Guidelines for public transport infrastructure and facilities

Interim consultation draft

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Safer Journeys

New Zealand Government

More information

NZ Transport Agency
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Record of amendment

Amendment number	Description of change	Effective date	Updated by

Contents

Introduction

The NZ Transport Agency is proud to present to you this public transport infrastructure and facilities guidance for New Zealand.

These guidelines are intended to encourage best practice, supported by case studies and international research. The aim is to improve the effectiveness of public transport across New Zealand. As these guidelines are implemented, higher levels of consistency will be achieved, resulting in opportunities for large scale procurement/cost reduction, a more accessible public transport network, less negative impacts associated with public transport infrastructure and facilities, and an increase in public transport patronage/revenue.

On reflection of the identified need for guidance on public transport infrastructure and facilities for New Zealand, this document will eventually replace all existing local/regional/city public transport infrastructure and facilities guidance. However, this will take time to achieve and the NZ Transport Agency expects there will be a period of transition. Therefore in recognition of existing guidance and legacy local variation, this guidance should be treated as a target, to be considered alongside local guidance where available/applicable.

For example, in Auckland there is previous ARTA guidance on *Bus stop infrastructure* (May 2009) and more recently AT guidance on *Public transport interchange* (Feb 2013). These two documents were used extensively in this guidance, and ultimately, may supersede/replace these references for Auckland.

The scope of this guidance is currently focused on public transport stop design (facilities), and not the links between stops (infrastructure), or the vehicles travelling on those links. At this stage, the scope is further restricted to bus stop facilities only. It is intended that this guidance will expand to include other aspects of public transport stop facility design under the NZ Transport Agency as regulatory authority, to include coaches, trams, trains and ferries.

This guidance uses referenced extracts from existing public transport facility guidance in order to bring all the relevant information into one place. It also seeks to align with key regulatory documents such as the *Requirements for urban buses in New Zealand* (2011), and Land Transport Rule: Traffic Control Devices (2004).

This document is very much work in progress and updates will be ongoing. To enable development, it will be web-based with paper versions only for key edition/revision milestones. The expectation is that users and registered contributors will interact via a dedicated NZ Transport Agency website, downloading required information and uploading draft additions for consideration.

Status of these guidelines

These are NZ Transport Agency guidelines. It is anticipated that where possible these guidelines will be followed and will provide the standard for public transport infrastructure. Part of the benefit of these guidelines comes from the consistency of application across New Zealand. Where local solutions deviate from these guidelines, there should be a significant documented reason for the deviation.

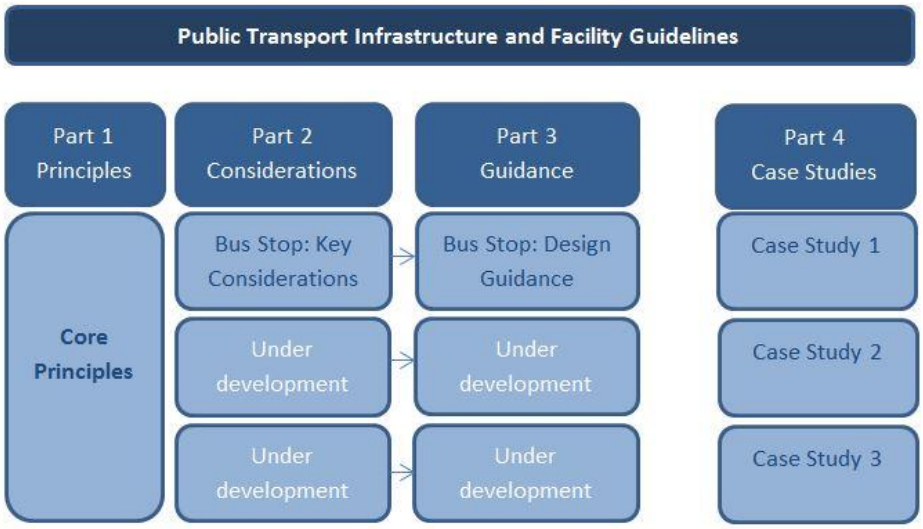
These guidelines provide information about infrastructure design. For information about service design and public transport network planning, reference should be made to the Transport Agency Regional Public Transport Plan (RPTP) guidelines.

How this guidance is structured

The guidance is structured into distinct parts, to provide a stepping-stone sequence – from core principles (broad strategic direction), to key considerations (generic over-arching guidance), to design guidance (focused guidance on adapting to specific requirements or situations).

The structure of this guideline document is set out as follows:

- Part 1: Core principles – encapsulates the basis for all public transport design.
- Part 2: Key considerations – presents overarching standards and guidelines for bus stops.
- Part 3: Design guidance – how design and provision can vary by type of bus stop.
- Part 4: Case Studies – being developed separately and will support these guidelines.



Currently this document focuses on urban bus stops and bus stop design information. However this document is designed to be easily expandable. Considerations and guidance for other types of public transport infrastructure are under development for future release.

This further work will expand the online guidelines to include public transport infrastructure broader than bus stops not covered in this initial document.

Part 1: Core NZ Transport Agency principles

A principle-based approach has been undertaken in developing these guidelines. A set of core principles and a supporting set of key considerations (Part 2) have been defined and agreed by the Public Transport Advisory Group (and sub-working group). These core principles reflect the outcomes desired through the implementation of these guidelines. When a question affecting public transport infrastructure or facilities arises, these principles and supporting key considerations will provide overall context and direction.

The core principles described in these guidelines provide an underlying direction for public transport infrastructure and facilities, but they do not remove the need to find the best solutions for the local context. This will include considerations of scale, in terms of passenger numbers, frequency and vehicle size. Application of these principles needs to be consistent for the overall benefits to occur.

The following core principles should be embedded in every aspect of public transport infrastructure and facilities. Consistent application of the core principles; accessible, safer, and affordable, will lead to the consistent delivery of high quality and effective public transport infrastructure and facilities.

The order of these principles is not important and does not reflect any priority.

Public transport infrastructure and facilities: core principles

Accessible

It is very important to recognise the different requirements and mobility levels of individual passengers when providing public transport infrastructure and facilities. New Zealand is a signatory of the United Nations Convention on the Rights of Persons with Disabilities, and as such there are expectations that public transport infrastructure and facilities should be accessible to all, regardless of ability, age, gender or race. Accessibility improvements to infrastructure will benefit all users. A key measure of public transport accessibility is that the vehicle aligns close and parallel with the stop platform. However, a broader view of accessibility includes ease to use infrastructure, good urban coverage, customer orientated and accessible by a variety of modes.

Safe

Infrastructure and facilities provided as part of the public transport network should be safe. Safety includes safely accessing the network, safety while waiting at bus stops/stations and providing infrastructure that is safe to use. All infrastructure and facilities provided as part of the public transport network should promote safety and a high level of personal security. The perception of safety will have an influence on the use of the public transport network. The relative safety of using public transport extends to the broader infrastructure and facilities supporting the network, including depots and other non-public areas.

Affordable

All public transport infrastructure and facilities should be provided at a cost that is considered affordable. The costs associated with a specific piece of infrastructure or facility should be outweighed by the benefits. It should be strongly recognised in any benefit/cost assessment that improved public transport infrastructure and facilities will unlock economic, social and environmental benefits.

Operationally efficient

Provision of public transport infrastructure and facilities should enable operational efficiency for the public transport network. This efficiency should include the movement of vehicles, loading of vehicles and consideration of design and location of the non-public infrastructure (driver's facilities, depots etc). Improved overall operational efficiency requires all the modes and services to operate as one network.

Definitions Section

All-day Service – A public transport service that operates at a regular frequency all day. For the purpose of these guidelines an all-day service operates for at least 12 hours per day with a minimum frequency of at least 60 minutes.

Busway – Road dedicated to bus services. The Northern Busway in Auckland is a local example of a busway.

Facility – Public transport facilities are off vehicles items associated with the delivery of public transport services. Facilities include, but may not be limited to: bus stops, rail stations, bus and rail interchanges, park and ride facilities, passenger ferry terminals and trolley bus infrastructure.

Frequent Service – A public transport service that operates at a high frequency throughout the day. For the purpose of these guidelines a frequent service has a minimum frequency of 15 minutes.

Infrastructure– Public transport infrastructure includes physical structures that support the delivery of public transport services. For the purpose of these guidelines public transport infrastructure describes the physical structures along a public transport route. Infrastructure includes but may not be limited to: Busways, bus lanes, rail corridors, signals and signal priority systems.

Infrequent Service – A public transport service that has a low frequency. For the purpose of these guidelines an infrequent service has a frequency of less than 1 service per hour.

Interchange - A public transport interchange is a location where passengers transfer from one mode of public transport to another or between two services of the same mode.

Local service – A public transport service that operates within a local area. Often a short or circular route.

Peak Only Service – A public transport service that only operates during the morning and evening peak times.

Rapid Service – A public transport service that's operates at a reliable high speed. This service will usually operate in a dedicated right-of-way with grade separation or priority signalling at intersections.

Supporting Service – A public transport service that operates to support another public transport service. Often considered a feeder or second level service.

Part 2: Bus stop key considerations

What is a bus stop?

In simple terms a bus stop is a place where passengers wait for a bus, which when it arrives, disembarkation and boarding takes place, before the bus departs to continue on its route. A bus stop is a defined space on the roadway and on the footpath representing the point of interchange between pedestrian and bus modes of travel.

The simplicity of the process belies the complexity of the design details required to achieve this interchange, in an accessible, safe and affordable manner. The key component of a successful bus stop is that the bus can reliably and consistently align close and parallel to the kerb, and stop where passengers expect it to stop relative to the bus stop flag, shelter, footpath indicators or road markings.

Failure to align the bus with the kerb properly means the bus driver has had to either stop too far away from the kerb, or has been forced to pull in/out of the bus stop at too sharp an angle. Either of these two scenarios can have serious implications with respect to the bus being considered accessible, safe and affordable.

Likely outcomes if bus does not stop parallel and close to the bus stop kerb:

Not accessible – a bus stopped not parallel or not close to the kerb can create an inaccessible vertical and/or horizontal gap for passengers to alight or board the bus.

Not safe – A bus stopped not parallel or not close to the kerb can create an unsafe vertical and/or horizontal gap for passengers to alight or board the bus. In addition, if a bus driver has pulled into a bus stop too sharply, due to an inadequate or obstructed approach taper the bus can protrude into the traffic lane, affecting the general flow and safety of passing traffic. Conversely, when pulling back out to re-join the general traffic, inadequate exit tapers means that the rear of the bus can overhang the kerb in the vicinity of pedestrians and street furniture.

