2.1. (Page 18)

3.2.2. *Local cycleways/Urban commercial centres/Slow streets: Design principles*

The design principles for slow streets are in section 2.2.5. (Page 26)

3.2.3. *Local cycleways/Urban commercial centres/Cycle lanes: Design principles*

In commercial centres where a separated cycle path is not appropriate, a wide cycle lane should be considered. The design principles are:

- The cycle lane ideally needs to be wide enough for cyclists to pass one another (approximately 1.8 to 2m). A wider lane also gives cyclists more protection from traffic movement and car doors opening into the cycle lane.
- At side roads where the cycle lane continues along the main road, a continuity line is used to indicate that cyclists have priority, however vehicles can pass through the cycle lane.
- In the lead up to and where the cycle lane crosses an intersection, driveway, or entrance a change in texture or green surfacing increases the visibility of a potential conflict point.
- A mountable kerb or ramp provides easy access to cycle parking or information points where these are located on the footpath.

Example of green coloured surfacing.

Design concept
(Local cycleways – Urban commercial centres – Cycle lanes)

3.3. Local cycleways and residential streets

In urban residential streets, local cycleways ideally will be neighbourhood greenways which create a slow, safe environment where bicycles, vehicles and people can comfortably co-exist. The quality of the environment and amenity of the residential street is also enhanced through the design.

On busier residential streets, where lower traffic speeds and volumes are not possible then separated cycle lanes or shared paths may be more appropriate.

3.3.1. Local cycleways/Residential streets/Neighbourhood greenways: Design principles

The design principles for neighbourhood greenways can be found in section 2.3.1.

In addition to these design principles, on a local cycleway where traffic volumes and speed are already low, the cycleway may only need to be signed. This may involve placing route markings on the carriageway to increase the drivers' awareness of cyclists while acting as wayfinding for cyclists. Such route marking will be subject to a NZTA trial before wider use.

Example of cycle markings on a residential street.

3.3.2. Local cycleways/Residential streets/Cycle lanes

- Cycle lanes should be considered where vehicular volumes (roughly more than 2000 vehicles per day) are expected to be too high for a neighbourhood greenway. The design principles are:
- The cycle lane ideally will be wide enough for cyclists to pass one another (approximately 1.8 to 2m). A wide lane also gives cyclists more protection from traffic movement and car doors opening into the cycle lane.
- Where there is no parking spaces then cycle lanes will be next to the kerb and extra width added to the cycle lane as appropriate.
- Where space is limited, additional space for the cycle lane can be achieved by re-allocating on-street car parking, reducing the width of the carriageway or using some of the berm as a cycleway. These options should include consultation with the local community.
- In the lead up to and where the cycle lane crosses an intersection, entrance or driveway, a change in texture or green surfacing is recommended. This can increase the visibility of cyclists at potential conflict points.
- Treatments such as vertical edge markers need to be considered in potential conflict areas especially where vehicles are known to enter the cycle lane.

3.3.3. Local cycleways/Residential streets/Shared paths: Design principles

Shared paths provide good local cycleway connections to schools or community facilities, especially in residential areas. The design principles are:

- The shared path ideally needs to be wide enough to comfortably accommodate both a pedestrian and a cyclist side by side (approximately 3.5m). Pedestrian and cycle volumes need to be assessed to determine the width. Vic Roads (2012) Cycle Note 21 provides further guidance on undertaking a path capacity and safety width assessment.
- On the shared path a painted line (or textured) provides simple separation to give space between pedestrians and cyclists. Where there are higher volumes of pedestrians or cyclists then a separated cycle path (at the footpath level), potentially utilising part of the berm could be more appropriate (Similar to Tennyson street in Christchurch).
- In and around schools and community buildings shared paths for slower, less confident cyclists are ideal and on-road cycle lanes could also be available for faster, more confident cyclists.
- The needs of low mobility and visually impaired pedestrians and cyclists should be considered in all designs.
- Surface types need to be smooth while retaining traction. Smooth sealed paths (using universal building materials such as asphalt or aggregate concrete) are preferred.

