WAKA KOTAHI
NZ TRANSPORT AGENCY

Getting to and from Public Transport
NZ Public Transport Design Guidance – Phase 1

<AUTHOR>

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OVERVIEW: GETTING TO AND FROM PUBLIC TRANSPORT

The importance of getting to and from the stop

Getting to and from public transport, or the 'first and last mile', is integral to every public transport journey. All passengers must make their way from their origin to a public transport stop to board their public transport service, then make their way from the public transport stop where they alight to their final destination. Whilst often termed the 'first and last mile' the actual length of these trips can range from less than 100m to many kilometres.

First and last mile connections are critical to a viable and enjoyable public transport journey experience. Key issues relating to the quality and ease of access to and from a public transport stop include:

- The effective distance between the origin/ destination and the public transport station or stop which largely determines whether passengers are able to walk or cycle or if they must use a motorised mode to access public transport
- The level of comfort and extent of universal access along the connecting route – even short distances may be unattractive or inaccessible for non-motorised modes if they involve long or convoluted road crossings, extensive exposure to inclement weather or lack of appropriate infrastructure
- The availability and attractiveness of motorised access mode options including taxi/ rideshare or feeder bus services, as well as facilities for kiss & ride or park & ride
- A person's level of perceived or actual safety and security accessing public transport.

It is important that those involved in public transport planning consider the whole of the passengers' journey. When planning for public transport journeys the following questions should be considered:

- How will people get to and from their public transport services?
- Is the whole journey accessible for all people?
- Is the whole journey safe?
- Is the whole journey attractive, convenient, relatively seamless, and intuitive?
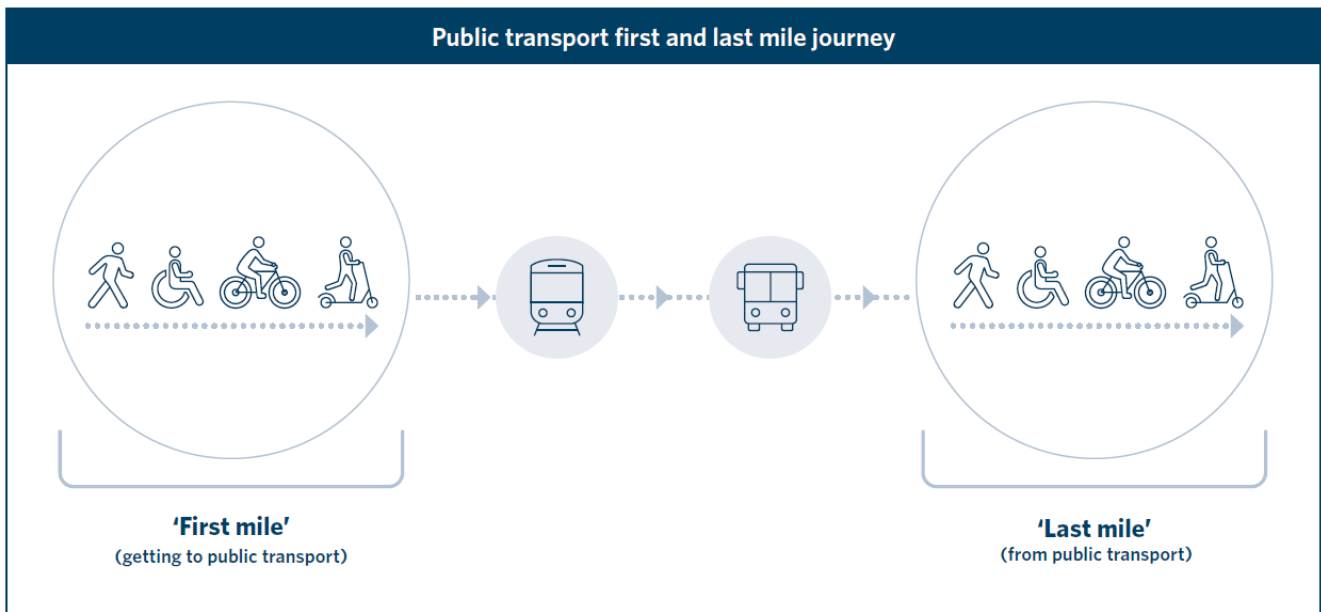- Is the whole journey affordable?

Public transport first and last mile journey

'First mile'
(getting to public transport)

'Last mile'
(from public transport)

Figure 1: First and last mile as parts of a journey involving public transport.

Whose role is it to consider getting to and from the stop?

Planning for a whole-of-journey perspective often involves cross-organisation collaboration with one organisation providing the public transport service and different organisations responsible for infrastructure related to different access modes or routes to and from the station. Sometimes planning for the whole journey can involve other organisations to ensure seamless connections to public transport stops, interchanges, and the places that people want to get to and from. Public sector organisations often collaborate with a range of other organisations to facilitate better connections to and from public transport including:

- private companies that own and operate shopping malls or precincts
- education facilities with large campuses, such as schools and tertiary institutes
- large health services such as hospitals
- community facilities such as sports grounds and libraries
- housing/commercial developers.

The importance of getting to and from the public transport stops is even recognised in the way that public transport is funded. Waka Kotahi NZ Transport Agency funding activity class WC531: Public Transport Infrastructure and Renewals identifies 'pedestrian and cycle access to public transport services' as a qualifying activity for funding as described in the Waka Kotahi Planning and Investment Knowledge Base.
https://www.nzta.govt.nz/planning-and-investment/planning-and-investment-knowledge-base/activity-classes-and-work-categories/public-transport/wc-531-public-transport-infrastructure-improvements-and-major-renewals/.

The New Zealand National Policy Statement on Urban Development has recently emphasised the importance of increasing the density and mix of land uses around public transport stops, particularly major rapid transport stops and stations. This is intended both to increase housing supply and help address affordability challenges as well as to provide a larger base of potential public transport customers within a short walk of high-quality public transport nodes.

New Zealand National Policy Statement on Urban Development 2020:
https://www.mfe.govt.nz/publications/towns-and-cities/national-policy-statement-urban-development-2020

Understanding customers and their journey choices

There are many different types of public transport customers all with differing levels of understanding of, and familiarity with the network, ranging from regular commuters to infrequent users and unfamiliar users and visitors. Within these groups are customers with unique requirements including the potential need for mobility or other assistance.

Despite these variables, most customers will at some point undertake pre-journey planning to seek out information about the public transport service before making their journey. Customers will generally wish to find out about the public transport route, timetables, ticketing and means of getting to and from the public transport service. Even frequent customers may regularly undertake pre-journey planning in the form of checking real time information including public transport vehicle location, or even public transport vehicle occupancy (crowding) levels. The sources of information available to customers include:

- Online sources
- Contact centre
- Printed material
- Asking someone (friends, family or others) who use the service regularly

Pre-journey planning is especially important for people unfamiliar with the public transport service (new users) and people with disabilities. New users and people with accessibility requirements need to be confident that they can efficiently and safely complete their public transport journey. This is because for some people, particularly new users, making a public transport journey for the first time may seem daunting.