Not affordable – A bus stopped not parallel or not close to the kerb can create an unacceptable vertical and/or horizontal stepping gap for passengers to alight or board the bus. This means passengers may take longer to alight or board the bus. This may create delays for the bus service and general traffic. Such delays can generate negative reactions from the travelling public where the bus is perceived as difficult to access, slow and unreliable by bus passengers, and a cause of delay by drivers (potential bus passengers). Fewer passengers mean reduced revenues.

The ability for buses to reliably and consistently align close and parallel to the kerb at the bus stop is absolutely critical to the delivery of an accessible, safe, efficient and affordable bus service. This aspect is often taken for granted, but will be immediately noticeable and has a significant negative effect, if not achieved.

Nine key considerations for bus stops

Building on the core principles (part 1), a set of nine supporting key considerations for bus stops have been defined and agreed by the NZ Transport Agency Public Transport Advisory Group (and sub-working group). These key considerations support the core principles by providing greater focus on how the desired outcomes of this guidance could be delivered, when public transport infrastructure or facilities are being considered, as part of the overall context and direction, provided by the core principles.

The key considerations described in these guidelines provide further detail on how the design and delivery of public transport infrastructure and facilities might be achieved. They do not remove the need to find the best solutions for the local context; one size cannot fit all. However, the consistent application of these key considerations where possible, will help ensure the benefits of good public transport infrastructure and facilities can be felt by all our communities.

The following key considerations should be embedded in every aspect of public transport infrastructure and facility projects. When planning, designing, procuring, maintaining or replacing these key considerations will lead to the consistent delivery of high quality and effective public transport infrastructure and facilities. The nine key considerations outlined here are:

1. Bus stop design
2. Bus stop shelters
3. Personal safety and security
4. Information provision
5. Bus stop access hierarchy
6. Environmental impact
7. Commercial opportunities
8. Location
9. Public transport operational requirements.

The order of these key considerations is not important and does not reflect any priority.

On reflection of the current scope of this guidance, only bus stop related issues under the key considerations are currently covered. The key considerations will be developed with input on other PT modes and other bus stop related issues to be added through future updates to these guidelines.

In part 3, a series of tables are presented reflecting how the key considerations could be interpreted across the range of different public transport facilities. At this stage, only bus related stop facilities have been drafted, with other bus based modules, and modules for other modes to follow.

Key consideration 1: Bus stop design

Introduction

The design and location of public transport stop facilities within the urban environment will have a significant impact on the success of a public transport system, as part of an integrated transport system (one network). Quality design will improve safety, increase functionality, reduce whole of life costs and create a more pleasant experience for customers. Quality design will provide inherent and intuitive clues about services available at that location. Public transport infrastructure and facilities should respond to the level of service for the given location.

By considering both location and service, a matrix can be developed to indicate the level of provision that would be appropriate in a given situation. This method of tiered infrastructure and facilities provision maintains consistency, yet allows flexibility.

The table below is an example of a tiered approach to stop facility design that considers both the location of the bus stop and the type of service using the stop.

Table 1: Bus stop levels of service matrix

Stop location	Type of PT service serving the stop			
	Rapid	Frequent all-day	Local & supporting	Infrequent & peak only
City signature	Icon	Icon	Premium	Premium
Major centre	Premium	Premium	Intermediate	Intermediate
Minor centre	Intermediate	Intermediate	Intermediate	Basic
Residential	Intermediate	Intermediate	Basic	Basic
Rural	Intermediate	Basic	Basic	Basic

Public transport networks need to be easily identified by existing and potential users. Stop facilities (including signage, shelter, seating and public facing information) should have a common appearance across the network. Costs can be reduced with a modular approach, common signage and standard design. While standardisation is an important consideration, public transport facilities and infrastructure should be provided in the appropriate way for the given location and level of service.

In response to the current scope of this guidance, this key consideration of the standardisation of public transport stop design is currently bus stop related only. Other PT modes and other bus stop considerations will be added as part of the ongoing development of this guidance.

This key consideration (bus stop design), is split into the following sections:

- What is a bus stop?
- Bus stop legal requirements
- Bus stop area
- Bus stop sign
- Bus stop kerbs & RUB
- Bus stop layout

This consideration of standard bus stop design is intended to be over-arching and generic, therefore regardless of location or level of service requirements. The interpretation of the bus stop content of this key consideration (bus stop design) in accordance with the level of service, is indicated in part 3 of this guidance.

Bus stop legal requirements

In summary, the legal requirements for bus stops are as follows:

- Generally subject to the Land Transport Rule, Traffic Control Devices, 2004 (TCD). See NZ Transport Agency website; http://www.nzta.govt.nz/resources/traffic-control-devices-manual/.
- Bus stop sign dimensions and specifications as per TCD, Part 3 Schedule 1, including R6-71 & R6-71.1.
- One bus stop sign per pole, as per sub-clause 4.5(1); supplementary information (eg timetable box) is not considered a traffic sign, and may be attached as well, subject to RCA.
- Bus stop road markings as per TCD Part 3 Schedule 2, M3-2; to indicate that road users may not park/stop/stand within 6m either side of a bus stop sign (called a bus box).
- When a marked bus box is more than 12m, signs must be provided at either end. If the marked bus box is equal to or less than 12m, a single sign in the middle is sufficient.

Note: buses need to be able to get to/from the marked bus box. Depending on local conditions, parking restrictions either side of the marked bus stop are often required.

These legal requirements are mandatory. The following sections cross reference to the legal requirements where applicable, to present a mixture of recommended or optional features to be considered as part of the bus stop design.

Other legal requirements can be applied through the by-law process or the local district plan to help manage bus stops within a local context. Bylaws & district plans can be used to improve the bus stop efficiency and effectiveness. The following two examples demonstrate how these local legal tools may be useful.

- Bylaw to prohibit non-contracted buses from stopping at bus stops. This ensures the buss top infrastructure is available for contracted bus services. Tour coaches and other buses stopping at bus stops in busy urban areas can block scheduled buses from stopping at the bus stop.
- District Plan provision granting bus shelter permitted activity status. This reduces the resource consent costs for new bus shelters and removes some of the local consultation requirements when installing new bus shelters. Often the resource consent costs and consultation for a new bus stop costs more than the installation of the bus shelter.

Bus stop area

Bus stop areas should be marked on the section of road an RCA has authorised to be reserved for a bus stop. The bus stop area can comprise of a bus box and associated bus stop related parking restrictions, responding to if the stop is a kerbside, indented or build-out (bus boarder).

Bus boxes must be marked if they extend more than 6 m on either side of a single Bus Stop sign, or extend greater than 12m in total. The ideal bus box should be slightly longer than the bus to allow the driver some margin for correction/space to straighten-up, to align parallel and close to the kerb. The objective is to achieve reliable and consistent parallel and close alignment between the bus and the kerb, regardless of bus size, bus route location or bus service type.

This guidance recommends that:

For bus stops served by single buses shorter than 11.5m in length, appropriate bus stop associated parking restrictions should be applied in response to the site context, if required (likely to be applicable for rural services or urban hopper services).

For bus stops served by single buses of 11.5m length or more should have marked bus boxes (likely to be applicable to all bus stops within medium/large urban areas).

For bus stops where more than one bus stop is provided within a bus stop area, these should have marked bus boxes (likely to be applicable to selected bus stops within medium/large urban areas, or where rural services may cluster).

On this basis, the following bus box dimensions are presented (see table 2 below).

Table 2: Bus box dimensions

Bus length	Bus box length	Bus box width
<11.5m	Use parking lines (if needed)	n/a
11.5m	12m	2.5m (or slightly less if needed)
12.6m	13.5m	2.5m ideal
13.5m	14.5m	2.5m ideal
15m	Up to 19m	2.5m (or more if possible)

The outer perimeter of the bus box should be marked out in broken yellow lines in line with design standards outlined in the Traffic Control Devices (TCD) Rule Schedule 2 (M3-2). The TCD states that use of the text 'BUS STOP' within a bus box is optional.

- In accordance with international best practice, these guidelines recommend that the text 'BUS STOP' is used for all bus stops with bus boxes. It is an important means of promoting driver awareness that this section of road space is reserved for bus services only, and potentially helping to deter inconsiderate parking in bus stop areas.

Road markings and signage follow similar rules, regardless of the type of bus stop; kerbside, indented or build-out (bus boarder).

Associated bus stop related parking restrictions are introduced to provide sufficient space to allow a bus to pull into the bus box and out again.

This guidance recommends the use of associated bus stop related parking restrictions for all bus stops with bus boxes. This is because generally bus boxes are recommended to be used in urban areas. Competition for parking space on urban streets can be acute, which is likely to conflict with the requirement to provide maximum certainty of reliable and consistent parallel and close alignment between the bus and the kerb, at the bus stop.

The length of bus stop associated parking restriction will vary depending on the size of bus using the stop. Based on a kerbside bus box, a typical 11.5m bus will require an 8m lead-in to the bus box and 5m to pull out, if parking or other restrictions are in place at either end of the bus stop area.

Such parking restrictions take the form of broken yellow NSAAT lines (no stopping at all times), either side of the bus box, and are used to define the outer limits of the bus stop area. NSAAT lines help to ensure that the required approach and exit tapers to from the bus box remain unobstructed so the bus can approach the bus stop correctly.

Bus stop sign

The bus stop sign identifies the area as a bus stop. It is an important part of the bus stop area as it indicates to passengers and bus drivers where the bus will stop, and acts as a 'control point' for the layout of bus stop facilities.

The sign can be placed on a standalone pole or attached to an existing light post to reduce street clutter. The sign should always be located in the correct position in respect to the bus stop area.

This guidance recommends that the bus stop sign should be placed at the head of each bus box. This allows for a consistent and predictable environment to be created at the bus stop. Bus drivers will know to always align the front door of the bus with the bus stop sign and pole, which is where key bus stop facilities are provided, i.e. hard stand area, raised kerbs and use of tactile ground surface indicators.

However, the *Traffic control devices manual* currently states that for a bus stop greater than 12 metres, signs must be provided at either end, or if the bus stop area is equal to/less than 12 metres (ie does not need a bus box), a single sign in the middle of the bus stop area is sufficient. However a single sign on a pole may be used for any length bus stop, if the bus stop area is marked with a yellow box and the words 'Bus Stop'. In response this guidance considers there is confusion here.

It is best practice and supported by this guidance that the bus stop sign should be at the head of the bus stop area to enable the bus to align with the sign. It is also best practice for the road space dedicated to the bus stop to be marked by a yellow box with the words 'Bus Stop'.