- The design of shared paths needs to encourage slower cycle speeds so the cyclist slows closer to the pace of a pedestrian. Surface texture treatments make people aware of the environment and promote more considerate use of shared paths.
- The design should create awareness of other path users by providing good on-path markings (such as aluminium role markings) with messages to indicate the presence of both pedestrians and cyclists. Surface texture treatments can also be used to raise awareness of other users and encourage more considerate use of shared paths. Further guidance on conflict minimisation is in Austroads (2006) Research Report: Pedestrian and cyclist conflict minimisation on shared paths.
- Shared path designs need to reflect the local character of the street and incorporate space for landscaping around the path.
- The design should consider safety and inter-visibility at driveways and intersections. Wide visual splays ensure good sight lines of people walking and cycling, the cycle side of the shared path should be located on the outside, away from boundary fences. A wider berm width between the driveway and the shared path can also increase visibility of the shared path.

Top: Example of a shared path. Bottom: Example of a separated cycle path on the berm (Tennyson Street Christchurch).

3.4. Local cycleways on arterial roads and distributor streets

On arterial roads and distributor streets, vehicle movement often has priority but more confident cyclists may also share the road. To improve safety, local cycleways ideally need to be either a separated cycle path or cycle lane.

3.4.1. Local cycleways/Arterial roads and distributor streets/Separated cycle path: Design principles

On arterial roads separated cycle paths should be considered first, because they provide the highest level of cycle comfort and safety. The design principles and concepts for separated cycle paths are in section 2.2.1.

3.4.2. Local cycleways/Arterial roads and distributor streets/ Cycle lanes: Design principles

On arterial roads or distributor streets which have slower vehicle speeds (ideally 50km/hr or less) and lower volumes, or where separated cycle lanes are not practical, a wide cycle lane is recommended. The design principles are:

- The cycle lane ideally needs to be wide enough for cyclists to pass one another (approximately 1.8 to 2m). A wider lane also gives cyclists more protection from traffic movement and car doors opening.
- Where there are no parking spaces then cycle lanes should be next to the kerb, with a no stopping line and extra width added to the cycle lane as appropriate.
- Where space is limited, additional space for the cycle lanes could be achieved by re-allocating on-street car parking or using some of the berm as a cycle lane or for parking bays. These options should include early consultation with the local community.
- Where the cycle lane crosses an intersection, driveway or entrance green surfacing should be used to increase the visibility of cyclists and reduces potential conflict.
- Treatments such as vertical edge markers need to be considered in potential conflict areas especially where vehicles often enter the cycleway.
- At side roads where the cycle lane continues along the main road, a continuity line is used to indicate that although cyclists have priority, vehicles can pass through the cycle lane.

Example of a cycle lane on an arterial road.

3.5. *Local cycleways at intersections*

Turning vehicles at controlled intersections, t-intersections and roundabouts can make cyclists using local cycleways vulnerable. Designs at intersections need to help to make the cyclist more visible and make it easier for them to pass through the intersection.

Designs to improve cycle comfort include advanced stop boxes, hook turn boxes, cycle lanes, cycle bypasses and traffic calmed single lane roundabouts. Designs will need to respond to the intersection type and capacity.

3.5.1. *Local cycleways/Signalised intersections/Advanced stop boxes and hook turn boxes: Design principles*

A cycle area ahead of (in advance of) vehicle traffic signal limit lines is called an advanced stop box. Advanced stop boxes give cyclists a head start from vehicles and make cyclists visible to queued drivers. Hook turn boxes allow a cyclist to turn right at an intersection in two separate manoeuvres. The design principles are:

- Advanced stop boxes need to provide an area where cyclists can wait safely when traffic signals are red. The box makes cyclists visible to queued drivers and gives cyclists a head start when the signal turns green.
- Where possible, the advanced stop box needs to cover the full width of the traffic lane not just the cycle lane. The position of the advanced stop box and cycle lane should take into consideration driver turning movements to make sure it is safe for all road users. The Manual of Traffic Signs and Markings (MOTSAM) provide good guidance on where and how to configure advanced stop boxes.
- Contemporary standards recommend advanced stop boxes are 4 to 5 metres deep. This allows cyclists to enter the box when vehicles are queuing. The current MOTSAM requirements are 2.9 metres deep. This standard is currently under review. Consideration should be given to deeper boxes.
- Hook turn boxes make right turns easier for young and less experienced riders. Hook turn boxes should be placed in safe locations so they do not interfere with other road users.