Providing a richer set of information and data in journey planning tools can help customers to make more informed travel decisions, information could include:

- The accessibility status of stops, vehicles and interchanges including location of ramps and lifts, location of priority parking etc
- Showing specific footpath and pedestrian crossing facilities along the access route to guide the user to the most direct route with the most appropriate facilities
- Live service disruptions (road closures, on time reliability, stop closures) which helps customers to adjust their travel plans accordingly
- Stop and station security features (e.g. CCTV) and staffing times which supports user comfort and confidence in using public transport
- Showing any cycle facilities along the access route to highlight where options exist for cycling to provide an attractive and safe access option to/ from public transport

PLANNING FOR GETTING TO AND FROM THE STOP

Public transport network considerations

Planning for getting to and from the stop should be undertaken alongside planning for the locations of public transport stops and interchanges as part of wider land use and spatial planning. When well-designed, public transport stops and routes provide for both efficient journeys for the customer and an efficient network for the network operator and contract manager/ funder.

<insert link to bus stop spacing section of the bus stop design topic>,

Where walking, cycling and micromobility access is safe, simple and intuitive for all ages and abilities, the effective catchment area for public transport stops increases and in some cases bus stops can be spaced further apart. This can lead to faster, more reliable and more efficient bus services, with less travel time variability for all passengers.

Safety getting to and from the stop

While travelling by public transport is typically safer than other motorised modes, getting to and from a stop or station can represent the highest risk component of the journey (see research report in 'Further Resources' box below for more information). People walking and riding bicycles are particularly vulnerable to being hit and injured by motor vehicle traffic.

Planning for safe routes to and from stops is a vital component of public transport planning. Road safety considerations are particularly important to promote walking and cycling as healthy and efficient modes while keeping public transport patrons safe throughout their whole journey. Safety also includes peoples' perceptions of being safe from traffic, as well as from harm or injury. Planning for personal security and perceptions of safety on first and last mile trips is vital, the importance cannot be overstated.

Further Resources

https://www.nzta.govt.nz/assets/resources/research/reports/581/581-the-role-public-transport-can-play-in-safer-journeys.pdf

For further guidance related to stop spacing refer to <Bus Stop Design>

- <Link to route planning in Cycle Network guidance>
- <Link to Safety for Walking in Pedestrian Network guidance>

Public transport access hierarchy

When planning for getting to and from public transport, transport authorities may develop a hierarchy to describe the relative level of priority that should be given to different access modes. Whilst in practice, the specific priorities for each site or stop may differ, with multiple modes often being catered for, the key considerations used in determining a more widely applicable hierarchy would include:

- Efficiency – prioritising modes that are spatially efficient, delivering the greatest number of potential customers with the least 'footprint' or cost
- Equity and economy – that is prioritising modes that all or most people have access to with little or no cost outlay
- Health and safety – that is prioritising modes that deliver the best health outcomes and prioritising the safety of the most vulnerable users where there are conflicts between the needs of different modes

As such, public transport access hierarchies always prioritise people over vehicles with walking the highest priority and park and ride the lowest priority overall. Figure 2 below shows the key features of a typical station access hierarchy.
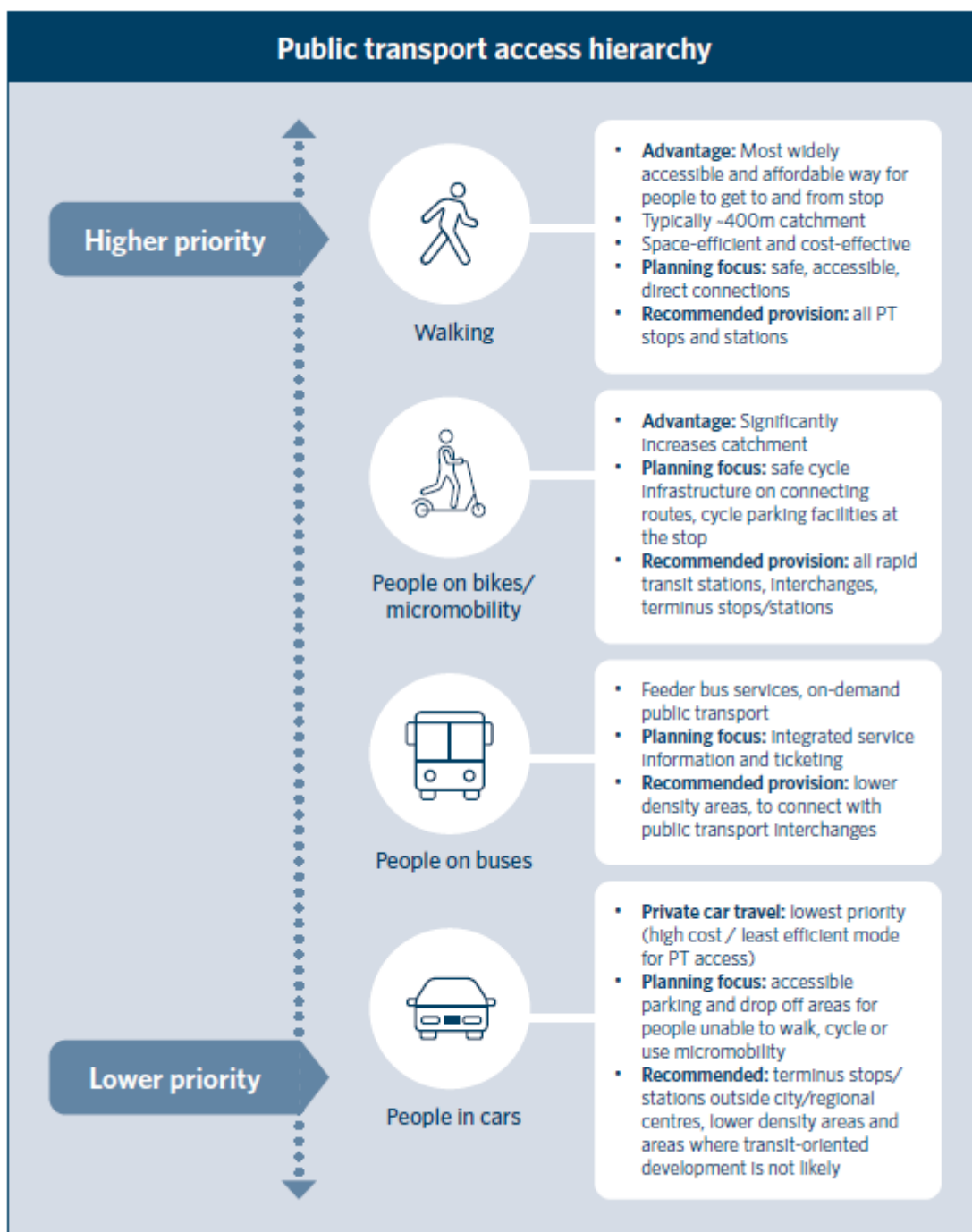
Public transport access hierarchy

Higher priority

Walking
- **Advantage:** Most widely accessible and affordable way for people to get to and from stop
- Typically ~400m catchment
- Space-efficient and cost-effective
- **Planning focus:** safe, accessible, direct connections
- **Recommended provision:** all PT stops and stations

People on bikes/ micromobility
- **Advantage:** Significantly increases catchment
- **Planning focus:** safe cycle infrastructure on connecting routes, cycle parking facilities at the stop
- **Recommended provision:** all rapid transit stations, interchanges, terminus stops/stations

People on buses
- Feeder bus services, on-demand public transport
- **Planning focus:** integrated service information and ticketing
- **Recommended provision:** lower density areas, to connect with public transport interchanges

People in cars
- **Private car travel:** lowest priority (high cost / least efficient mode for PT access)
- **Planning focus:** accessible parking and drop off areas for people unable to walk, cycle or use micromobility
- **Recommended:** terminus stops/ stations outside city/regional centres, lower density areas and areas where transit-oriented development is not likely

Lower priority

Figure 2: Mode provision hierarchy for getting to and from public transport and quick tips

Planning for Walking

Walking is one of the most practical, affordable, and widely accessible ways for people to undertake the first and last mile of journeys involving public transport.