Placing a bus stop sign in the middle of the bus stop area (without any other signage or road markings) is not appropriate for most urban situations as the bus stop is likely to be infringed by local car parking and will create confusion for passengers on where the bus will stop.

Secondly having two bus stop signs for one bus box also seems inappropriate, again due to the function of the bus stop sign to indicate to both the bus driver and the passenger where the bus is going to stop, i.e. at the head of the bus box. Multiple bus stop signs would be appropriate for extremely long bus stops or bus stops where the front sign may be obscured. Tactile indicators at the head of the stop provide an indication of where to board the bus.

This guidance recommends that:

- The bus stop sign reverts to a passenger and bus driver function not a car parking control function, with one bus stop sign per bus stop area or bus box, at the head of the bus stop area or bus box.
- If a bus box is not applicable, standard NSAAT lines are used, plus a bus stop sign placed relevant to the bus, to complete the bus stop area.
- If a 12m+ bus box is required, the bus box markings communicate NSAAT, plus a bus stop sign relevant to the bus, plus bus stop associated parking restrictions to complete the bus stop area.

Bus stop kerbs and RUB

The kerb forms the critical interface between the bus and the passenger. The key consideration is the relationship between the bus platform, (surfacing, height and level) and the footway platform (surfacing, height and level), assuming close and parallel alignment of the bus to the bus stop kerb. The preferred kerb height should be driven by a desire to:

- reduce the step height between the bus floor and the bus stop kerb to provide easy boarding/alighting for all passengers, regardless of their mobility levels
- reduce the gradient of the ramp, for use with a wheelchair, pram, or luggage
- facilitate quicker boarding and alighting times.

Below, we look at firstly the bus platform requirement, then the footway platform response.

Bus platform requirements

The key reference for understanding the bus platform requirements is the NZ Transport Agency *Requirements for urban buse*s (RUB). While this document is directed to urban buses, it is considered a useful benchmark for establishing good bus stop design. The RUB aims to enhance the attractiveness of buses used to provide urban services in order to encourage increased usage, with a particular emphasis on improving accessibility for all users, including people with physical, sensory and cognitive impairments. Note the emphasis of the RUB on improving access for disabled people. Thus guidance supports this emphasis as improved accessibility benefits all bus passengers.

The RUB contains the following table, which summarises step height from ground level to the bus platform.

Table 3: RUB step height summary

First step	Measured from the ground to top of step nosing (without kneeling in operation).	
SB bus	≤300mm (may be up to 370mm if kneeling ≤300mm is fitted).	
LB bus	19.5 inch rims	22.5 inch rims.
	Front door ≤370mm	Front door ≤370mm.
	Rear door ≤370mm	Rear door ≤370mm
	With kneeling: Front door ≤280mm	With kneeling: Rear door ≤300mm
	Interpretation: Kneeling is highly desirable for a SB buses and is mandatory for a LB buses. Measurement should be taken at the midpoint of the open door aperture with the bus on level ground (not on a cambered surface) and includes any step edge highlighter strip. For some LBs the fitment of larger rims and tyres offer significant benefits in terms of ride quality, maintenance costs and fuel efficiency. The possible intention to fit larger rims should be signalled by operators in any tender documents so that regional councils can check and if necessary address any infrastructure/facility requirements.	
Any additional steps, including aisle or seat plinths	As per the Land Transport Rule: Passenger Service Vehicles 1999.	
For LBDD stairwell	For passenger confidence, step heights should preferably be all of equal height. A maximum of two different heights is permitted.	

In summary the RUB indicates a normal step height of <300mm, although the height allowance could be higher if the bus is capable of kneeling. For example, new buses have a step height of 340mm though this can reduce to 280mm when kneeling.

It is also important to note that many urban buses will have two doors (front and rear). For rear doors, the normal step height is 340mm, though this can reduce to 300mm when kneeling.

This guidance recommends that a bus is considered to have achieved close and parallel alignment to the bus stop kerb when:

- the horizontal gap between the bus platform (front and rear) and the footpath platform is no more than 200mm
- the vertical gap between the bus platform (front and rear) and the footpath platform is no more than 180mm (based on a 120mm kerb height and a 300mm bus platform height).

The maximum horizontal gap can be met through appropriate entry and exit tapers achieved through measures such as the bus box and associated bus stop parking restrictions (as required, depending on the bus stop type; kerbside, indented or bus boarder).The maximum vertical gap can be met and reduced considerably, below the maximum, with special kerbs, bus ramps and kneeling buses.

Footpath platform response

With the bus platform height now defined by the RUB as between 340mm and 280mm, we now focus on the footpath platform (kerb height).

On review it is clear that kerb height can vary considerably for all sorts of reasons. Bus design allows some flexibility in response, but only within a relatively small threshold. Therefore the requirement to ensure all bus stops fall within a range of kerb heights is critical to the delivery of an accessible bus service.

Previous research indicates a range of standards of bus stop kerb heights. The following table presents a summary of this information against the RUB, and how this relates to a derived estimated vertical gap.

Table 4: Bus kerb height summary

City	Bus stop kerb H	Front door		Rear door		Meet max vertical gap of 180mm?
		RUB range	Gap range	RUB range	Gap range	
Auckland	120mm	340mm to 280mm	220mm to 160mm	340mm to 300mm	220mm to 180mm	Yes, if kneeling
London	140mm		200mm to 140mm		200mm to 160mm	Yes, if kneeling
Melbourne	150mm		190mm to 130mm		190mm to 150mm	Yes, if kneeling, and close if not
Perth	175mm		165mm to 105mm		165mm to 125mm	Yes, if kneeling or not

On this basis it is considered that the current minimum bus stop kerb height standard of 120mm is acceptable as a minimum kerb height for use by a new kneeling bus or an older bus with a 300mm bus platform height.

This guidance recommends that all new or rebuilt bus stop kerbs should have a minimum height of 150mm for use by a new kneeling buses or an older bus with a 300mm bus platform height. This change would mean the minimum vertical gap recommended by this guidance of 180mm would be met in all circumstances, and would raise the quality and level of accessibility. This recommendation is recognised as a step towards the ultimate ideal; level bus boarding.

To go higher than 150mm would be a decision based on the specifics of the bus route or network in question. This could be in response to bus types or a quality route strategy. There is a need to be careful that any change in kerb height does not introduce issues such as:

- risk that buses will overhang/snag the kerb and damage the bus and kerb
- risk that bus drivers fear the possibility of snagging so shy away from the kerb and therefore not accurately dock the bus alongside the kerb.

Such risks negate the benefits sought from implementing higher kerbs, but can be overcome by providing the correct bus stop layout, with correct entry and exit tapers and with appropriate bus driver training.

Special kerbs: the ultimate solution?

The key considerations being discussed here are the vertical and horizontal gaps between the bus platform and the footway platform. There have been recent innovations in special kerbs which seek to combine height and proximity to achieve reduced horizontal and vertical gaps (50–75mm).

Special kerbs are profiled to guide the bus tyre to fit as close to the kerb as possible, and have a height profile to further reduce the step height between the bus platform and the footway platform. To achieve this, absolute ability for close and parallel docking of the bus has to be consistently delivered. If not, the benefits are removed, and a worse access situation arises, than with conventional kerbs.

Special kerbs broadly come in sizes ranging from 160mm to 220mm in height, with little benefit in using such special kerbs for anything below 150mm. On this basis, the use of special kerbs should only be used where:

- there is absolute certainty of parallel docking and correct approach to/from all bus stops at all times
- the road camber at all bus stops is within standard and will be maintained
- the use of special kerbs is consistently applied at all bus stops along a bus route/routes/network
- the specification of the buses to be used fit the use of the special kerbs; ideally all the buses to be used at a bus stop with special kerb, are of the same specification.

If one of these conditions cannot be reasonably met, it is recommended that the use of special kerbs should be discounted, in favour of 150mm standard kerbs.

Ramps, cambers and gradients

Through the discussion on kerb heights and step heights, there is another key consideration to be taken into account – gradients. Based on the principle of a step-free surface to improve accessibility for all, this introduces the need for ramps, cambers and gradients. The

Standard for New Zealand Design for Access and Mobility – Buildings and Associated Facilities (NZS 4121:2001) recommends:

- step ramps formed between two horizontal surfaces shall have a maximum slope of 1:8/12%/7 degree maximum
- the allowable camber for crowned and banked footpaths and ramps shall have a maximum slope of 1:50.

Such gradient criteria needs to be carried through from the camber of the road, the floor of the bus (kneeling or not), the ramp on to the footway (if used) and the camber of the footway at the bus stop. Key issues to watch out for are:

- Road surface renewal incrementally 'lifting' the road level. This can mean a previously compliant kerb height becomes progressively less compliant, and the ramp becomes too steep; does not improve access.
- Drainage channels adjacent to the kerb 'tilting' the bus towards the kerb, especially in combination with road surface renewal, resulting in a bus floor gradient that is too steep; reduces access to bus.
- In combination with the use of the kneeling bus function, this may accentuate the bus floor gradient issue whilst trying to overcome the kerb height issue; reduces access to bus.

Therefore achieving the maximum ramp, camber and gradient profiles is a key consideration to achieve access for all.

Stop layout

Every bus stop should be long enough to allow a standard bus to pull in at the correct angle to enable it to stop close and parallel to the kerb and manoeuvre out of the bus stop safely. Buses should also be able to approach and leave bus stops without delay or obstruction. Note that some bus stops may need to enable more than one bus to stop at any time.

As discussed previously, in practice regardless of the standard of bus stop design, buses are often prevented from achieving the above for two main reasons:

- The bus layout geometry is poor and/or
- Vehicles are parked close to or at the bus stop.

Each of these issues will prevent buses from reaching the kerbside and forcing buses to stop in the road; does not improve access.

Therefore the provision of an appropriate bus stop layout, building on the key considerations of markings, signage, kerb heights etc. will help enable the bus to stop closely to the kerb. The ideal bus stop layout will achieve the following objectives:

- Minimise bus delay.
- Maximise ease of access between the bus and the footpath.
- Prevent/dissuade other vehicles from parking in the bus stop area.
- Allow the bus to line up within 200mm of, and parallel to, the kerb.
- Afford a higher priority than on-street parking and new frontage access.
- Maintain road safety.

The main types of bus stop layouts are:

- kerbside bus stop
- indented bus bay
- bus boarder.

Bus service/route requirements may vary according to:

- for single buses
- for two or more single buses (different routes)
- for two or more buses operating in tandem (same route).