Example of a hook turn box and an advanced stop box.

3.5.2. *Local cycleways/Signalised intersections/Cycle lanes: Design principles*

There are two main scenarios for cycle lanes at signalised intersections, the first is a single cycle lane (design concept 1) and the second is a left-turn and straight-through cycle lane (design concept 2). Both of these scenarios will improve the visibility of cyclists at intersections. The design principles are:

- The number of traffic lanes, their direction (left-turn, straight-through or right-turn lanes) and vehicle speeds need to be taken into consideration when deciding on the position, markings and width of a cycle lane (approximately 1.6 to 2m) as it approaches an intersection.
- Where there is only one traffic lane, the cycle lane needs to approach the intersection on the kerb side (design concept 1).
- Where there is more than one traffic lane then a second cycle lane can be placed between the left-turn and straight-through traffic lanes (design concept 2).
- In both designs, hook turn boxes can facilitate right turns for young or less experienced riders. Hook turn boxes need to be placed safely so they do not conflict with other road users and turning movements.
- Cycle lane markings ideally need to continue through the intersection, preferably using a green surface treatment or painted continuity lines. This helps cyclists through the intersection, increases their visibility and helps drivers to understand where cyclists are riding at the intersection.
- Left-turning vehicles often cross into cycle lanes when approaching intersections. To protect cyclists at intersections vertical separation and green surfacing encourages vehicles to stay out of the cycle lane. This is especially important if the intersection is busy.
- Low mountable kerbs and vertical edge markers are two ways of providing vertical separation (illustrated in design concept 1). When vertical protection is introduced it is important to maintain clear sightlines of pedestrian crossings and provide ongoing maintenance of any vertical edge markers.
- Cyclists can be given a higher priority and a more protected crossing at signalised intersections by introducing: an exclusive cycle phase, a delay to the left turning vehicle lane, or a delay to the on-coming right turning traffic lane while cyclists cross.

Top: Example of cycle lane markings and colour treatment through the intersection. Bottom: Example of vertical edge markers.

Design concepts
(Local cycleways – Signalised intersections – Cycle lanes)

1. Single cycle lane at the intersection.

2. Left-turn and straight-through cycle lane at the intersection.

3.5.3. Local cycleways/ Intersections/By-passes: Design principles

On local cycleways, where a cycle lane makes a left turn at an intersection and vehicle turning speeds and volumes are high (often with wide angled corners) then a cycle by-pass can be considered. The design principles are:

- A cycle by-pass provides a safe, continuous left-turn for cyclists by offering an off-road cycle path, next to the footpath, which goes around the outside of the intersection. The cycle path needs to allow space for pedestrians approaching and waiting to cross the intersection and take into account what the land alongside it is used for.
- An alternative design is an on-road by-pass. An on-road by-pass will ideally have two parts: a separate on-road cycle lane for left turning cyclists and an advanced stop box for cyclists who continue straight on.
- An on-road by-pass needs to be highly visible and could also offer extra protection such as vertical edge markers. An advanced stop box also offers a safe place to wait for the signals to turn green without being in the way of any left-turning cyclists.
- Design needs to consider pedestrian movements, volumes, waiting space, and the needs of mobility and visually impaired pedestrians.

Example of a cycle bypass at an intersection.