Walking is the most common way for New Zealanders to get to and from a public transport stop. Surveys in the Wellington Region have shown that 85% of trips to a public transport stop, and 92% of trips from the stop to the destination, were made as a pedestrian.

(https://www.gw.govt.nz/assets/Transport/Regional-transport/Regional-Transport-Analysis/StateofWalkingReportWellingtonRegion2001-2015.pdf).

Walking is also the most space-efficient mode, meaning that more people can travel on a footpath per square metre than typically travel in a road lane. Walking access, including safe and convenient road crossings, should be built into new land developments, redevelopments, or retrofitted if there are deficiencies in the existing environment. (see Checklist: Improving connections for getting to and from the stop). This will help ensure that people in the whole area around a public transport stop or station feel that they can access and use the facility.

The most powerful tool planners can use to promote the use of public transport is to enable compact urban form and permeable street designs (lanes, paths and road crossings) that provide access for walking and cycling).

How far people are willing to walk to/from public transport can be affected by:
- The level of service of walking facilities including factors such as pedestrian delay, amenity, directness and safety/security
- The level of service of the public transport, with higher frequency, faster services typically attracting customers from a wider catchment than slower lower frequency services

The below table provides a general guide for the distance which customers may be willing to walk to access different types of public transport services. In practice some customers may be willing to walk shorter distances whilst other customers are willing to walk longer distances. Therefore, walking catchments do not have fixed boundaries but rather the percentage of people who walk to and from public transport stops tends to drop off significantly beyond the distances shown in Table 1.

Table 1: General walking catchments to stops with different levels of public transport service (Source: South-East Queensland household travel survey)

Walking catchment	For
≤400m or 5min walk	Low frequency public transport stops
≤800m or 10min walk	High frequency public transport stops (a service at least every 15min)
≤1200m or 15min walk	High frequency and rapid public transport stops or stations

Public transport catchment sizes may also increase in areas that are particularly pedestrian-oriented as people are willing to walk further where it is pleasant to do so, and when the environment at the stop or station is also pleasant. This is supported by research which shows that people remember the walking legs of their public transport journeys more vividly than the in-vehicle legs and perceptions of walking time are longer for less pleasant walking environments (refer Hillnhütter 2019, referenced at bottom of page).

Urban design and street layouts should support legible and intuitive access to public transport to the greatest extent possible. Planning for wayfinding is important as a network-wide solution to promote the uptake of public transport, particularly for people who are new to an area, or visiting. It can also highlight public transport as a possible mode of travel.

Using wayfinding to support getting to and from the stop can include digital real-time signage in popular trip destinations such as shopping centres and public libraries.

- Guidance on walkability and wayfinding for walking is provided in the Pedestrian Network Guide.
- <Insert links to PNG sections on Walkability and Wayfinding>

Guidance on spacing bus stops is offered in the bus stop design topic but it is worth noting that there are important trade-offs between trying to ensure stops are close and convenient for public transport passengers to walk to but spaced far enough apart to improve public transport travel time and reliability to create an attractive and efficient service.

- <Insert link to PT Network Planning / Bus Stop Design topics>
- <insert link to walkability in Pedestrian Network Guide>

A Wellington case study shows the current walking catchment of a bus service (current in Figure 2), and how it could still be well-serviced by more strategic placement of fewer bus stops, thereby reducing public transport travel times (proposed in Figure 2).
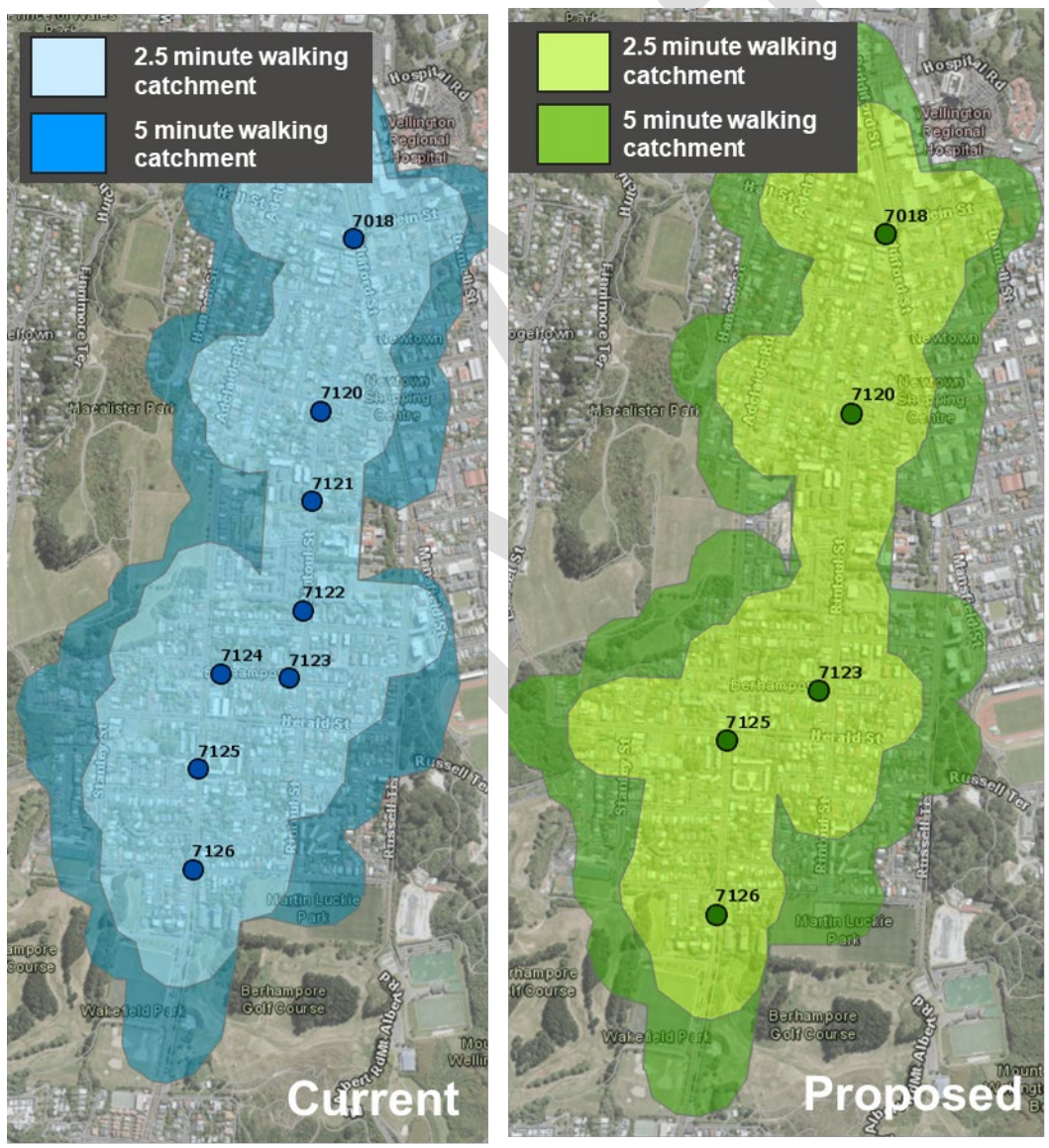

Figure 0-1: In this case study of Berhampore, Wellington a similar walking catchment can be served with less stops by strategic placement of stops, reducing total travel times on public transport (Images by Wellington City Council)

The analysis above found that consolidating stops with an aim of approximately 1 stop per 400m could result in increased efficiency of the bus service with very little impact on the effective 5-minute walk catchments. As such any disbenefits resulting from increased walk distances by some customers was more than outweighed by in vehicle travel time and reliability benefits as confirmed through economic analysis.