Bus type may vary according to:

- <11.5m single bus
- 11.5m single bus
- 12.6m single bus
- 13.5m single bus
- 13.5m>articulated bus
- 13.5m double deck bus
- 13.5m> coach
- 13.5m> double deck coach.

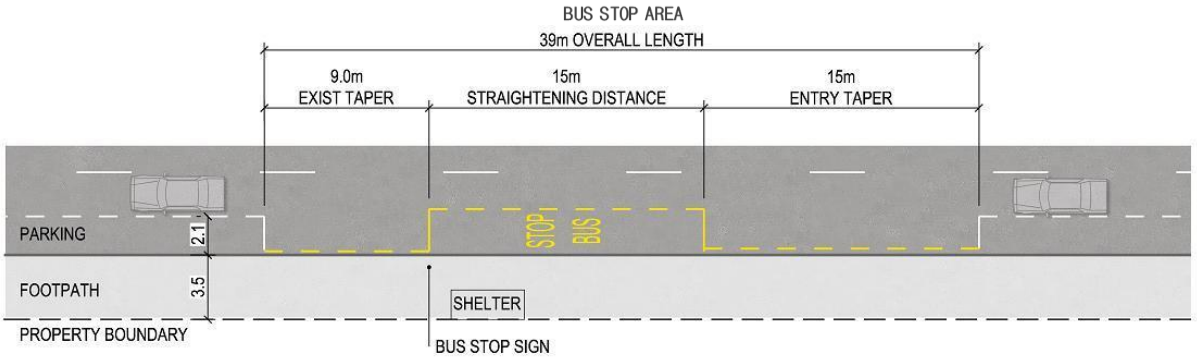
The interpretation and application of bus stop layouts will vary significantly according to the opportunities and constraints of each bus stop site. However, as presented above, there are key geometries which need to be considered relating to lengths for approach, bus stop area, bus box, and departure taper, to achieve the above objectives.

Longer bus ranks may be required for busy bus stops with multiple routes. Consideration should be given to allowing sufficient space for these buses pull in, wait and pull out of the bus stop. A small amount of space should be provided between bus bays to allow for manoeuvring. Consideration should also be given to the length of buses in the local fleet. Further guidance on this will be provided in the future public transport interchange module.

Kerbside bus stop

The kerbside design is the simplest bus stop layout and is expected to be the most common layout in New Zealand. The bus stop area is located within/on the side of the general traffic running lane, or in the parking lane (with associated tapers), or in a bus lane. If the bus stop is on the side of the traffic running lane, the bus may not lose its place in traffic flow. Driver delay is minimal, though may encourage possible unsafe overtaking.

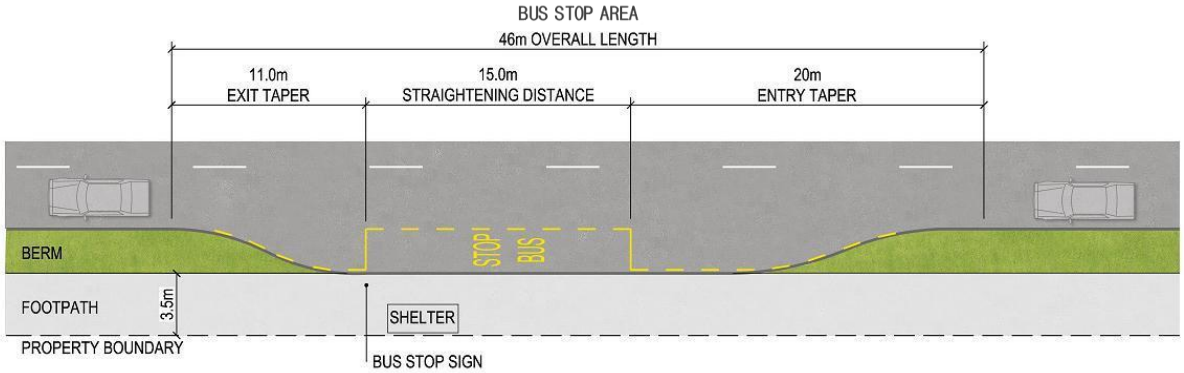
Figure 1: Diagram of a kerbside bus stop with parking either side for a single 'standard' 13.5m long tag axle bus.



Indented bus bay

An indented bus stop area is where it is located off the running lane (in a lay-by or in the parking lane), with associated tapers. Perhaps suitable for higher speed roads, or where buses stop for longer durations. Getting the bus to line-up to the kerb is tricky, due to 's-bend' movement. The bus loses its place in the traffic flow and can struggle to re-enter flow. The design means during busy times bus drivers may be tempted to stay in the traffic flow; does not improve access. Half indents can help reduce these issues though can create an unsafe pinch-point whilst in use.

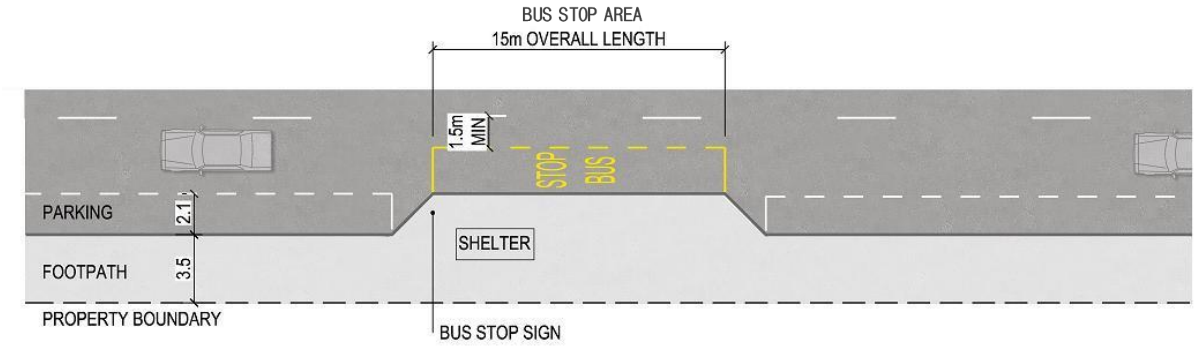
Figure 2: Diagram of a fully indented bus bay for a single 'standard' 13.5m long tag axle bus.



Bus boarder

Here the bus stop area is retained in the running lane, bordered on each side by on-street parking. No tapers are required and docking is simpler for the bus driver. Bus borders minimise the amount of kerbside lost to street parking. Bus stays in the flow, thus minimising delay for the bus. Driver delay is minimal, though this design can encourage unsafe overtaking by other traffic behind the bus. Careful design is needed to tie the boarding area back into the footway, deal with road drainage and avoid creating a cyclist pinch point.

Figure 3: Diagram of a full width bus boarder for a single 'standard' 13.5m long tag axle bus.



The following table attempts to summarise the key considerations of the bus layouts against the bus layout objectives, bus route requirements and bus types.

Table 5: Bus stop layout considerations

Key: Favourable: Neutral: Undesirable:

		Bus stop type		
		Kerbside	Indented	Boarder
Objectives	Minimise bus delay		Bus unable to exit easily	Best
	Maximise ease of access		Bus may stop in the road	Most reliable
	Dissuade/prevent parking	Looks like part of the kerb	Looks like a parking lay-by	Best
	Parallel bus docking	Variable	Bus unable to dock easily	Best
	Bus stop kerb priority	Modest	Strong	Strongest
	Maintain road safety	Some unsafe overtaking	Risk to bus users due to gap between bus and footpath	Most difficult for drivers to pass bus
Route types	Single bus route			
	Two or more single bus routes		Compounded s-bend moves	
	Two or more tandem bus routes		Can be difficult	
Bus type	Single bus		Account for central bus doors	Best
	Articulated bus		Difficult to account for rear doors	Best
	Double deck bus		Account for central bus doors	Best
	Coach		Suitable for long dwell times	Unsuitable for long dwell times

The above table indicates that:

- kerbside bus stops are considered a good all-rounder option. Ability to deliver parallel docking will be more variable due to on-street parking and kerb geometry. In response the size of bus stop area may be quite extensive, which could impact on frontage access/on-street parking
- indented bus stops should be avoided unless a road safety or speed issue demands this layout be applied. It is the worst layout in terms of reliable access, parallel docking and where bus routes share a bus stop area. This type of bus stop is not recommended, but if required, it should be designed using maximum length tapers. For coaches the indented bus stop may be a good option in response to longer dwell times. However, again parallel docking must be achieved.
- the bus boarder is considered the best bus stop layout due to the ability for the bus to reliably and consistently dock in parallel, with little risk of parking conflict. This layout needs to be carefully applied though, as can create pinch-points which may be a hazard for passing traffic and cyclists. Not suitable at all for coaches due to longer dwell times

Key consideration 2: Bus stop shelters

Shelter is provided to afford some protection while people wait for the bus from the wind, rain and sun, with (depending on the scale of facility) regulation of waiting temperature (heat and cold). To lesser extent shelter may also be provided against noise and can form part of a safety barrier system.

Not every stop will require a shelter. The decision to provide a shelter will vary according to the function of the bus stop, demand to board at the bus stop, space to fit a shelter on the footpath, and local community requirements.

Bus stop shelters can be configured and located in a variety of different formats depending on the stop layout, size of footway, function of the bus stop and adjoining land-uses/frontages.

The shelter location on the pavement should retain a safe pathway enabling pedestrians to pass the bus stop shelter. The pathway should link to the bus stop hard stand.

In essence there are three main configurations, each with different criteria and minimum width requirements:

- Centre of footway – suitable for wide footways, these shelters offer dedicated waiting space with ample pedestrian through flow space, enabling bus passengers to see and board the bus with ease under a shelter.
- Back of kerb – suitable for narrow footways with frontage access required.
- Back of footway – suitable for narrow footways where there is no frontage access needed.

Table 6: Bus shelter location configurations

Shelter type	Shelter width	Footway width	Waiting width	Through ped route width
Centre	0.65 to 1.3m	4.7 to 8m	2.7 to 3m	2 to 5m
Back of kerb		4 to 4.7m	2m	2 to 2.7m
Back of footway		3.3 to 4.5m	1.3 to 1.5m	2 to 3m

This guidance recommends (based on table 6) that to maintain pedestrian amenity on the footway, 1.8m should be considered the minimum unobstructed residual width past a bus shelter placed on a footway, with a minimal allowance for 'shy space' of 0.2m. This is as per the LTNZ *Pedestrian planning and design guide*, 2007.

Building on this recommendation, the ideal and minimum footway width requirements to be maintained through the bus stop area are as follows:

- A continuous, accessible, unobstructed pedestrian route of travel of 1.8m minimum width.
- A continuous, unobstructed, clearance area of 800mm minimum width from the kerb face.
- A boarding and alighting clear area of 1.2 metres by 8.0m upstream from the bus stop flag.