Design concept
(Local cycleways – Intersections – By-passes)

3.5.4. *Local cycleways/ Intersections/Roundabouts: Design principles*

Roundabouts are challenging for cyclists and where possible they should be avoided on local cycleways. If a single lane roundabout is unavoidable, then the roundabout design needs to reduce the vehicle speed to cycling speed. This means that cyclists can safely share the traffic lane. Multi-lane roundabouts should provide an off-road cycle path. The design principles are:

- At minor roundabouts (single lane, low traffic volume) the geometry of the roundabout needs to reduce approaching and circulating vehicle speeds. The design needs to encourage vehicles to slow down and share the road space with cyclists. Consideration should be given to radial geometric designs, which increase deflection and reduce speed compared to the traditional tangential design.
- In a radial design, cyclists can share the traffic lane. The cycle lane needs to finish before the roundabout and include signage to alert all road users that cyclists will now be merging into the traffic lane before they enter the roundabout.
- If the radial roundabout has splitter islands between each arm, the islands need to have parallel kerbs not the triangular shaped islands used in a tangential roundabout.
- If the minor roundabout on a local cycleway provides passage to a nearby school or community facility then a shared path around the outside of the roundabout is ideal. The width of the shared path will need to accommodate both pedestrians and cyclists.
- Another option for roundabouts is a cycle roundabout. Cycle roundabouts often have two narrow approach lanes where the cyclist 'takes' the lane to travel through or around the roundabout. The narrow lanes reduce speeds and encourage lane sharing. Large vehicles are advised (by signs) to straddle both approach lanes.
- For large roundabouts with multi-lane approaches an off-road cycle path with traffic signals is safest. As the cycle lane approaches the roundabout, flush kerbs provide a ramp onto a shared path. The shared path ideally connects to a signal crossing at a safe distance back from the roundabout exit. Once through the roundabout the shared path merges the cyclist back into the on-road cycle lane.

Top and bottom: Examples of cycle roundabouts with a shared lane.

3.5.5. *Local cycleways/ Intersections/T-intersections: Design principles*

Local cycleways approaching T-intersections need to offer continued priority and increased visibility to improve safety. The design principles are:

- Approaching the T-intersection parking should be restricted and a wide cycle lane provided to increase the inter-visibility between the driver and cyclist (design concept one). A small kerb radius (3-5m) can also be used to slow turning vehicles and reduce the pedestrian crossing distance.
- To improve visibility, a green coloured surface across the T-intersection is ideal especially where there are a number of vehicles turning. The green surface should start before and end after the intersection.
- At the top of a signal-controlled T-intersection a separate cycle signal that allows cycles to continue through the top of the T (even when the main vehicle signal is red) is recommended (illustrated in design concept 2). This requires a trial with NZTA before it can be implemented across the network.
- The design needs to consider potential conflicts with pedestrians and incorporate either markings for cyclists to give way to pedestrians or a signal to stop cyclists, if the pedestrian phase has been triggered.
- The design needs to consider any potential conflict with driveways or entrances across the T-intersection.
- The design needs to consider the discharge capacity of the side road and network implications.

Design concepts
(Local cycleways – Intersections – T-intersections)

1. Cycle lane at a T-intersection.

2. Cycle signals allow cycles to continue through the top of the T-intersection.

3.6. *Local cycleways and bus routes*

There are some locations on the transport network where there will be both a local cycleway and a bus priority lane, where this occurs the bus lane should be shared with cyclists.

Design Principles

The design principles are:

- Part-time bus lanes need to provide enough width to comfortably share space with cyclists. They should be wide enough to accommodate overtaking (both buses overtaking cyclists and cyclists passing parked cars when the bus lane is not operating) and provide a buffer between cyclists and the vehicle traffic. To achieve this, the ideal width is around 4.5m and the absolute minimum width for a shared cycle and bus lane is 4.2m which should only occur over a short distance.

Example of a shared bus lane.

4. Recreational cycleways

Recreational cycleways provide for people who cycle for sport (faster cyclists) and/or for a road trip and people who ride for leisure (slower cyclists). The design of cycle facilities for each user is different. Sports/road trip facilities need to focus on improving on-road conditions while leisure cycle facilities need to focus on off-road options that connect parks or greenspace.

Both designs should be continuous and wide enough so that cyclists of all abilities feel safe. The proposed routes for the local and recreational cycleways are illustrated in Figure 4.1.