References and additional resources

Hillnhütter, H. (2019). Walking for Public Transport. Proceedings of the Walk21 Conference, Rotterdam. Current published version here: https://www.vegvesen.no/_attachment/1592640/binary/1143108?fast_title=Walking+for+Public+Transport.pdf

Queensland Government (2015). 'Chapter 3: Supporting access infrastructure'. Available online at: https://www.publications.qld.gov.au/dataset/public-transport-infrastructure-manual/resource/b90e1d85-1d10-4804-84ed-ddd20f257f7f

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Planning for Cycling & Micromobility

The catchment area for public transport stops and stations can be significantly extended through the use of bicycles or micromobility devices. This option is likely to be more attractive for longer public transport journeys because for shorter overall trip length cyclists may simply choose to ride the whole way.

Table 2 provides a typical practice guide about potential catchment sizes associated with cycling and powered micromobility.

Table 2 Riding catchments and service provision (based on Department of Transport and Main Roads 2016)

Riding catchment	For
≤2.5km or 10min riding	All public transport stops or stations with convenient end-of-trip access to stop/station, amenities and attractive public transport services
≤5km or 20min riding	Premium public transport stops and high passenger volume stations with high-quality, secure end-of-trip facilities
Up to 15km	Limited uptake, only for high passenger volume public transport stations where there is a long-distance commute to the nearest activity centre; important for 'end of line' services, particularly train stations, and some e-bike access

For additional information on riding catchments and more detailed guidance refer to the Queensland Public Transport Infrastructure Manual (2015), Chapter 3: https://www.publications.qld.gov.au/dataset/public-transport-infrastructure-manual/resource/b90e1d85-1d10-4804-84ed-ddd20f257f7f

To plan for cycling and micromobility access to public transport, practitioners should consider the following:
- Routes to/ from 'premium' high frequency stops/stations are a high priority due to potential for mode shift: plan for infrastructure improvements to fill the gaps in on-road

and off-cycling road routes, and stop/station infrastructure including protected cycle parking or storage (particularly where bicycles are not permitted on buses/trains)

- Routes to/ from stops/stations in low density areas that connect to long PT journeys: plan for infrastructure improvements to fill the gaps in on-road and off-road routes, and provide secure cycle parking
- Consider personal amenities such as changing rooms at stations with high rates or potential rates of cycling, please refer to the public transport interchange chapter.
- The ability to take a bicycle or other micromobility device onto a bus or train can help encourage journeys using public transport. See the Requirements for Urban Buses.

Planning for cycling and micromobility should identify appropriate locations for infrastructure interventions based on the role of each street for movement and place. It should also include wayfinding for cycling in local streets to attract new trips by bicycle. See the City Network Guidance.

Figure 0-2 Example of cycle parking facilities, Rangiora (Credit: Simon Hart)

- <link to PT interchange topic>
- Requirements on Urban Buses for space allocation for mobility devices on buses
- <Insert link to wayfinding in Cycle Network Guidance>

Planning for fixed schedule and on-demand public transport

Rapid transit stations (heavy rail, light rail or busway) tend to have wide station spacing and therefore some customers wishing to access services from these stations may live outside of a comfortable walking or cycling distance. Therefore, it is more common for customers accessing rapid transit station to use motorised modes compared to customers accessing their local public transport stops. Feeder bus services provide an important means of accessing the rapid transit

network, this section discusses ways to plan for seamless connections between public transport services.

Fixed schedule public transport services

Fixed schedule public transport services have trips which depart at the same time and follow the same route each day. Fixed schedule services are the most common form of public transport in New Zealand.

There are three types of connections between fixed schedule public transport services which are:

- Pulse connection is where multiple public transport routes are coordinated so that vehicles arrive at a station at regular times on the hour (generally a train station or town centre) so that passengers can transfer between routes.
- Timed connection is where the feeder public transport service is scheduled to arrive at the station before the connecting service with passengers waiting in between services (generally 5 to 10 minutes).
- Frequent connection is where two high frequency public transport routes (generally every 10 minutes or better) cross paths and passengers transfer between. For frequent connections the timetables are not coordinated because the high frequency means that there should only ever be a short wait between services.
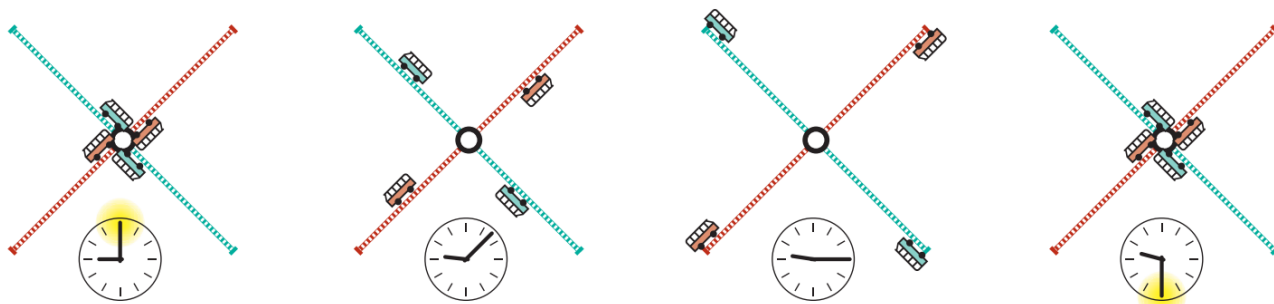

Diagram showing the principle of pulse timetable operations (Nielsen, G. HiTrans Best practice guide to Public Transport – Part 2 Planning the networks)

For pulse and timed connections, the reliability of the connecting services is a critical consideration (especially if the frequency of the services is low). That is, if the services are unreliable then it is difficult to ensure a reliable connection between services without having excessively long wait times for passengers. The techniques available to practitioners to addressing unreliable connecting services include:

- Implementing public transport priority if the cause of the unreliability is delay caused by traffic congestion. The Public Transport Priority and Optimisation chapter provides guidance on selecting appropriate priority measures.
- Reducing delays at bus stops through measures such as all door boarding, faster ticketing and bus stop consolidation. Further guidance on reducing delays at bus stops can be found in the Bus Stop Design chapter.
- Designing shorter public transport routes if the trip distance is excessively long. This approach needs to be balanced against network efficiency and avoiding unnecessary transfers.
- Enabling connecting services to wait at the transfer point for a period of time after the scheduled departure if there is a delay to the service. Having connecting services wait needs to be balanced against delays for other passengers along the route.