In recognition of the variety of shelter options available, the following images give an idea of the range of bus stop shelter facility this guidance is seeking to cover.

Opportunities to provide further facilities at a bus stop in the future should always be considered when selecting a bus stop location, eg locations on a wide footpath are more likely to be suitable for a seat or shelter in the future.

Key consideration 3: Personal safety and security

The security of passengers and staff should be paramount in the facility design. Security considerations must include passengers, public, bus drivers, employees, and vehicles/facilities. Security affects the following:

- Layout of the interchange – to encourage natural surveillance and to design out isolated/closed spaces.
- Construction material – to provide an open-plan feel and transparency.
- Lighting.
- CCTV and deterrent music to discourage loitering.
- Operations – staff able to work without threat or intimidation, with back-up if required.

A consideration for the location of bus stops should be to maximise personal safety and security for bus passengers, residents and road users. Safe design of bus stops should include Crime Prevention through Environmental Design (CPTED).

Where possible, bus stops should be located near land uses that provide passive surveillance. There needs to be a balance between providing opportunities for passive surveillance and intruding on the privacy of neighbouring residences. The potential for intrusions on privacy should be considered when the site is inspected. Placing bus stops at more isolated locations to avoid potential objections can impact upon passenger safety and security, thus creating a barrier to increasing public transport use. The bus stop location

should be visible from all sides and sight lines, and should not be obstructed by trees, buildings etc. The bus stop location should also provide adequate rear vision sight lines for bus drivers.

Consideration should be given to the location of existing lighting. Lighting can be expensive to install but is an essential element that improves the safety and security for passengers. Utilising existing lighting will therefore reduce costs whilst still provide passengers with a higher level of service.

Wayfinding is an important element of safety and security by simply enabling passengers not to get lost or to maintain confidence that the route continues to the intended destination. Wayfinding needs to be carefully considered for larger interchange type sites and bus stop locations should be integrated with local street mapping displays and facilities.

Key consideration 4: Information provision

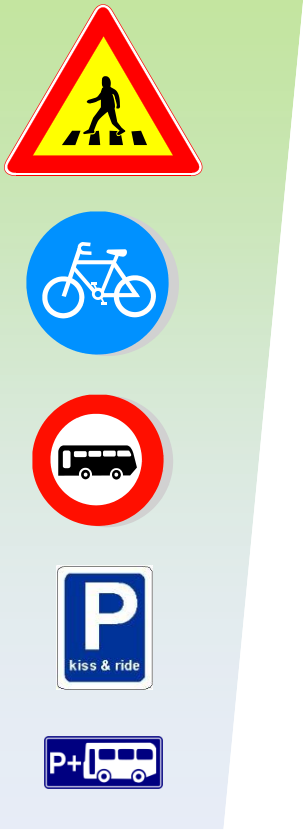
Public transport information advising of timetables destinations and fares should be easily available. Information should be clear and easy to understand. Where possible, real time information should be provided to the customer. Fare and ticketing information should be easily obtainable for the passenger prior to boarding a service.

Through better use of information the experience for the customer will be improved. Network and schedule design will have considerable implications for the provision of information. Complex network and schedule structures will be more difficult to communicate clearly. Information provision includes/involves the following:

- Provision of static network, timetable and fare information – timetables and route information must be displayed at all times. Optimise the accessibility of this information by positioning it near thoroughfares, under shelter with large print and braille.
- Platform and bus stop identification – distinguish platforms at multi-platform stops with a universal identification system and identify bus stops using unique numbering system such as used by Auckland Transport. Both platforms and stops should have tactile and visual indicators.
- Electronic access to information including real-time arrival and departure information – real-time information signs should be positioned in the line of sight of a waiting customer looking towards the direction of the arriving bus and not obscured by canopies. Link the bus stop number to an accessible phone app to enable passengers to check their stop remotely. Electronic information should be supported by an 0800 phone number.
- Central departures board – at larger interchange sites, screens showing real time departures of all bus stops should be displayed centrally within the bus stop area. Real time information should be audio enabled.
- Integration with wayfinding measures and local area maps – to assist in orientation for onward journeys outside of the bus stop area.

Key consideration 5: Bus stop access hierarchy

The following preferred access hierarchy should be considered when developing passenger waiting facilities and other facilities at bus stops and interchanges. The overall preferred access hierarchy for access to bus stop waiting area is:

Pedestrians		The most important and most vulnerable users should be afforded the best access to the bus stop and given priority at all crossing points.
Cycles		Giving priority to this mode recognises both the desirability to increase usage of this mode and the vulnerability of the mode.
Public transport		The need for reliability of access means there is a need to give priority to the public transport mode, e.g. buses.
Kiss and ride		Optimum function of this mode requires close access to the bus stop. This mode is more important at interchanges. This mode includes taxi stands.
Park and ride		While an important part of many large bus stops and some interchanges, it is the access mode that should least affect the others.

Consideration of access to public transport facilities in this order makes best use of the valuable land adjacent to public transport stops. The encouragement of passengers to arrive on foot, by bike or by other PT, will reduce localised congestion and reduce the land area required for vehicle parking. This principle recognises that all forms of arrival at a public transport stop are valid and should be catered for. However, the balance and the scale should be appropriate to the situation and this hierarchy should be used to assist in the prioritisation of facility improvements.

Accessibility considerations should not only reflect the design of the public transport stop but also connection within and to surrounding land use. *The accessible journey, a report of the inquiry into accessible public land transport* by the Human Rights Commission recognised that accessible transport is a 'whole of journey' consideration. Public transport stop design should not only comply with all building code requirements, but should also consider an approach that creates an 'accessible environment'.

Pedestrian and cycling catchment

Analysis of the pedestrian and cycling catchments for a bus stop will provide an indication of the total pool of potential bus users at the specific bus stop and any major passenger destinations. More frequent service, higher quality services, better bus stop facilities and favourable terrain will increase the distance passengers are willing to travel to reach a bus stop. Generally bus users are comfortable walking approximately 400m maximum to access

a bus stop. If a rapid transit stop, then the threshold may increase to approximately 800m, or if a cycle is used, then a distance of up to 5km to a rapid transit stop could be expected. The propensity to walk/cycle will be hugely dependent upon the local topography and quality of the links to the stop. The bus stop catchment is therefore dependent upon the walk (and cycle) links to the surrounding neighbourhoods streets and commercial areas.

This is especially critical for less able passengers. Often there is a disconnect between the quality of the bus stop and the quality of the surrounding footways. The benefit of achieving close and parallel bus docking at the bus stop is somewhat reduced if the surrounding streets have high kerbs, no crossings or are unlit. No one lives or works at a bus stop. It is crucial to think of the whole journey and for stakeholders to work together to achieve the totally accessible journey. Remember accessibility benefits everyone.

Interchange with other public transport services

A bus stop that provides for multiple routes or is adjacent to another public transport mode will act as a public transport interchange. Special attention needs to be given at interchanges to ensure that it is easy and safe for passengers to link between services and modes. Interchanges can include additional facilities to improve the travel and interchange experience.

Park & ride or kiss & ride opportunities

Park & ride is the provision of free or low cost parking spaces used by passengers who travel to the park by car and then transfer to a public transport service. Park & ride opportunities are best in lower density outer urban areas with a large dispersed non-walking catchment.

Park & ride may not be the most efficient use of land around a bus stop, but can provide an incentive that increases demand along bus routes. It can also have unintended consequences on the residential bus service and reduce community accessibility, and can suffer from over-spill into neighbouring streets. Park & ride is useful, but needs to be part of a mix of options for public transport stop access, not the only promoted option. Greater levels of access priority should be given to pedestrians, cyclists and passengers arriving on connecting services.

Kiss & ride is where a car passenger hops out of a car, which is then driven away, leaving the passenger to catch the public transport mode. Dedicated space that is just off to one side from the main activity area can be provided but is seldom sufficient for demand. An alternative option is to treat kiss & ride as a short-term parking activity and manage it within the car park facilities. Owing to the speed of the kiss & ride process, it is imperative such demands do not impact on the safety and convenience of pedestrians and cyclists.

Key consideration 6: Environmental impact

By its very nature the facilities supporting a public transport network should be designed to enhance and improve the local community. One of the enhancements should be reduced negative environmental impact, particularly when compared to private single occupant vehicle travel for the same journey. If designed and planned correctly, the infrastructure and facilities supporting the public transport network could reduce the environmental impact on the community.

Some areas of immediate success can be in vehicle technology, the reduction of stormwater run-off, choice of materials in construction and reduction of operational energy costs through low energy equipment, solar panels and smart design.

Key consideration 7: Commercial opportunities

Commercial opportunities associated with public transport facilities provide an opportunity to enhance the customer's experience while reducing the cost of constructing, operating and maintaining public transport facilities. With improved facilities, there will be a higher number of users and potentially greater associated commercial opportunities.

Commercial facilities near or incorporated into public transport facilities can improve the level of safety by improving passive surveillance and lighting. As changes to public transport facilities are undertaken, assessment of potential commercial opportunities should be considered.

There are many successful examples of this in New Zealand, e.g. leases to coffee shops, convenience stores and supermarkets are provided adjacent to public transport stops and advertising agencies provide partnerships in developing shelters for bus stops. International examples of commercial enterprises co-located with public transport include bike hire, car rental, gyms and professional office space. Public transport is an enabler of activity and this potential needs to be promoted alongside the historic car-access focused commercial activity.

Key consideration 8: Location

Bus stops must be located to allow passengers to board and alight from the bus in safety and with ease. Bus stop locations should be situated close to a passenger origin or destination. Attributes to consider when determining the bus stop location include:

- distance between stops
- local topography
- intersections
- land use = demand.

Each of these location based attributes is discussed below.

Distance between stops

In general, urban bus stops should be close to significant passenger origin or destinations. The most efficient spacing between bus stops has some overlap between walking catchments. Spaces too close together will reduce the operating efficiency of the bus, increase bus travel times and cost more money to maintain. Stops too far apart will increase the walking distance to the bus stop, discourage passenger use and will make the service feel irrelevant. The ideal stop spacing is usually close to twice the distance passengers are willing to walk to the bus stop, i.e. if your pedestrian catchment is 400m, the ideal stop spacing along the route could be up to approximately 800m, depending on side street catchment configuration and overlap with other bus service catchment areas.

Local topography

Bus stops should be located (where possible) on a level section of road to maximise accessibility and safety for mobility impaired passengers. Bus stops on hills may need to be located closer together to compensate for reduced walkability. Consider topographical barriers like hills and waterways when planning bus stop locations.