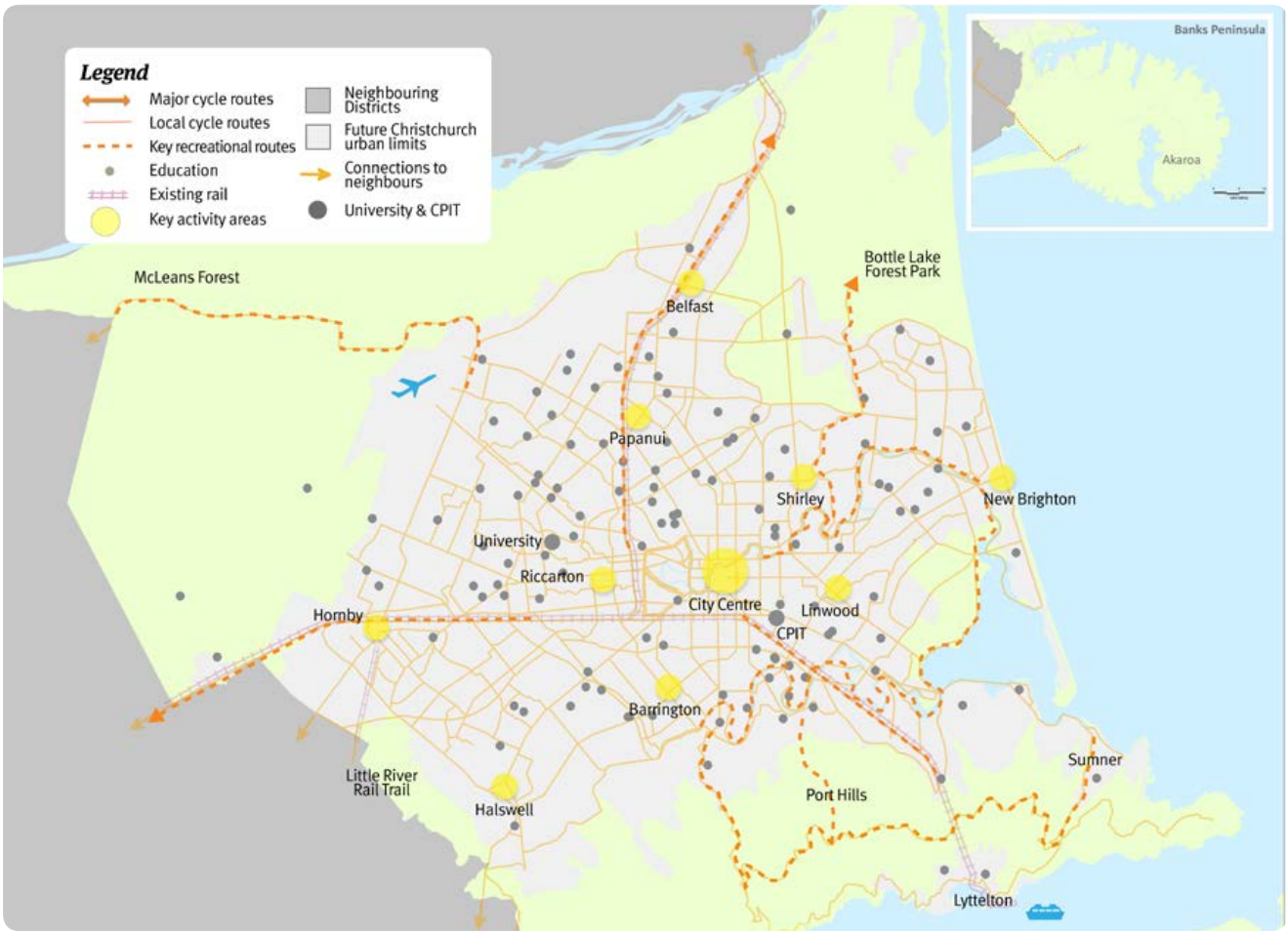


Figure 4.1. Future local and recreational cycleway network (Christchurch Transport Strategic Plan).

4.1. Recreational cycleways and cycling for leisure

Recreational cycleways that connect parks, rivers and coastal areas are ideally off-road, wide, shared paths. The design provides a safe environment to facilitate leisure and recreational cycling.