Another consideration for timed connections is the compatibility of the services headways between connecting services. Time connections work best if the connecting services have the same or a dividable headway for example a train service with a 30min headway would connect best with a

bus service with a 60, 30 or 15min headway. A connecting service with an incompatible headway (a bus service every 20min using the same example) would result in connection times that are either too long or too short.
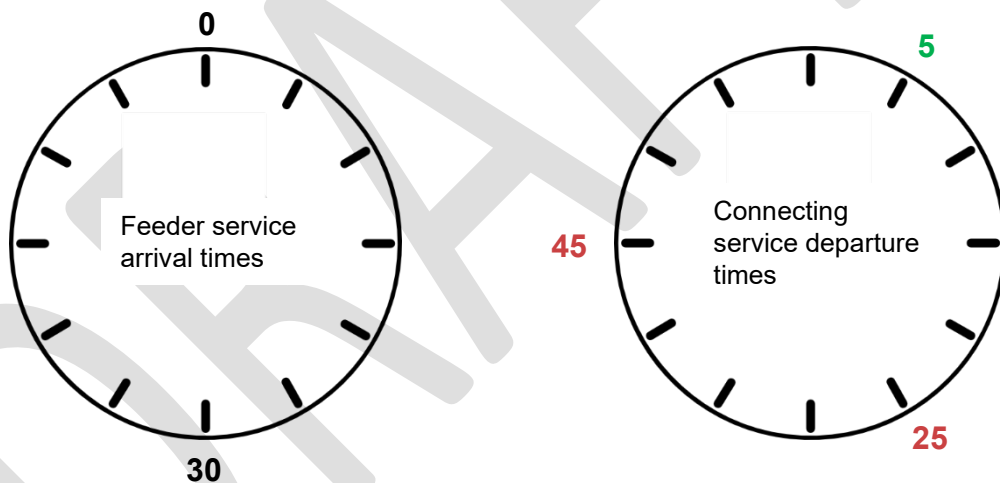
Compatible service headways
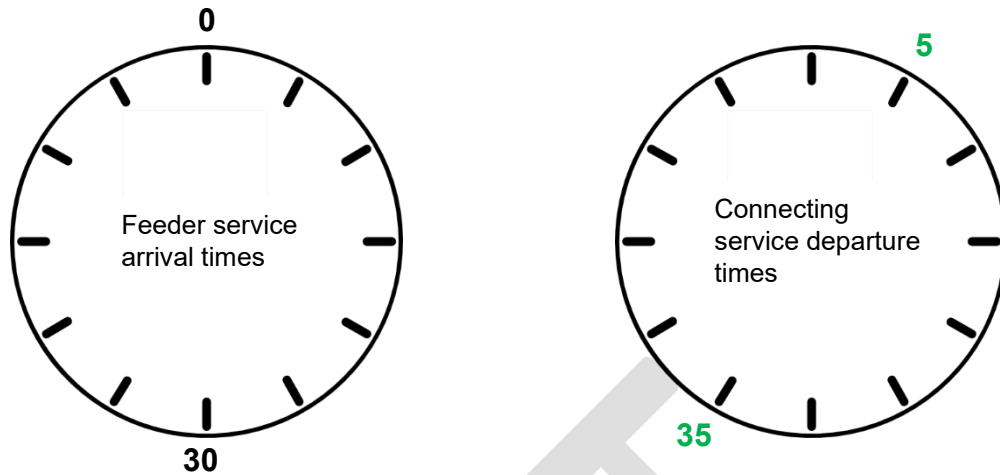
30min feeder and connecting services results in two optimal connections

Incompatible service headway

30min feeder and 20min connecting services results in one optimal connection, one long connection and one missed connection
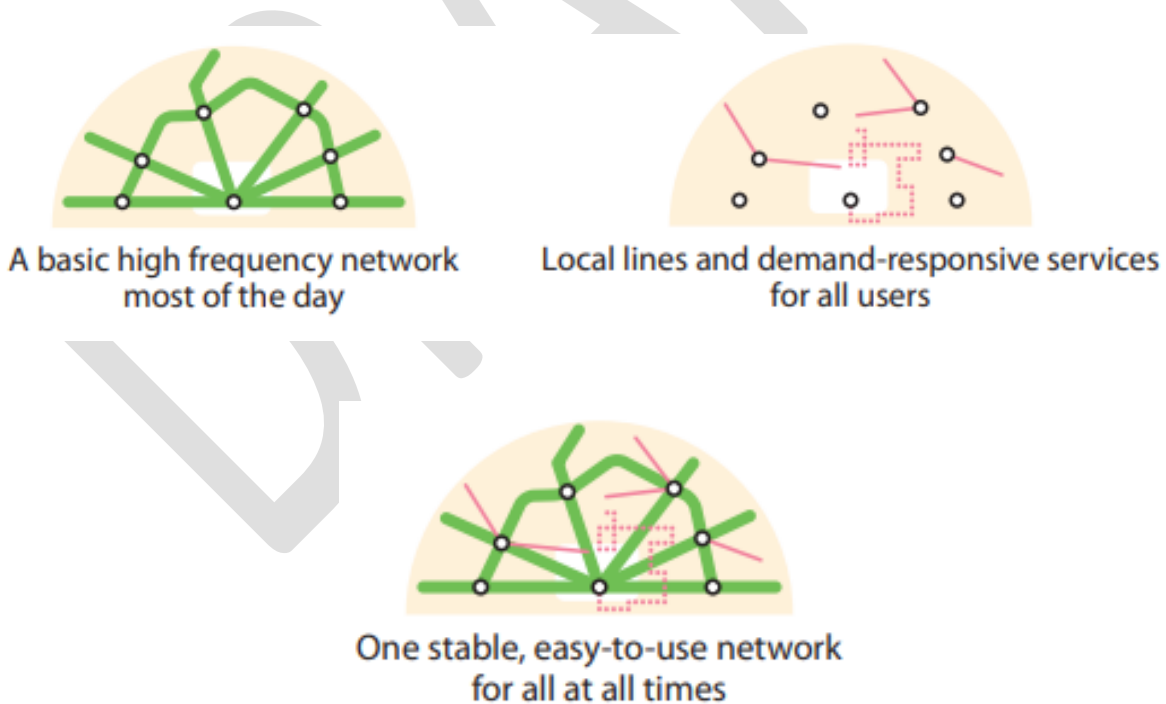
On-demand public transport services

On-demand public transport services have flexible routes and timetables which change based on the location and destinations of passengers who book a trip. Some on-demand public transport services require passengers to walk to fixed stop locations (which may or may not have bus stop infrastructure) whilst other pick passengers up from their driveways. For some on-demand services passengers are limited to set destinations with other on-demand services dropping passengers at any destination within a fixed area. On-demand public transport services are a new addition to the public transport system in New Zealand with trial services having been untaken in Timaru and Devonport, Auckland.

On-demand public transport services can provide an important connection to the wider public transport network. Compared to fixed schedule services, on-demand services have the following advantages and disadvantages:

Advantages	Disadvantages
• Provides a transport option for areas underserved by existing public transport options, these areas may be inefficient to serve by traditional public transport • Can provide a door to door service which is particularly important for passengers with limited mobility • More flexible departure times which is not limited by a fixed timetable	• Smaller vehicles are able to carry less passengers which may be a limitation at peak times • Less certain route and arrival time as timetable and route is responsive to other passengers • Lack of bus stops for some on-demand services reduces awareness of the service, this can be mitigated through greater marketing • Generally high operation cost per passenger

Depending on the transport options, land use characteristics and customer preferences some areas may be more efficient to serve with on-demand public transport whilst other would suit fixed schedule public transport. A public transport network can be made of both on-demand and fixed route services which work in combination to maximise access to public transport. In this approach fixed schedule services would provide direct connections between main destinations and on-demand services would provide coverage for low density outer areas.

A basic high frequency network most of the day

Local lines and demand-responsive services for all users

One stable, easy-to-use network for all at all times

Network design approach incorporating fixed schedule and on-demand services (adapted from Nielsen, G. HiTrans Best practice guide to Public Transport – Part 2 Planning the networks)

Planning for motor vehicle connections to public transport

The access hierarchy <insert link back to the access hierarchy in this chapter> emphasises that walking, cycling, micromobility and, to a lesser degree, feeder services are the most spatially and economically efficient ways to get people to and from public transport. However, there is a case for providing access for other motorised trips to and from the stop or station in one of two ways:

- Providing drop-off/pick up access for private or shared passenger vehicles in a way that does not compromise access for other modes. This may be particularly relevant in areas where feeder or even on-demand services are unviable.
- Providing parking spaces to store private vehicles at stations. Whilst this is a relatively high cost, low value use of land it may be appropriate where demand for alternate land uses is currently low, particularly if it is designed as an interim measure that retains the potential for subsequent re-purposing.

Drop-off areas

Short stay vehicle access for drop-offs represents an important method for accessing some public transport stations. They extend the reach of public transport for people who choose not to walk, cycle, or use micromobility devices and do not have access to feeder services. They also provide access for people who cannot walk far, and therefore cannot otherwise get to and from the stop easily.

"Drop-off" comes in two primary forms: (1) "kiss and ride" (that is, drop-off areas where drivers stop for just a few seconds) and (2) on-demand services, such as taxis and ride-share. Drop-off facilities can help extend the reach of public transport without the high costs associated with providing all day parking due to higher turnover of each vehicle space.

The growing demand for app-based ride-hailing may increase pressure on drop off areas and surrounding kerb space. Drop-off facilities are most suited to premium public transport stations with large catchments that are not entirely covered by feeder public transport services. They are less suited to busy town and regional centre stations where they would displace other land uses or create a traffic barrier between the station and other destinations. They can, however, be accommodated with proactive urban design and streetscape treatments to minimise a potential separation of services.

Park and Ride

Provision of park and ride facilities to allow customers to cover the first and last mile (at one end of their trip) in their own vehicle is generally considered the least effective and most expensive option for transport agencies. Some of the key drawbacks include:

- It can make other more efficient modes (such as walking, cycling and micromobility) less attractive due to the presence of busy circulating roadways and lack of activation adjacent to the station;
- In some locations park and ride may have limited benefit for attracting new public transport patronage – many park and ride users would continue to use public transport without the park and ride, but would have otherwise accessed the station with a different mode;
- It is expensive to build and maintain;
- It may take up high-value land, removing the opportunity to increase land use density around the transit stop which would potentially support higher patronage;
- It surrounds the station with a swathe of under-utilised space, which pushes active land uses further away and may impact on feeder services
- It increases local traffic and may induce local congestion and create a traffic barrier between the station and adjacent destinations; and

- It may exacerbate undesirable urban sprawl.

However, providing parking facilities can have benefits, namely:
- Extending the reach and catchment for public transport, particularly where that catchment includes rural areas without feeder services;
- In some instances, increasing public transport patronage; and
- Reducing broader network congestion by replacing longer car journeys with public transport journeys, locations.

INFRASTRUCTURE TO SUPPORT GETTING TO AND FROM THE STOP

Street environment considerations for walking

Designing safe and convenient public transport facilities for pedestrians involves considering safety, accessibility, directness, and amenity (or attractiveness) of the walking network. The Pedestrian Network Guidance provides extensive and robust guidance on planning and designing for walking. This section of the Getting to and From Public Transport guideline provides a snapshot of some key considerations to get you started and is focussed on walking to and from public transport specifically. However, links to the relevant sections of the Pedestrian Network Guidance are also offered along the way.

Safety and accessibility for walking
Consideration for walking includes the presence and quality of pedestrian infrastructure, including paths, crossings, and bridges. Traffic volumes and speeds are key considerations when it comes to pedestrian safety. Movement and Place frameworks such as, for example, the One Network Framework can help identify where infrastructure improvements may be most needed to promote safe connections to public transport stops and stations.

Perceptions of safety while travelling to and from public transport can be a strong influencing factor in peoples' decision to use public transport. Crime Prevention Through Environmental Design (CPTED) audits can help identify opportunities to enhance actual and perceived safety.

Safe and obvious walking routes that include step-free choices make the first and last mile accessible to a broader range of people. These accessibility considerations are particularly important for people who do not or cannot drive and are therefore more likely to rely on public transport for their everyday participation.
- <Link to One Network Framework >
- <Link to CPTED detail within Pedestrian Network Guidance>
- <Link to principles of universal access for walking in Pedestrian Network Guide>
- <Link to Inclusive Access Case Study>

Directness and convenience for walking
Providing more direct connections to public transport will also increase the catchment area within a 5-10min walk of the service. Minimising delay at pedestrian crossings is important, so providing pedestrian priority wherever practical will make for more attractive walking connections to public transport. It is also important that once a pedestrian arrives at a station, the access to the actual platform or boarding area is direct rather than expecting people to take circuitous routes around parking or other infrastructure.

- <mark><Link to discussion of directness and lack of delay for walking in Pedestrian Network Guide></mark>

Amenity for walking

Increasing the attractiveness, or amenity value, of walking routes in the first and last mile is likely to increase the overall number of people who walk to and from their public transport service. As well as traffic and network considerations, amenity considerations, including lighting, planting, shade/weather protection (including at major road crossings), and wayfinding information, contribute to the pedestrian experience.

- <mark><Link to Bridging the Gap urban design guide> <Link to CPTED Case Study></mark>

Street environment considerations for cycling and micromobility

The reach of public transport is extended when people can cycle or use micromobility to get to and from a stop. Designing connections for cycling and micromobility to and from public transport requires consideration of safety, directness, and end of trip/interchange facilities.

Safety for cycling and micromobility

Street design that makes cycling and micromobility safe and attractive promotes good connections for public transport journeys. As is the case for walking, low traffic volumes and low speeds promote safer travel. High quality cycling infrastructure (i.e. separated from traffic) should be provided where traffic volumes or speeds are high. Traffic calming could also be considered. Considerations about whether or not cyclists and those using powered micromobility will be comfortable using traffic lanes safely depends on the street context.

- Robust guidance on designing cycling infrastructure is available in the Cycling Network Guidance:

https://www.nzta.govt.nz/walking-cycling-and-public-transport/cycling/cycling-standards-and-guidance/cycling-network-guidance/.