Intersections

Locating bus stops near intersections can improve access for potential passengers. However, traffic management issues may need to be considered in determining the most appropriate location. In general, where possible, stops should be located on the departure rather than the approach side of intersections.

What is critical though is to understand at project inception the mode hierarchy to be applied to the project. This will determine the level of tolerance to traffic impact, the level of priority to be afforded to buses, and possibly the ability to reallocate road space to buses.

A recent project on Dominion Road, Auckland, indicated the level of bus stop facilities that could be provided even at a busy urban intersection, if there is support for a pro-bus approach to the project (Dominion Road carries more bus passengers then private car occupants in peak hours).

The bus stop should be located sufficiently downstream of the intersection to provide the required manoeuvring space for buses, if indented or to a lesser extent if kerbside stops are used.

Kerb build-outs at intersections increase pedestrian safety and convenience when crossing the road. The bus stop needs to be sufficiently downstream of the intersection so that any current (or future) kerb build outs do not impact on the functioning of the bus stop, unless the bus stop is converted to kerbside or bus-boarder style.

Road geometry and/or traffic movement requirements on a departure leg may preclude buses from stopping soon after having passed through an intersection. In these circumstances, the stop would be better located on the approach rather than the departure side of an intersection. This level of variability recognises the need for a case-by-case approach at intersections and along corridors.

Land-use = demand generators

Public transport supporting land-use planning will enable public transport to be considered for more trips meaning increased demand and patronage. Land-use planning characteristics include density, mix and location around public transport nodes.

Low density makes viable public transport harder to achieve. New Zealand is largely a low density land-use development area, and this is particularly evident in residential areas.

Mix is important as it enables multi-functional destinations with a variety of attractors not just one single activity type. Mixed use retail and leisure combined with employment (eg office) begins to create a critical mass that attracts sufficient public transport demand. The effect is reduced however, if the trip origins are low density highly spread residential.

Location here is about proximity and penetration:

- A retail mall with a train station inside it.
- A hospital over a busway station.
- A university precinct with buses stopping in the central plaza.

- A residential estate with local stops and bus-only links direct to town.

Note public travel demand in its simplest form is all about accessibility to the node/stop at either end of the trip, not the route.

Key consideration 9: Public transport operational requirements

In this guide the public transport operations component largely focuses on the environment required for safe, efficient and future proofed vehicle manoeuvring and processing through the stop. This guidance does not include stabling, depots or facilities away from the stop.

For bus services, operational requirements focus on the consideration of both the bus driver and the physical requirements for the buses.

Operational aspects to consider in order to provide a fail-proof environment with room for growth/change in vehicle specification include:

- well lit and well signed bus operational areas
- good demarcation required between bus areas and customer areas
- easy bus manoeuvres with margin allowed for bus type variances, and ideally no reversing of in service buses
- vehicle conflict areas should be avoided or engineering controls put in place, and
- reasonable allowance for growth in bus numbers and type using the interchange in the future.

In addition allowance needs to be made within the bus network for necessary staff and operations facilities. Guidance for this will be given in other modules of the Public Transport Infrastructure and Facility Guidelines.

Part 3: Design guidance for bus stop infrastructure

Purpose

The purpose of this section is to interpret the generic bus stop key considerations (part 2) against different levels of bus stop facility, in order to provide guidance that enables the delivery of a more consistent standard of bus stop facilities in New Zealand. The guidance provided by this section is based on the set of core principles and key considerations that when followed together will help improve the efficiency and effectiveness of the facilities and infrastructure that make the bus networks.

Bus stops are key to improving the public transport network, as they provide the most common interface between the public and public transport services. For this reason it is important to get them right and provide a bus stop that is safe, accessible and attractive, which effectively provides for the needs of the passenger in an efficient manner.

This guidance will outline approaches to bus stop design based on the key considerations, according to different levels of bus stop facility.

Bus stop level of service

A level of service for bus stop provision can be determined using the example table below. This table considers the location of the bus stop and the type of bus service using the bus stop. A four tiered level of service is recommended: basic, intermediate, premium & icon.

Table 7: Bus stop level of service provision

	Type of bus service			
Bus stop location	Rapid	Frequent all-day	Local & supporting	Infrequent & peak only
City signature	Icon	Icon	Premium	Premium
Major centre	Premium	Premium	Intermediate	Intermediate
Minor centre	Intermediate	Intermediate	Intermediate	Basic
Residential	Intermediate	Intermediate	Basic	Basic
Rural	Intermediate	Basic	Basic	Basic

This method of tiered levels of service at bus stops maintains overall consistency, yet allows variation between levels accordingly.

Bus stop level of service description

All bus stops are connection points, either between travel modes, services or land-uses.

In a network that relies on transfers to connect various modes, services and land-uses, interchanges are an essential piece of the public transport network.

Bus stops can vary from a simple pole, to large purpose built facilities. Bus stops are a key component of public transport networks and can require significant levels of investment. Improvements to bus stops are crucial to improving public transport networks and make public transport more effective.

Table 8: Description of bus stop levels of service

Basic		
Lower daily volume of passengers	Lower frequency/single services	Typical locations could be on rural roads or suburban residential streets, often provided as pairs on two-way routes, 400–800m apart.
Intermediate		
Low to moderate daily volume of passengers	Moderate frequency/two or three services	Typical locations could be a local/suburban shopping centre or on main arterial routes/intersections, in pairs or as a small integrated block or strip of stops.
Premium		
Moderate to higher daily volume of passengers	Moderate to higher frequency/four or more services	Typical locations could be sub-regional centres, suburban rail/busway/ferry interchanges, key land-use sites such as a hospital or an education campus, as a medium sized integrated block or strip of stops.
Icon		
High daily volume of passengers	High frequency/high number of services	Typical locations could be major city centre sites or at sites of regional/national significance such as an international airport, as a larger sized integrated block or strip of stops.

The types and levels of facilities to be provided at bus stops is often unique to the location and will reflect the type of service and type of stop being served. Facilities to be provided may range from the most basic to the high levels of amenity, so could include:

- shelters, seating, toilets
- security systems, public address systems, CCTV, help points
- ticket vending, information provision, public telephones
- retail and food and beverage outlets
- cycle parking, other vehicle parking, taxi areas
- bus drivers' room, control room, security room and left luggage/lockers.

The decision on facility provision should aim to achieve consistency across the bus network in accordance with the types of services and types of stops being served.

The following table is intended to give an overview of the recommended infrastructure and facilities associated with each bus stop.

Table 9: Recommended bus stop features by level of service

Colour key: Recommended: Discretionary: Not recommended:

Key consideration	Descriptor	Basic	Intermediate	Premium	Icon
Bus stop layout*	Kerbside**				
	Indented				
	Boarder				
Shelters	Single unit				
	Multiple units				
	Canopy roof				
Safety and security	At grade crossings				
	Grade sep. crossings				
	Lit by street lights				
	Facility lighting				
	Passive				
	CCTV				
	PA system				
	Help points				

	Deterrent music				
	Ground staff				
Information and ticketing	ID no & name				
	Timetable box				
	RTI on stop pole				
	RTI inside shelter				
	Spider/network maps				
	Local area maps				
	Wayfinding signs				
	Ticket machine				
	Info kiosk				
	Central RTI panel				
Access facilities	Pedestrian routes				
	Cycle routes				
	Formal cycle parking				
	Formal car parking				
	Formal kiss & ride				
Environmental impact	Low energy equip.				
	Solar panels				
	Clean drainage				
	Recycling point				
Commercial opportunities (and supporting facilities)	Food & Beverage outlets				
	Toilets				
	Water fountain				
	Rubbish bins				
	Public telephones				
	Luggage lockers				
	Other retail				
	Public art				
Locational attributes	400–800m between stops				
	Flat topography				
	On intersections				
	Land-use mix				
Operations	Bus driver's area				

	Bus lay-over bays				
	Control room				

Colour key: Recommended: Discretionary: Not recommended:

*Bus stop design – assumes bus stop area/bus box design is compliant.

**Kerbside – here is a bus stop set within/on the side of the general traffic running lane.

The following points of clarification are made in support of table 9 above, in terms of key distinctions made between the different types of bus stop, in relation to the recommended provision or not of facilities.

Lighting

For all bus stops, the most efficient method for lighting would be to use existing street lighting facilities, with enhancements where required. It is expected that Intermediate level bus stops would largely be covered by existing/enhanced street lighting.

For Basic bus stops in rural locations, street lighting may not be available. In these circumstances the location of the bus stop would need to be reconsidered.

For some Premium and all Icon bus stops the style of facility may require specific lighting due to roofing or location off-street, and therefore not appropriate to be lit by existing/enhanced street lighting.

Real-time information (RTI)

It is recommended that as a starting principle, RTI is provided at all stops on a network, including lower frequency services. This is to provide confidence to passengers that they are engaged in a high quality public transport system and to enable communication with all points on the network. The style of RTI provision can vary between bus stops.

- For all levels of service – use mobile apps to provide RTI.
- For Basic bus stops – use mobile apps to provide RTI only.
- For Intermediate, premium and Icon bus stops – provide RTI screens either on the bus stop flag pole or in the shelter.
- For Icon bus stops – provide a central RTI screen for all services and all stops in the facility.

Parking and park & ride

Note: the term 'formal' refers to where parking is provided as part of the bus stop facility. Ideally, the bus stop facility could share parking with adjoining land-uses or public provision if available, and not have to provide any itself.

Cycle parking for Basic and Intermediate bus stops is considered discretionary and generally will not be required, unless a specific demand arises, and if no other shared or informal options are available. For Premium and Icon bus stops formal cycle parking should be considered, unless it can be shared with other suitable on-street provision.

Specific car parking for Basic and Intermediate level bus stop is not recommended as this level of bus stop is too small to warrant this level of investment, and are perhaps located in areas not suitable for car parks. In these instances the focus is on walking (or cycling) to the bus stop, or informal kiss & ride. Car parking and kiss & ride is also not nessesarily recommended for Icon bus stops as these bus stops are expected to be located in high land

value areas, and where other parking options should be available. Icon bus stops are also expected to be a destination or interchange rather than origin or home.

Car parking and kiss & ride are considered discretionary for Premium bus stops, as this level includes busway stations which may include a park & ride facility. Again, if parking can be shared with a local land-use, e.g. shopping centre then this is a more efficient approach to parking provision.

Bus and driver facilities/control room

The provision of driver facilities is important and needs to fit the network. It is considered as discretionary only in terms of location rather than provision. Ideally lay-over should occur on the edges rather than in the middle of the network. Further guidance on this will be provided in future modules of the Public Transport Infrastructure and Facility Guidelines.