Design Principles

The design principles are:

- The designs should cater for the volumes and the directional split of cyclists and pedestrians that use and could use the path.
- Shared paths need to be wide enough to comfortably accommodate expected volumes of both cyclists and pedestrians. Cycle Note 21 provides further guidance on undertaking a path capacity width assessment.
- Designs should sensitive to the park or greenspace setting.
- Where paths are located close to water, over water or along banks extra safety considerations should be taken into count. Where paths are located close to water, or over water, or along banks then safety considerations should be taken into count. For appropriate treatments to ensure safety refer to the Austroads Guide to Road Design – Part 6A – Pedestrian and Cyclist Paths, Sections 7.7.1 and 7.7.2.
- Recreational shared paths can be unsealed to fit in with the park or coastal environment.

Example of a recreational walking and cycle path.

4.2. Recreational cycleways and cycling for sport and road trips

Recreational cycleways for sports and road trip cyclists need to focus on improved on-road conditions. Providing for road sport cyclists requires an understanding of the characteristic needs of the group. Generally road cyclists are made up of people into sport or simply cycling for their own enjoyment. Road cycling trips are typically up to three times longer than utility, commuter or education cycling trips.

Design Principles

The design principles for on road cycling facilities are:

- The design should seek to provide a high quality road surface which can accommodate a typical sport cycle speed of over 30 km/h.
- On going maintenance is important to address pot holes and edge breaks. To maintain a clean surface, clear of broken glass the cycleway should be more regularly swept.
- The design should seek to provide generous road, shoulder and cycle lane widths to accommodate road cyclist who often ride side by side. This is especially needed on roads with high speeds (above 50 km/h), particularly on arterial and rural roads. The Austroads recommended widths for cycle lanes and shared shoulder widths are below. If parking is present the cycle lane widths should be wider. Refer to New Zealand supplement to the Austroads guide to traffic engineering practice part 14: Bicycle (NZTA) for these cycle lane widths:

Speed limit	50kph or less	70kph	100kph
Lane width (in metres)	1.5	1.9	2.5

- On narrow or rural roads where space is physically limited, safety needs to be improved through signage, markings and education campaigns. On tight, narrow or blind corners, use roadsigns, warning signs or electronic signs to let vehicles know a cyclist is likely to be on the road ahead. On the most popular recreational cycleways a reduction in speed limits could be considered.
- Wide, separated cycle paths in rural areas could be considered to improve safety for sports/road trip cyclists.

Example of road use signs.

5. Parking and cycle facilities

To encourage more people to cycle more often quality cycleway design needs to include cycle parking.

5.1. Cycle parking

To encourage more people to cycle, a good number of secure, high quality cycle parking facilities should be located at key destinations throughout the city. Good parking provision can add creativity, de-clutter spaces and un-block footpaths from badly parked bicycles. Cycle parking demand should be monitored and planned for so that parking provision is well thought out and can be adapted to the changing needs of the city. This will avoid an over or under supply of bicycle parking facilities.

Different parking facilities are appropriate for different circumstances depending on the location, estimated length of stay and likely users. This guideline focuses on the design principles for short and long stay cycle parking.

5.1.1. Cycle parking/Short term: Design principles

For short term parking (two hours or less) the design principles are:

- Place cycle stands close to key destinations and in prominent areas. This will increase the attractiveness of cycling and the security of the facility.
- Cycle stands need to be designed to provide stability in windy conditions or on a sloping footpath. They should cater for and provide stability to different styles of bicycles (including cargo and electric bikes), so that both the frame and a wheel can be secured, such as the wide hoop stand. Ideally stands will not be secured by the front-wheel only.
- The design of cycle stands should be attractive, practical, easy to use, robust and easy to maintain.
- Ideally cycle stands will provide basic weather protection and basic cycle service facilities.
- Cycle stands need to be placed so parked bikes do not interfere with pedestrians and where they are not hit by moving vehicles.
- The number of cycle stands ideally will allow for spare spaces even at peak times. The space provided should allow for stands to be progressively added as cycle numbers grow.
- Innovative designs can encourage their use and add to the urban form.