Micromobility such as private and shared e-scooters, and shared mobility such as bicycle and e-bike share, are emerging means for people to bridge the first/last mile gap and to extend the reach of public transport. There is limited research on the extent to which micromobility is being used as a first/last mile solution. However, the tools to encourage the safe use of non-powered micromobility devices to access public transport are like those for walking, such as wider footpaths and high-quality crossings, and cycling. Powered micromobility such as electric scooters, are newer to New Zealand and are currently often operated on footpaths. Legislation is being considered to support use of cycle lanes and cycleways which may be a more appropriate location for those wanting to travel at speeds more compatible with cycling.

Charging points and secure storage may be beneficial at larger stations, particularly at 'end of line' stations. Where shared bikes or scooters are used, space should be provided outside the station where they can be left without blocking footpaths. At stations with large numbers of people arriving by walking or cycling and scootering, infrastructure should provide separation between people moving at different speeds.

Figure 4 Example of cycle and e-scooter parking facilities (Source: Ground Control Systems)

Directness for cycling and micromobility

Permeable street networks allow for direct cycling and micromobility journeys. Permeability can include off-road connections not available to cars and larger motor vehicles or protected mid-block crossings across busy streets. Opportunities to provide cycling and micromobility connections to make journeys more direct are presented in the Cycle Network Guidance.

- <Link to Cycle Network Guidance>

Stop and station infrastructure for first and last mile

The attractiveness and therefore use of cycling and micromobility to access public transport increases if high quality end of trip facilities are provided at the stop or station. Such facilities may include:

- Direct and prioritised access to the platform or boarding area from the street (namely, avoiding the need for cyclists and micromobility riders to travel through a car parking area);
- Secure storage and lockable parking for bicycles and scooters;
- Lockers for personal storage;
- Storage docking stations for shared bikes/scooters;
- Storage zones for dockless devices such as shared bikes/scooters;
- Charging facilities for e-bikes and powered micromobility;
- Bathrooms; and
- Bicycle / scooter repair stations.

The Interchanges section of the PTDG provides further guidance related to the end of trip facilities, as does the Cycle Network Guidance.

- <Insert links to Interchanges chapter of PTDG and Bicycle parking chapter of CNG: https://www.nzta.govt.nz/resources/cycle-parking-planning-and-design/

# Infrastructure for fixed schedule and on-demand public transport

For guidance on the design of interchanges to accommodate the needs of all users please refer to the Interchanges Design Chapter. This section provides an overview of the design considerations for enabling seamless transfers between public transport services.

Fixed schedule public transport services

As fixed schedule public transport services have a limited amount of time between services, it is important to minimise the distance between transfer points. This can be achieved by prioritising public transport access over other motor vehicle access when designing the interchange. Ideally connecting public transport services should be located immediately adjacent to the main station platforms or adjacent to the main entrance to the station. If vehicle types are compatible (bus to bus or bus to light rail connection), then connecting public transport services could use the same platform.
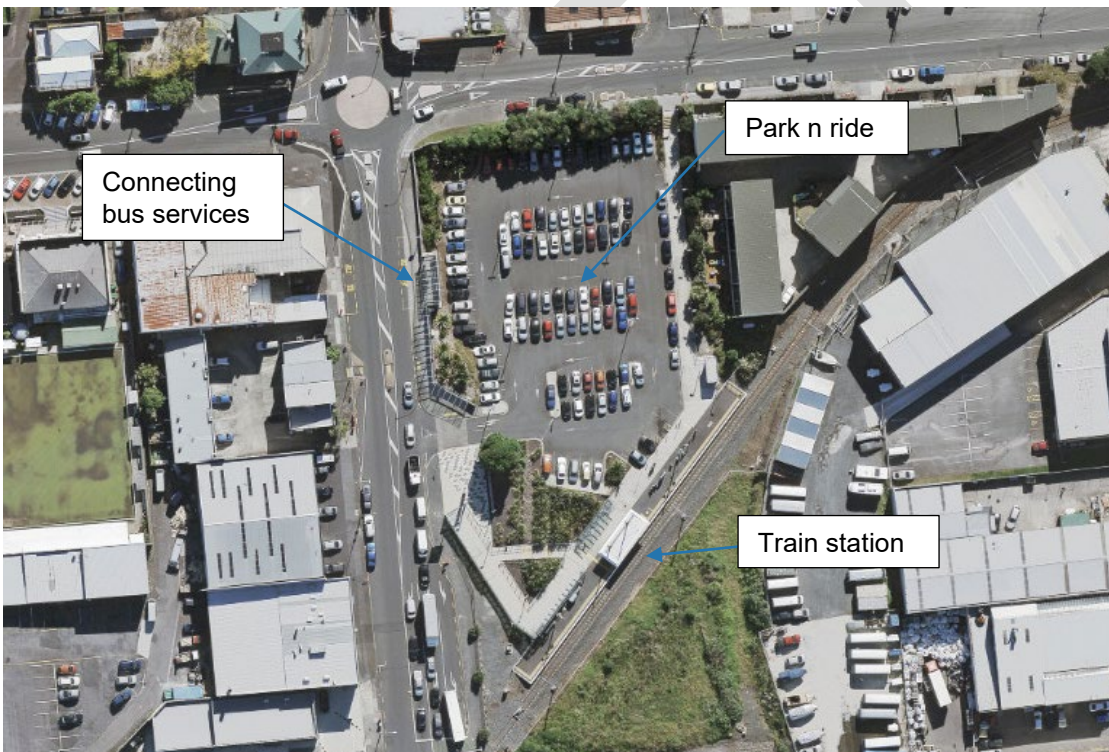
Example of interchange with poor connection between public transport services with bus services being located further away from train station than park n ride. Onehunga Station, Auckland (Image source: LINZ, NZTA, Eagle Technology)
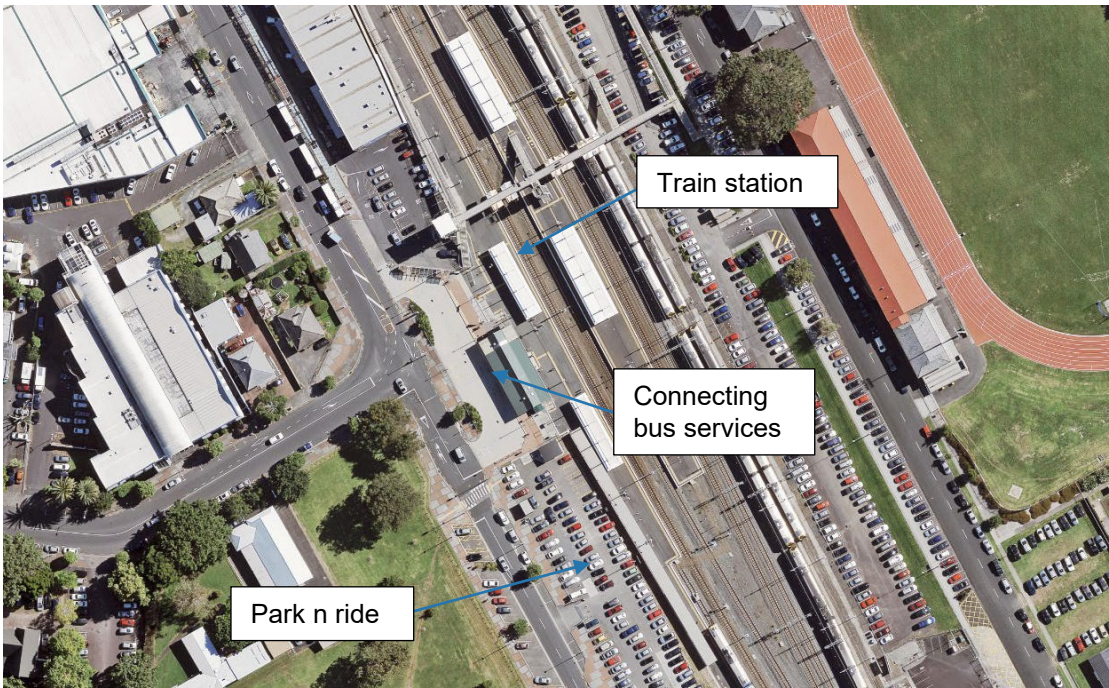
Example of interchange with good connections between public transport services with bus services being located outside main entrance to the station. Papakura Station, Auckland (Source: Auckland Council)

Example of bus and tram services sharing the same platform at Queens Bridge Street, Melbourne (image source: Marcus Wong)

Other design considerations for enabling seamless transfers include:
- Locating connecting public transport services on the same side of the road which avoids passengers having to cross traffic lanes
- Maximising directness of walking routes and providing visual links between transfer points which makes it legible and intuitive for passengers to find their way between services
- Providing step free routes between transfer points to enable universal access for all users to the public transport system
- Having sufficient stop capacity to enable connecting vehicles to wait for a late running service
- Providing shelter between transfer points if a walk between stops or platforms is required

On-demand public transport services

The level of infrastructure required for on-demand public transport services at stations will depend on frequency, vehicle size and various operational characteristics which affect dwell time. The station infrastructure required for on-demand public transport could range from simply a dedicated priority parking spot for a low volume small vehicle service to a length of kerb space for a higher volume or medium to large vehicle operated service. Additional considerations for the design of on-demand public transport infrastructure at interchanges includes:
- Providing an accessway layout that enables vehicles to safety turn around which is separate from walking and cycling routes
- Encouraging the turnover of drop off spaces which could include parking time restrictions
- Pedestrian walking routes between the drop off area and the connecting public transport services
- Weather protection, lighting and CCTV for passengers to wait safely and comfortably

Infrastructure for motor vehicle connections to public transport

Designing a Park and Ride
Considerations for the design of a park and ride facility include:
- Providing the most convenient facilities for people with the fewest alternatives, i.e., accessible parking spaces;
- Prioritising access to and through stations for people arriving by walking, cycling or micromobility devices above those who park and ride.
- Prioritising relatively efficient and sustainable travel choices, such as spaces for carpooling or charging for electric vehicles;
- Protecting feeder bus operations or rail replacement services from park and ride congestion;
- Providing safe and secure access for people to walk from their cars to the bus or train platforms, with good lighting and surveillance;
- Setting parking fees to optimise parking utilisation at close to 95% of capacity and potentially splitting into functionality areas based on different periods of time/ costs people would be interested on leaving their vehicles in;
- Setting at least a nominal parking fee from the outset and noting that it is subject to review based on demand, can help to manage user expectations in advance of future reviews of pricing levels; and
- Managing on-street parking demand with time restrictions and fees to discourage spillover effects or to create incentives (e.g. around car-share, electric vehicles).

Monitoring the uptake of a park and ride can help with an overall public transport planning approach to promote an effective and integrated public transport network.

Temporary Park and Rides

Recently in New Zealand there has been consideration about whether to implement temporary park and rides at some newly developed railway stations. While this may help attract some people to use the new railway stations, there is some risk that it will be hard to remove in the future and/or will create a precedent of parking provision at the station leading to pressure to develop additional parking rather than eventual infill development.

It is recommended that temporary park and ride facilities be priced, at least to some degree, which will enable demand management and increase the attractiveness of alternative modes for access.

IMPROVING CONNECTIONS FOR GETTING TO AND FROM THE STOP

Once public transport routes for first and last mile improvements have been identified, the following checklists can be used to assess their quality. Deficiencies can then be addressed through routine maintenance or capital improvements programmes.

The table can also be used proactively, to assess the appropriateness of new public transport stops in relation to the local neighbourhood. While the interventions are listed in order of impact, the most useful interventions depend on the local street and land use context.

More information about design for walking, cycling and micromobility, including advice on different methods and tools than can be used for more detailed access assessments are provided in the Pedestrian Network Guide and Cycling Network Guide.

	Factors to consider	✓X	Advice / Assessment Notes
Higher impact ↑	Are vehicle speeds and volumes low?		*If speeds are >30km/h and/or traffic volumes are greater than 3,000 vehicles per day, consider traffic calming treatments and/or separated facilities for walking, cycling, and micromobility*
	Are there safe and obvious step-free routes?		*Are footpaths of high quality? Are ramps and alternative routes of a shallow gradient, well-advertised, well lit, and slip-resistant?*
	Are paths attractive and direct?		*Are there opportunities for off-road walking and cycling connections / cut-throughs? Are footpaths wide enough or are there opportunities to widen them?*
	Are road crossings appropriate and on desire lines?		*Do people need to make circuitous routes to use crossings? Are crossings where people actually cross? Are they safe? Is it the right type of crossing? Are there missing crossings or do they require further protection at signals or unacceptable levels of delay? Check crash history and/or Pedestrian Network Guidance for guidance on crossing types etc.*
	Are streets and paths well-lit, following CPTED principles?		*Will people feel safe getting to and from the stop in the dark? Does the stop benefit from passive surveillance?*
	Are the feeder public transport services reliable?		*Investigate the causes of unreliability and implement appropriate public transport priority measures.*
	Are the feeder and connecting public transport services located a short walk from each other (ideally 20m or less)?		*Reallocate interchange space to bring feeder and connecting public transport services closer together whilst also prioritising access for people walking and people on bikes.*
	Are there access and parking facilities at the stop or station for people cycling or using micromobility?		*Are cycle and micromobility paths and facilities prioritised above car park access? Are there secure parking or storage, charging points, lockers, and bathrooms? Note: provide cycle parking for a range of users.*
	Are the connection times to/from feeder public transport services optimal (not too short or too long)?		*Adjust the feeder or connecting public transport service timetables to improve connection times*
	Is there obvious wayfinding to direct people to the stop or station?		*Is there signage for people unfamiliar with the area?*
	Are there accessible parking and drop-off options at the stop or station?		*Is the stop or station accessible to someone who cannot walk far, or who needs to drive there or be dropped off? Are feeder bus stops close to the station?*
	Are there street trees and planting?		*Are walking routes attractive, including in hot weather, and with shelter from wind/rain?*
Lower impact ↓	Is there seating along walking routes?		*Are walking routes pleasant, encouraging a sense of place?*

	Are cycle facilities free of glass and debris?		*Are cycling and micromobility routes reliably smooth?*
	Is shared cycling/micromobility (e.g. bikeshare or scooter share) available?		*Is there opportunity to provide or promote public or private cycle or micromobility options?*
	Would park and ride facilities increase public transport patronage?		*Consideration at the end of high-frequency routes, particularly bus and train stations at the ends of lines and where people travel a long way to their destination*

- <Pedestrian Network Guide>
- <Cycling Network Guide>.