Basic bus stops

An indicative basic bus stop is shown in the schematic below. This shows how the fundamental components of this level of bus stop can fit together. The following table describes the key considerations for this level of bus stop.

Key:

1. Single unit shelter (discretionary)
2. ID no & name, timetable box
3. Bus stop box with 'BUS STOP' label

Table 10: Recommended bus stop features for basic bus stops

Recommended: Discretionary: Not Recommended:

Key consideration	Descriptor	Basic - recommendations
Bus stop layout	Kerbside	The selection of bus stop layout will depend upon the site characteristics and traffic conditions. While an indented layout is indicated as discretionary, it is considered such a layout is the least desirable.
	Indented	
	Boarder	
Shelters	Single unit	The provision of a shelter is subject to budget, stop function and site characteristics. A balance needs to be made between passenger amenity and costs of provision. This is an acute issue for Basic bus stops due to the number of stops and the number with relatively low passenger volumes.
	Multiple units	
	Canopy roof	
Safety and security	At grade crossings	Use existing on-street facilities. Check that the crossings provide suitable levels of access for all, and link bus stop pairs as appropriate.
	Grade sep. crossings	
	Lit by street lights	Use existing on-street facilities where available. If

Key consideration	Descriptor	Basic - recommendations
	Facility lighting	not available then reconsider the location or consider alternative lighting eg solar power.
	Passive	Position the bus stop so that it is visible or audible from neighbouring properties, and obvious to passing traffic. All stops should display an easy dial 24/7 emergency telephone contact number to a central control point, alongside 111. Help points are unlikely to be feasible for this level of stop.
	CCTV	
	PA system	
	Help points	
	Deterrent music	
	Ground staff	
Information and ticketing	ID no & name	It is recommended all stops should have: • a unique reference number and a name • a timetable for the services serving the stop, and • a spider route map to show interchange opportunities. RTI should be promoted via a mobile app linking to the bus stop number. Local area maps are discretionary perhaps for further consideration or are only provided if the stop serves an area of specific interest or activity. The provision of a ticket machine depends on the fare system used. Generally not applicable in NZ currently so can be ignored.
	Timetable box	
	RTI on stop pole	
	RTI inside shelter	
	Spider maps	
	Local area maps	
	Wayfinding signs	
	Ticket machine	
	Info kiosk	
	Central RTI panel	
Access facilities	Pedestrian routes	All stops must be accessible on-foot from surrounding land-uses via local footway networks. As these stops are located next to a road, all are potentially accessible by bicycle or by car. Cycle parking is very much discretionary, but car parking and kiss & ride are not applicable at all. However need to ensure design promotes keeping the bus stop area clear of parking at all times.
	Cycle routes	
	Formal cycle parking	
	Formal car parking	
	Formal kiss & ride	
Environmental impact	Low energy equip	If the stop needs its own lighting, low energy lighting should be used if possible. If away from the power network, solar power might be an option. It is unlikely the level of bus service will warrant clean drainage systems. To avoid a multitude of bins, passengers are encouraged to take their litter home.
	Solar panels	
	Clean drainage	
	Recycling point	
Commercial opportunities (and supporting facilities)	Food & Beverage outlets	None of these facilities are considered viable or recommended to be provided by this level of bus stop. However there is no reason why passengers could not use the coffee shop across the street, a bin or telephone on-street, or other retail round the corner, if available.
	Toilets	
	Water fountain	
	Rubbish bins	
	Public telephones	
	Luggage lockers	
	Other retail	

Key consideration	Descriptor	Basic - recommendations
	Public art	
Locational attributes	800m between stops	Stop spacing of 800m is a target threshold based on general expectations of reasonable walk distances to this level of bus stop. If there are other reasons to space stops closer or further apart, that is fine. Reasons may be land-use/distribution of demand generators, intersections and road network form, topography and other natural features. Ideally the bus stop will be positioned on a flat straight section of road with good visibility, good pedestrian connectivity and appropriate to intersections and crossings.
	Flat topography	
	On intersections	
	Land use mix	
Public transport operations	Bus drivers' area	None of these facilities are considered feasible for this level of stop.
	Bus lay-over bays	
	Control room	

Colour key: Recommended: Discretionary: Not Recommended:

Intermediate bus stops

An indicative intermediate bus stop is shown in the schematic below. This shows how the fundamental components of this level of bus stop can fit together. The following table describes the key considerations for this level of bus stop.

Key:

1. Single unit shelter
2. ID no & name, timetable box
3. Bus stop box with 'BUS STOP' label
4. Real Time Information
5. Network maps
6. Rubbish bin

Table 11: Recommended bus stop features for intermediate bus stops

Recommended: Discretionary: Not Recommended:

Key consideration	Descriptor	Intermediate
Bus stop layout	Kerbside	The selection of bus stop layout will depend upon the site characteristics and traffic conditions. Kerbside and boarder are preferred.
	Indented	
	Boarder	
Shelters	Single unit	The amount of shelter dependent will relate to peak boarding numbers.
	Multiple units	
	Canopy roof	
Safety and security	At grade crossings	Use existing on-street facilities. Check that the crossings provide suitable levels of access for all,
	Grade sep. crossings	

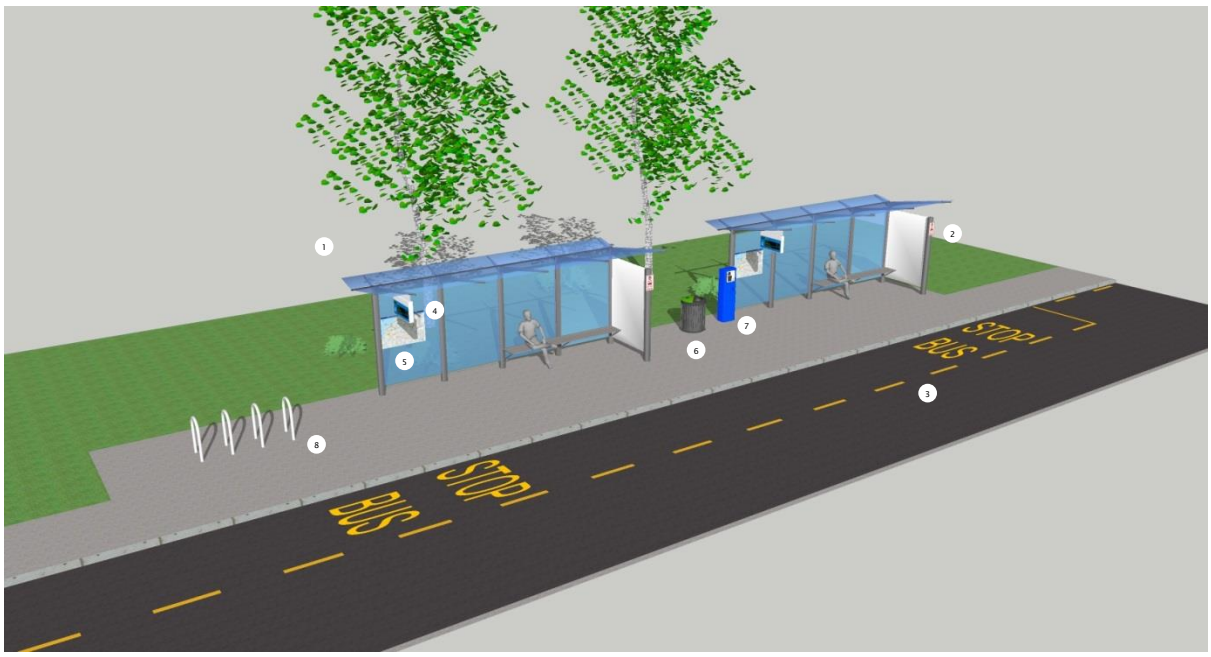
Key consideration	Descriptor	Intermediate
		and link bus stop pairs as appropriate.
	Lit by street lights	Use existing on-street facilities where available but consider additional lighting if required. Also consider alternative lighting e.g. solar power.
	Facility lighting	
	Passive	Position the bus stop so that it is visible or audible from neighbouring properties, and obvious to passing traffic. All stops should display an easy dial 24/7 emergency telephone contact number to a central control point, alongside 111. Help points and CCTV are perhaps more feasible for this level of stop.
	CCTV	
	PA system	
	Help points	
	Deterrent music	
	Ground staff	
Information and ticketing	ID no & name	Recommend all stops should have: • a unique reference number and a name • a timetable for the services serving the stop, and • a network route map to show interchange opportunities. RTI should be provided at the stop. Local area maps would ideally be provided. The provision of a ticket machine depends on the fare system used.
	Timetable box	
	RTI on stop pole	
	RTI inside shelter	
	Network maps	
	Local area maps	
	Wayfinding signs	
	Ticket machine	
	Info kiosk	
	Central RTI panel	
Access facilities	Pedestrian routes	All stops must be accessible on-foot from surrounding land-uses via local footway networks. As these stops are located next to a road, all are potentially accessible by bicycle or by car. Cycle parking is very much discretionary, but car parking and kiss & ride are not applicable. However need to ensure design promotes keeping the bus stop area clear of parking at all times.
	Cycle routes	
	Formal cycle parking	
	Formal car parking	
	Formal kiss & ride	
Environmental impact	Low energy equip	If the stop needs its own lighting, low energy lighting should be used if possible. The level of bus service may warrant clean drainage systems.
	Solar panels	
	Clean drainage	
	Recycling point	
Commercial opportunities (and supporting facilities)	Food & Beverage outlets	F & B concession sites could be considered at well used stops. Rubbish bins would generally be provided.
	Toilets	
	Water fountain	

Key consideration	Descriptor	Intermediate
	Rubbish bins	
	Public telephones	
	Luggage lockers	
	Other retail	
	Public art	
Locational attributes	400–800m between stops	Stop spacing of 800m is a target threshold based on general expectations of reasonable walk distances to this level of bus stop. If there are other reasons to space stops closer or further apart, that is fine. Reasons may be land-use/distribution of demand generators, intersections and road network form, topography and other natural features. Ideally the bus stop will be positioned on a flat straight section of road with good visibility, good pedestrian connectivity and appropriate to intersections and crossings.
	Flat topography	
	On intersections	
	Land use mix	
Public transport operations	Bus drivers' area	Depending on network design these stops may need to accommodate bus lay-over nearby and/or a driver's area.
	Bus lay-over bays	
	Control room	

Colour key Recommended: Discretionary: Not Recommended:

Premium bus stops

An indicative premium bus stop is shown in the schematic below. This shows how the fundamental components of this level of bus stop can fit together. The following table describes the key considerations for this level of bus stop.