From top to bottom: Examples of innovative parking designs, servicing facilities and cycle stand shelters.

5.1.2. *Cycle parking/Long term: Design principles*

For long term cycle parking (above two hours) the design principles are:

- Long term parking should be in places where people are likely to leave their bicycles for longer than two hours (eg: public transport stops, commercial centres, areas of high employment or community facilities). Individual businesses are also encouraged to provide secure, covered parking with adequate facilities to encourage employees to cycle to work.
- Long term parking facilities should be contained and covered with restricted access.
- Electric parking facilities with charging points can be considered in popular locations to facilitate the growing trend of electric bicycles.

There are three key types of long term parking facilities: individual lockers, collective facilities and larger storage facilities. Each type is outlined below.

- **Individual locker parking** offers a covered, secure, location for cycles and other accessories to be stored. They can be on-street or integrated into buildings. The lockers can either be privately rented or used on a first come, first served basis where people provide their own padlock. They can be privately owned and managed. Ideally they will be supervised (eg: with CCTV or natural surveillance).
- **Collective lockers** hold a number of cycles securely. They operate as a collective with each member of the collective owning a key. They can be on-street or off-street and work well in high density residential environments, or with a single employer or group of employers with close connections.
- **Larger storage facilities** need to be covered and secure and may include additional facilities such as lockers or showers. They need to be in areas where there is a high demand for long term cycle parking (eg: a public transport interchange or a large commercial area). The facility should be secure to enter, use and exit. The storage facility could be integrated into other buildings or off-street car parks to reduce the space required for on-street storage.

From top to bottom: Examples of a large storage facility, an individual locker and a secure facility.

Glossary

Aluminium role signs – message signs rolled into the footpath or cyclepath.

Bridge parapet – a structure or wall that prevents users from falling off a bridge when there is a drop.

Bus bay – a special area on the side of the road used by buses to stop as a designated bus stop in order to pick up and drop off passengers.

Cargo bike – Bicycles that have been designed to carry a significant load. Designs often have large containers either at the front or rear of the bicycle.

Carriageway – the width of a road where a vehicle is not restricted by any physical barriers. The carriageway is area between the two kerbs of the roadway.

Chicane – an artificial feature creating extra turns in a road, used on streets to slow traffic for safety.

Coloured surface treatments – different coloured surfaces used to signify cycle lanes at points of conflict.

Continuity line – Broken white lines for road marking, which are wider and closer together than regular broken lines.

Contra-flow cycle lane – cycle lanes which operate in the opposite direction to the usual flow of traffic on the road.

Copenhagen cycle paths – cycle paths which originated in Copenhagen. They are unique in that the cycle path is located between the height of a road and the height of the footpath. This stops cars encroaching in the cycle lane and highlight to pedestrians that the area is for cycling.

Crossing treatments – facilities which are put in place which make crossing the road easier for people.

Cycle Barnes Dance – an intersection treatment which allows for all cyclists at each arm of the intersection to have a combined green phase. This allows for full movement across the intersection whilst cars are held on red.

Cycle bypass – infrastructure which allows cyclists to legally complete an intersection manoeuvre even when the vehicle traffic signals are red.

Cycle crossing – specifically designed infrastructure to allow cyclists to cross busy roads in a safe, convenient manner.

Cycle lane – an area on the road which has been designated for bicycles only, often found towards the edge of the carriageway.

Cycle network – highlights the future cycling routes in Christchurch, split into major, local and recreational routes.

Cycle roundabout – a roundabout design safe for cycling, which has two narrow approach lanes which encourage lane sharing.

Cycleway – a route which is prioritised for cycling.

Diagonal diverters – are build outs at intersections to prevent through traffic, they include gaps for bicycles, so that they can pass through the intersection.

Electronic cycle counters – large structures found on cycle routes which show the number of cyclists which have used the route. Can be used for cycle count information as well as cycling promotion purposes.

End user facilities – facilities which are required at the end of a journey which cyclists may require. Can include, showers, lockers and bicycle stands.

Flush kerbs – kerb lines which are at the same level as the carriageway, this results in no drop down from the footpath to the carriageway.

Induction loops – signalling infrastructure which made up of pressure sensors which detect cyclists before they reach a set of signals. This allows for the signals to change allowing for cyclists to go when they approach the signals.

In-line bus stop – bus stops which are located within the carriageway and are marked by a painted are near the kerb.

Island bus stop – a cycle by-pass around the bus stop using an island.

Kerb and channelling – drainage infrastructure found at the edge of carriageway.

Kerbed separation – physical infrastructure which separates cycle facilities from other traffic lanes. Can be a variety of widths.

Light wells – spaces in roof structures or bridges which allows natural light to funnel down to the area below.

Lighting studs – small circular studs which can be placed in the pavement to highlight presence of potential hazards. They charge up during the day and emit a constant light during night hours.

Maze fence – a zig-zag fence often used to slow and warn pedestrians and cyclists in the build up to railway crossings.

Median islands – structures found in the middle of the carriageway to separate two different flows of traffic.

Mobility friendly – infrastructure which is designed to accommodate people of all mobility levels.

Mountable kerbs – kerbs which are low enough to be driven over without significant discomfort. Often plastic or temporary.

Neighbourhood greenways – streets which have been designed to give cyclists and pedestrians a greater level of priority in the street environment. This can be achieved by using traffic calming measures to speeds and volumes on the street (sometimes referred to as Bicycle Boulevards or Green Streets).

NZTA – New Zealand Transport Agency

Painted separation – painted markings which designate the boundary where cycling facilities and either a traffic lane or a footpath begins. This painted area can vary from a single painted line to area one metre wide with chevrons inside.

Part-time bus lanes – bus lanes which are only in operation at peak times. At non peak times they become a normal traffic lane or car parking.

Planter separation – a method of separating cycle facilities from other modes using vegetation, often in the form of plants in raised boxes or trees.

Pump station – a place with a bicycle pump to inflate tyres and basic mechanical tools to fix bicycles.

Raised platforms – areas on the carriageway which are raised to slow traffic at potential conflict areas.

Road Controlling Authority – local authority responsible for roads

Road classification – categorises roads according to their function and place type.

Road corridor width – the width of the entire section of roading corridor, including cycling infrastructure, berms, and footpaths.

Road user hierarchy – defining modal priorities (walking, public transport, cycling, traffic or freight) to give particular modes of transport priority on certain roads at particular times of day.

Separated cycle paths – areas which are physically separated and used for cycling. These could be on-road facilities separated by a kerb or cycle paths which are separated from a footpath by a grass strip.

Shared paths – Transport infrastructure which allows cyclists and pedestrians to have shared use of a pathway.

Slow streets – Streets which have been designed specifically for reduce traffic speeds.

Street furniture – Objects or pieces of equipment installed on streets and roads for various purposes. Examples include, post boxes, benches, sculptures etc. Careful placement of street furniture placement can help reduce traffic speeds.

Surface treatments – The material applied to the top level of the carriageway which makes the carriageway more visual at conflict points.

Traffic calming – measures used on a street to reduce the speed and volume of vehicles in order to create a safer environment for pedestrians and active transport users.

Traffic lane – an area of carriageway which has been designated for traffic to use.

Turf cells – Pieces of infrastructure which allows grass to grow in plastic frames. The frames give extra support allowing for vehicles and bicycles to use the area with no degradation of the grass.

Universal design – The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design.

VicRoads – one of several state government agencies that assist the Victoria State Government to achieve its integrated transport policy objectives.

Visibility splay – an area clear of obstruction, a set distance back from the road edge and along the road, to allow drivers to see any traffic (including pedestrians and cyclists) coming. In the case of pedestrian or cycle visibility splay, this area is from the pavement boundary, to allow drivers pulling out of a driveway to see pedestrians or cyclists coming.

Wayfinding – concerned with helping people orientate themselves in places, this may can come in a variety of ways from better signage to improving urban design.

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