Key:

1. Multiple unit shelter
2. Bus stop sign
3. Bus stop box with 'BUS STOP' label
4. RTI
5. Timetables, network maps and local area maps
6. Rubbish bin
7. Ticket machine
8. Cycle parking

Table 12: Recommended bus stop features for premium bus stops

Key: Recommended: Discretionary: Not Recommended:

Key consideration	Descriptor	Premium
Bus stop layout	Kerbside	The selection of bus stop layout will depend upon the site characteristics and traffic conditions. Kerbside is best or a boarder if suitable.
	Indented	
	Boarder	
Shelters	Single unit	The amount of shelter will relate to peak boarding numbers. Likely to need more than one shelter.
	Multiple units	
	Canopy roof	
Safety and	At grade crossings	Use existing on-street facilities. Check that the

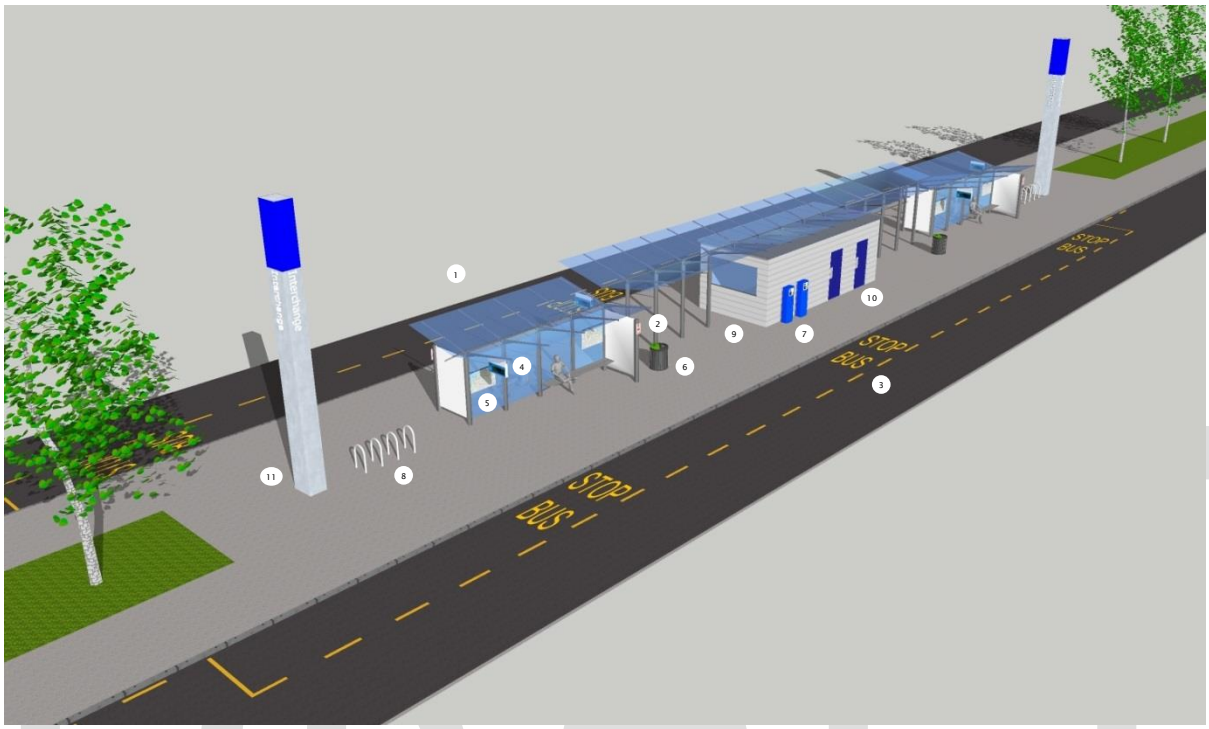
security	Grade sep. crossings	crossings provide suitable levels of access for all, and link bus stop pairs as appropriate. In exceptional circumstances grade separated crossing maybe considered (Premium bus stops may include park & ride and busway stops).
	Lit by street lights Facility lighting	Use existing on-street facilities where available but consider additional lighting if required. Also consider alternative lighting eg solar power.
	Passive CCTV PA system Help points Deterrent music Ground staff	Position the bus stop so that it is visible or audible from neighbouring properties, and obvious to passing traffic. All stops should display an easy dial 24/7 emergency telephone contact number to a central control point, alongside 111. Help points should be provided along with CCTV.
Information and ticketing	ID no & name Timetable box RTI on stop pole RTI Inside shelter Network maps Local area maps Wayfinding signs Ticket machine Info kiosk Central RTI panel	Recommend all stops should have: • a unique reference number and a name • a timetable for the services serving the stop, and • a network route map to show interchange opportunities. RTI should be provided at the stop. Local area maps should be provided. The provision of a ticket machine depends on the fare system used.
Access facilities	Pedestrian routes Cycle routes Formal cycle parking Formal car parking Formal kiss & ride	All stops must be accessible on-foot from surrounding land-uses via local footway networks. As these stops are located next to a road, all are potentially accessible by bicycle or by car. Cycle parking should be provided, but car parking and kiss & ride are discretionary and would be offered based on land use surrounding the site, and type of bus stop (Premium bus stops may include park & ride and busway stops). However, need to ensure design promotes keeping the bus stop area clear of parking at all times.
Environmental impact	Low energy equip Solar panels Clean drainage Recycling point	If the stop needs its own lighting, low energy lighting should be used if possible. If away from the power network, solar power might be an option. Provision of clean drainage systems to be considered. Recycling points should be considered,

Commercial opportunities (and supporting facilities)	Food & Beverage outlets	F & B concessions could be considered at well used stops, depending on stop location. Toilets should either be provided or available in close proximity to the site. Rubbish bins would be provided. Inclusion of other retail can be considered, depending on stop location. Including public art in the design should be considered.
	Toilets	
	Water fountain	
	Rubbish bins	
	Public telephones	
	Luggage lockers	
	Other retail	
	Public art	
Locational attributes	800m btw stops	Stop spacing of 800m is a target threshold based on general expectations of reasonable walk distances to this level of bus stop. If there are other reasons to space stops closer or further apart, that is fine. Reasons may be land-use/distribution of demand generators, intersections and road network form, topography and other natural features. Ideally the bus stop will be positioned on a flat straight section of road with good visibility, good pedestrian connectivity and appropriate to intersections and crossings. A stop of this size should be designed to be sympathetic to and inclusive of local land-use.
	Flat topography	
	On intersections	
	Land use mix	
Public transport operations	Bus drivers' area	Depending on network design these stops may need to accommodate bus lay-over nearby and/or a driver's area.
	Bus lay-over bays	
	Control room	

Colour key: Recommended: Discretionary: Not Recommended:

Icon bus stops

An indicative icon bus stop is shown in the schematic below. This shows how the fundamental components of this level of bus stop can fit together. The following table describes the key considerations for this level of bus stop.



Key:

1. Multiple unit shelter
2. Bus stop sign
3. Bus stop box with 'BUS STOP' label
4. RTI
5. Timetables, network maps and local area maps
6. Rubbish bin
7. Ticket machines
8. Cycle parking
9. Food and beverage outlet
10. Toilets
11. Bus stop location pole

Table 13: Recommended bus stop features for icon bus stops

Recommended: Discretionary: Not Recommended:

Key consideration	Descriptor	Icon
Bus stop layout	Kerbside	This type of location should always have kerbside stops only.
	Indented	
	Boarder	
Shelters	Single unit	The amount of shelter provided will be dependent upon peak boarding numbers. Bespoke shelter may
	Multiple units	

	Canopy roof	be required depending on local situations.
Safety and security	At grade crossings Grade sep. crossings	Use existing on-street facilities but consider grade separated crossings where connections between and to other modes requires significant road or other structures to be crossed. Pedestrian and vehicle type and volumes would be a consideration. Check that crossings provide suitable levels of access for all, and link bus stop pairs as needed.
	Lit by street lights Facility lighting	Use existing on-street facilities as much as possible but additional lighting would likely be required. Also consider alternative lighting, eg solar power.
	Passive CCTV PA system Help points Deterrent music Ground staff	Position the bus stop so that it is visible or audible from neighbouring properties, and obvious to passing traffic. All stops should display an easy dial 24/7 emergency telephone contact number to a central control point, alongside 111. Help points should be provided along with CCTV. Deterrent music (typically classical) reduces vagrants and loitering. Ground staff can provide information and assistance to traveling public.
Information & ticketing	ID no & name Timetable box RTI on stop pole RTI inside shelter Network maps Local area maps Wayfinding signs Ticket machine Info kiosk Central RTI panel	Recommend all stops should have: • a unique reference number and a name • a timetable for the services serving the stop, and • a network route map to show interchange opportunities. RTI should be provided at each stop, in centralised waiting areas and/or major pedestrian entry points. Local area maps should be provided along with wayfinding signage. Ticket machines would be highly desirable. A staffed information kiosk is also desirable.
Access facilities	Pedestrian routes Cycle routes Formal cycle parking Formal car parking Formal kiss & ride	All stops must be accessible on-foot from surrounding land-uses via local footway networks. As these stops are located next to a road, all are potentially accessible by bicycle or by car. Cycle parking should be provided, but car parking and kiss & ride are unlikely as these stops as this type of stop is normally centrally located and short and medium parking facilities are typically

		included in surrounding land use. Design of stops and platforms should ensure the bus stop area is clear of parking at all times.
Environmental impact	Low energy equip Solar panels Clean drainage Recycling point	If the stop needs its own lighting, low energy lighting should be used if possible. Clean drainage systems should be provided. Recycling points should be provided.
Commercial opportunities (and supporting facilities)	Food & Beverage outlets Toilets Water fountain Rubbish bins Public telephones Luggage lockers Other retail Public art	F & B concessions should be included: • Toilets should be provided on-site. • Public telephones (including Wifi) should be provided. • Rubbish bins should be provided. Inclusion of other retail is ideal. Including public art in the design should be considered.
Locational attributes	800m btw stops Flat topography On intersections Land use mix	Stop design and locations will be central and bespoke to the local land use; supportive, sympathetic and inclusive. All stops should be positioned on flat straight platforms with well-designed pedestrian links.
Public transport operations	Bus drivers' area Bus lay-over bays Control room	Depending on network design, these stops may need to bus layover nearby and/or a driver's area. A facility of this size may require a control room to manage services, security, and facility systems.

Colour key: Recommended: Discretionary: Not Recommended: