Transport for NSW

Bus Priority Infrastructure Planning Toolbox

NSW GOVERNMENT

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1. Introduction

1. Introduction

1.1 Purpose

This Bus Priority Infrastructure Planning Toolbox (the Toolbox) provides strategic planning guidance on bus priority infrastructure that improves the overall travel time and reliability outcomes for bus customers, particularly on the Rapid Bus Network. The document provides advice on effective bus priority infrastructure to suit different road and street and land use contexts, including schematic layout examples.

The Toolbox is part of the Movement and Place tools that supports the Practitioner's Guide to Movement and Place and informs decision-making when allocating or reallocating road space for bus customers. The Toolbox recognises that bus customers are also walking customers and are an important part of bus planning.

This document provides strategic planning guidance on:

- Bus priority infrastructure planning to improve the overall travel time and reliability of bus services
- Bus priority strategic/concept designs, including example schematic layouts to inform the planning process
- Bus priority placement within the road and street network and its relationship to bus stops and the street environments.

The Toolbox informs practitioners involved in the early planning stage for bus priority infrastructure on dedicated road space to enable fast, frequent and reliable bus services.

This document does not set out the strategic need for bus priority in a particular location; that is the function of a city/region's bus strategy which identifies Frequent and Rapid Bus Network requiring bus priority and the rationale behind it. This document also does not guide detailed design, community engagement or delivery.

The application of the guidance document within the bus project life cycle is shown in Figure 1.

1.2 Objectives, outcomes and benefits

Application of the Toolbox aims to:

- Enable reliable and congestion-free all-day frequent bus services for our customers
- Identify and incorporate bus priority that is safe and fit-for-purpose for present and future networks through engagement and co-design

This document's application contributes to the six outcomes from Future Transport 2056: customer-focused; successful places; a strong economy; safety and performance; accessible services; and sustainable. These six outcomes are achieved through bus priority's ability to deliver the following benefits:

- Improved bus reliability and journey times for customers
- Increased bus patronage
- Reduced bus operating costs
- Improved bus priority planning and design that is safely aligned with a road and street's desired Movement significance and Place intensity
- Optimised use of existing assets through road space reallocation instead of new capital investment
- Improved customer satisfaction with faster end-to-end journey, supporting the 30-minute city vision with improved connections in urban areas
- Safety for all road and street users, including people getting on and off buses.

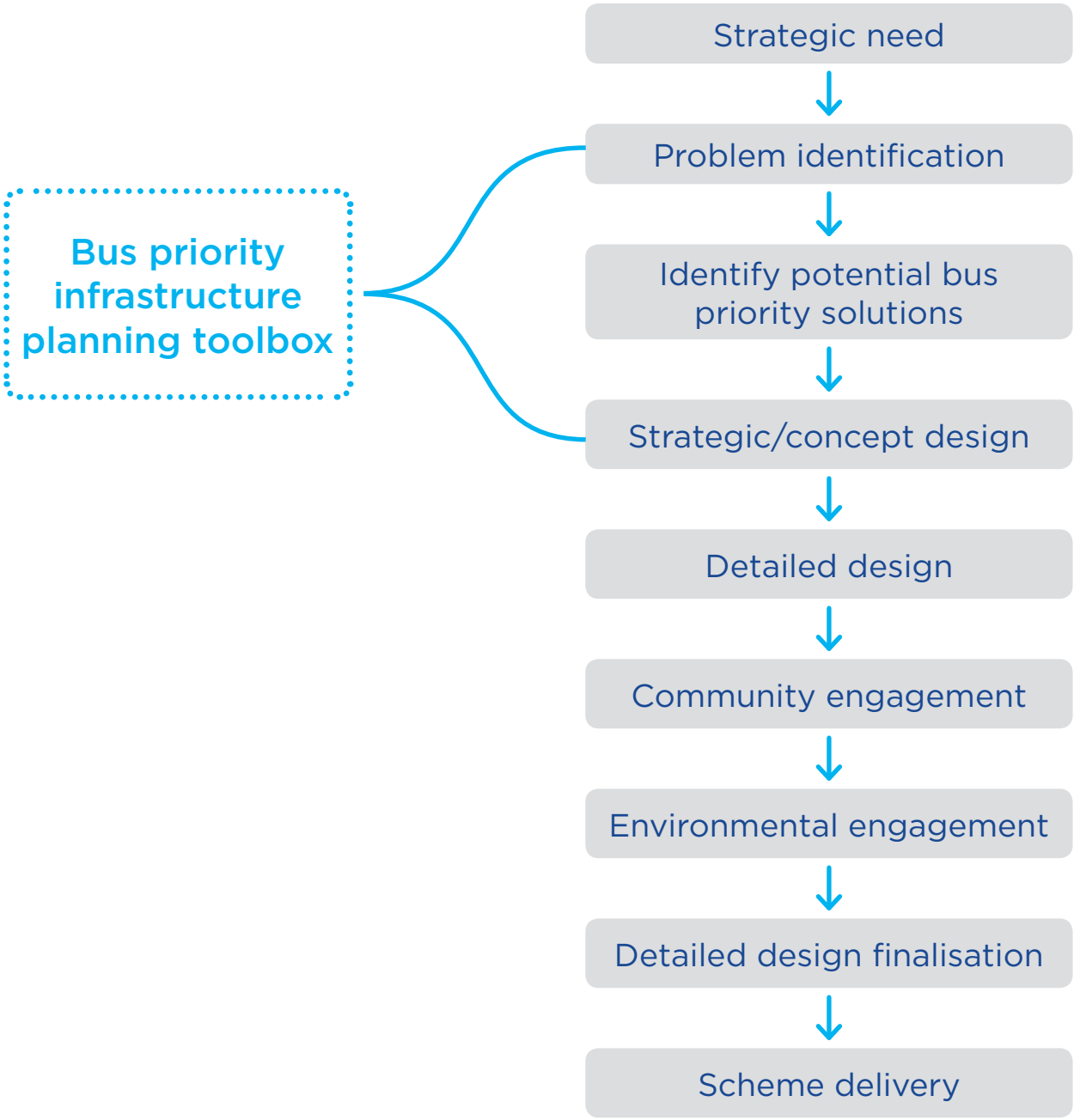

Figure 1. **Positioning of the Bus Priority Infrastructure Planning Guide within the bus priority planning, design and delivery life cycle**

2. The challenge:

balancing road space demand


OWL & THE PUSSYCAT
PRESCHOOL BROOKVALE
WAPRINGAH ROAD
Frenchs Forest
Chatswood
Mona Vale B1
NISSAN
Used Cars

2. The challenge: balancing road space demand

Planning for bus priority is important to improve bus reliability and operational efficiency on existing and planned corridors for bus customers. Journey time and reliability savings from bus priority implementation combined with bus service improvements have translated to direct patronage gains in Australian cities.[1 2]

1 Currie, G., & Sarvi, M. (2012). New Model for Secondary Benefits of Transit Priority. Transportation Research Record, 2276(1), 63–71.

2 Austroads (2017) Prioritising On-Road Public Transport, Sydney: Austroads Ltd

Furthermore, a typical segregated or exclusive bus right-of-way (e.g. a busway or transitway) offers high carrying capacity, averaging over 15,000 passengers per hour during peak periods, depending on the service frequency and bus passenger capacity. Balancing demands for road space is key in ensuring the network focuses on moving people rather than vehicles.

Table 1 summarises various challenges related to bus priority. Careful consideration of the challenges is important in identifying suitable bus priority infrastructure.

Table 1: Key challenges associated with bus priority.

Challenge	Explanation
1. Balancing competing demands for road space	• Lack of clear guidance on how and when road space can be prioritised for buses over other modes of transport • Potential localised delays to general traffic due to reallocation of a general traffic lane for bus priority • Significant land acquisition and utility relocation costs to widen roads to provide for bus priority
2. Integration with land use	• Need to ensure the bus priority's layout and location complement the desired place intensity of a road or street
3. Integration with other transport modes	• Need to ensure the bus priority's layout and location facilitate movements between modes and services (e.g. walking and cycling access, transfers to rail, light rail, bus, ferry, etc.)
4. Bus priority remains effective and consistent	• Traffic flows and behaviours change over time • Insufficient priority delivered, partly delivered, driver behaviour or traffic growth not forecast or anticipated in strategic plans
5. Public/ stakeholder feedback	• Strong focus on the impacts of parking loss or reduced traffic capacity; desire to keep the impacts minimal or net-zero • Limited focus on bus customer benefits • Consultation focuses on affected landowners but comments from bus customers are seldom captured

Challenge	Explanation
6. Long implementation timeframes	• Progressing a bus priority proposal from idea to implementation requires a significant amount of planning, design, consultation and compliance with existing regulatory processes, inhibiting the ability to be proactive or to respond to challenges quickly • Consultative and compliance requirements inhibit the agile implementation of trial bus lanes that could deliver immediate reliability and journey time benefits
7. Limited road space	• Minimum standard of bus priority design can impede efficient bus operations e.g. bus lanes that are too short to allow for extensive priority for buses, inability for buses to get into bus lanes due to congestion, bus lanes that are too narrow or indented bus stops that require merging into a general traffic lane • Fragmented bus priority implementation leads to sub-optimal outcomes for the whole network • In some cases, limited road space can result in insufficient bus stop and waiting area capacity
8. Traffic signal priority issues	• Congestion on intersection approaches prevents buses from accessing signal priority • Bus detecting signal priority such as Public Transport Information and Priority System (PTIPS) and Sydney Coordinated Adaptive Traffic System (SCATS) are not widely available
9. Compliance and enforcement	• Lack of enforcement (camera or police) against vehicles driving or parked in a bus lane • Lack of enforcement normalises non-compliant driver behaviour

3. The opportunity:

attractive, reliable, safe and faster bus services


B
732 Rouse Hill
742 Rouse Hill
747 Rouse Hill
751 Rouse Hill
transportnsw.info
Tallawong Station
PLEASE SIGNAL DRIVER
NEW SOUTH WALES

3. The opportunity: attractive, reliable, safe and faster bus services

3.1 Overview

Future Transport 2056's customer outcomes for Greater Sydney and Regional NSW reveal values that are important to improving the bus customer experience: time; system and efficiency; reliability and convenience.

Achieving these outcomes are most likely to encourage our customers to shift to buses or use bus travel more often. Bus priority provision has a material effect on all of these values because allocating road space priority for buses over general traffic:

- Reduces journey times and improves convenience for customers
- Increases bus schedule reliability for passenger reassurance
- Allows for more efficient bus operations as more passenger capacity can be delivered with fewer buses.

3.2 Principles

Accordingly, there is an opportunity to target bus priority planning to deliver on the Future Transport 2056 customer outcomes. Planning effective bus priority in line with best practice principles can deliver the stated customer benefits to support customer demand and future growth. Bus priority planning principles to address the customer experience include:

1. Provide attractive bus services with priority over cars to encourage mode shift
2. Enable reliable services by avoiding congestions
3. Enable faster services by providing shorter alternative routes for buses
4. Safely integrate with surrounding land uses and the desired Movement significance and Place intensity along a route

Each principle is explained further on the next page.

Figure 2. B-Line's extensive bus priority infrastructure has improved its service reliability. As of February 2021, B-Line has the highest bus patronage in Greater Sydney

3.2.1 Provide attractive bus services with priority over cars to encourage mode shift

Attractive bus services that improve customer experience deliver fast and reliable journey times for customers. This can be achieved through allocating road space and traffic signal priority for buses over cars for all-day frequent routes so that more buses can run faster, carry a greater number of passengers and provide a discernible travel time saving. In particular, bus priority to drive this mode shift needs to consider:

- Provision along planned key bus corridors in advance of desired future demand
- Road space reallocation for bus priority before road widening and land acquisition – in some cases, parking loss is unavoidable and the Movement & Place framework and Road User Space Allocation policy should be used to ensure a balanced approach
- Bus operations support with suitably located bus layovers to allow for more efficient end-to-end services by reducing the time spent running empty buses before and after a service
- Focusing on moving more people reliably and efficiently by ensuring consistent bus priority measures as well as wayfinding, stop and fleet provisions
- Getting it right the first time – avoid adopting less effective bus priority measures that make it hard to change in the future.

3.2.2 Enable reliable services by avoiding congestions

Bus priority that avoids congested traffic conditions enables more consistent travel times and hence reliable journeys for customers. Congestion avoidance can be achieved through bus priority that spans the length of a bus route to the greatest extent possible so that buses are not affected by congestion pinch points.

3.2.3 Enable faster services by providing shorter alternative routes for buses

Bus priority can reduce travel times and save both operating and capital costs by enabling buses to perform the service in less time. Direct bus links can be achieved by identifying opportunities for buses to bypass congestion or shorten the length of a bus route compared to the general traffic route. It can also be achieved through well-positioned layovers that support efficient bus operations and reduce out-of-service times at the start and end of a bus route.

3.2.4 Safely integrate with surrounding land uses and the desired Movement significance and Place intensity along a route

Safe bus priority considers the surrounding environment's conditions with respect to traffic speed, people and traffic volumes and the predominant land uses, while considering how it may influence the desired Movement significance and Place intensity. Bus priority measures can be adaptable to safely integrate a road or street's planned Movement and Place functions by, for example, adapting speed limits and road space allocation for bus priority to local conditions. Bus priority measures must ensure people have safe and prioritised access at pedestrian crossings and to/from bus stops and interchanges.

4. Bus priority guidance

4. Bus priority guidance

4.1 Overview

Bus priority that aligns with the principles in Section 3.2 will enable attractive, reliable, safe and faster bus services. Given the range of bus priority measures available, this section provides guidance on **where** and **when** different types of bus priority can be applied, taking into account factors such as:

- Movement and Place classification
- Bus network hierarchy
- Road environment

Many factors can affect the effectiveness and efficiency of bus priority and bus customers' travel experience, such as:

- **Bus priority's location:** Bus priority measures located along corridors with key bus services that carry large numbers of passengers will produce the greatest journey time and reliability benefits for customers. Equally, bus priority that targets frequent bus corridors with known congestion issues will deliver efficiency gains
- **Continuity:** It is more desirable to have continuous bus priority rather than priority at discrete locations; the longer the bus priority along a corridor, the greater the reliability and efficiency benefits
- **Space:** Design elements such as bus lane width affect the effectiveness of a chosen bus priority measure
- **Enforcement:** Enforcement also affects the effectiveness of certain bus priority solutions that reserve a right-of-way for buses
- **Walking and cycling access**: Safe, easy and unobstructed access to and from the stops is critical in ensuring a smooth end-to-end journey

Bus priority implementation ranges on a spectrum from only adopting measures when there are no congestion impacts on general traffic to an approach that prioritises the needs of bus users and operations over car traffic.

To date, bus priority provision in NSW has represented all parts of this spectrum. Providing bus priority through the lens of minimising impacts on general traffic may lead to undesirable outcomes such as not having sufficiently extensive bus priority for the all-day frequent bus network or costly land acquisitions to provide an extra lane for bus priority instead of reallocating existing road space. On the other hand, there are examples of high-quality bus priority in NSW, e.g. the Northwest Transitway, the M2 bus lanes and full-time bus lanes in Sydney CBD.

Given the breadth of bus priority approaches in NSW, the guidance provided in this section positions itself towards the 'high priority' end of the spectrum, recognising the spatial efficiencies of reallocating road space to move large numbers of passengers by bus and the Future Transport 2056 objectives.

The bus priority planning guidance is presented in the following pages below under a five-step decision-making process.

4.2 Decision-making process and bus priority types

Step 1
Assess the site

Collect Movement and Place data on the site and decide on the desired site environment under the Movement and Place classification, or reference an existing plan or strategy that contains this information.

Step 2
Identify bus network hierarchy

Liaise with Transport for NSW to identify current and future planned bus services along the subject street or road segment. This will include determining the appropriate bus network hierarchy (Rapid, Frequent, Local and/or On-demand routes) to be accommodated following an existing Bus Network Strategy that may apply to the area or region.

Step 3
Identify and evaluate bus priority type

Identify an appropriate bus priority type based on the desired Movement and Place classification from Step 1, and the bus network hierarchy applicable from Step 2.

Step 4
Select specific bus priority design

Select a specific design for the selected bus priority type from Step 2 based on the available road width.

Step 5
Evaluate the preliminary bus priority design

Review the selected preliminary bus priority design chosen and evaluate whether the outcomes reached would meet customer needs, improve efficiency, increase safety and support surrounding land uses.

Step 1 – Assess the site

This step involves assessing the road or street being considered for bus priority under the Practitioner's Guide to Movement and Place. This exercise should involve a multidisciplinary team to ensure holistic Movement and Place considerations.

Classification under Movement and Place framework helps practitioners to understand and communicate the relationship between the Movement significance and Place intensity of a street or road with the help of four street environments. Understanding the extent to which people's movement interacts with adjacent places guides practitioners to match the right outcome to its context. Bus priority that is compatible with an environment's desired classification ensures priority measures safely support a road or street's desired Movement significance and Place intensity.

Figure 3. Classification under Movement and Place

Assessing the site involves:

- Classifying the site's desired environment, e.g. Main Road, Main Street, Local Street or Civic Space for the road or street being considered for bus priority, as informed by local Movement and Place metrics and the gap between the existing environment and the desired future state. Section 3.6 of the Practitioner's Guide to Movement and Place provides further detail on how the road and street environments can be classified
- Assessing Movement metrics, including but not limited to: speed limit, vehicle speeds, traffic volume, bus frequency/volume, pedestrian volumes, bus passenger movements, interchange movements between modes
- Assessing Place metrics, including but not limited to: type of land uses, street function, temporal changes in activity, built form, road width, presence of major transport interchange nodes within centres
- Analysing bus operations data to identify key challenges, including but not limited to: reliability, headway spacing, travel time, operating speed, crowding at bus stop, safety, comfort, accessibility
- Conducting a site visit to inform the evaluation. If a site visit is not possible, a desktop study can be undertaken using available street information from street and aerial surveys or other suitable data.
- If available, refer to a plan or strategy that includes the assessment information cited above.

Step 2 – Identify bus network hierarchy

This step involves consulting Transport for NSW to understand existing and future bus customer and route network needs on a corridor; moving away from the traditional approach that focuses on the number of bus services and road network performance.

Practitioners should identify the intended hierarchy/functional role of the bus route/s on the corridor within the relevant bus strategy, i.e. whether Rapid, Frequent or Local bus routes, if applicable.

The numbers and needs of bus customers riding through, as well as customers boarding and alighting along the subject corridor segment, need to be understood to ensure Movement and Place considerations are properly balanced at each location. A corridor may be shared across different routes turning on and off and it may have different bus network functional roles along the length. Bus priority infrastructure may need to be implemented in the short, medium or long terms. Staged or incremental delivery of bus improvements may be necessary according to local circumstances such as emerging traffic pinch points or in response to new development impacting customer demand.

Liaising with Transport for NSW will inform these considerations to assist in the next step of determining and evaluating the appropriate bus priority type.

Step 3 – Identify and evaluate bus priority type

This step involves determining a suitable bus priority type based on the Movement and Place classification agreed to in Step 1 and the bus network hierarchy on a corridor, i.e. whether it is a Rapid, Frequent, Local or On-demand bus route in the bus network, from Step 2.

There is not a one-size-fits-all approach to bus priority types – each needs to be compatible with the desired Movement and Place classification and the type of bus route(s) it serves. Table 1 summarises the recommended bus priority type based on these factors. Explanations of the various bus priority types and their compatibility with the selected Movement and Place classifications and bus network hierarchy are provided below.

Adjacent land uses and bus stops should also be considered in planning for a bus priority as they impact the efficacy of each provision.

Table 2 shows the recommended bus priority type when planning for a particular bus network hierarchy at the outset. This classification does not mean bus routes of a different hierarchy would be precluded from using another bus priority type. For example, Frequent and Local buses could share an exclusive bus alignment with a Rapid bus route.

More information on bus priority types and examples can be found in Austroads On-Road Public Transport Priority Tool Appendix C

Table 2: Bus priority type based on Movement and Place classification and bus network hierarchy

Bus priority type	Movement and Place classification	Bus network hierarchy
A - Exclusive bus alignment	Main Road	Rapid
B - Segregated alignment in mixed environment	Main Road, Main Street, Local Street	Rapid, Frequent
C - Bus lane	Main Road, Main Street, Local Street	Frequent
D - Bus-only street	Local Street	Rapid, Frequent, Local
E - Stop design and location	Main Road, Main Street, Local Street, Civic Space	Rapid, Frequent, Local, On-demand
F - Intersection priority	Main Road, Main Street, Local Street, Civic Space	Rapid, Frequent, Local

For the purpose of bus priority for Rapid and Frequent bus routes, a Main Road classification involves roads and streets that support the efficient movement of bus customers as well as people and freight using other modes. While place activity levels are typically less intense on Main Roads, future Rapid and Frequent bus routes on Main Roads are still expected to serve roads and streets with supporting land uses that provide customer access to bus services. Accordingly, Main Road environments served by future Rapid and Frequent buses would typically involve lower speed environments for general traffic (e.g. 60km/h speed limit or lower) with road/street-fronting land uses.

Buses and people walking and cycling

Integration with walking

All bus customers use the footpath regardless of their ability. Safe and easy access to bus stops shapes the overall customer experience and street environments. Walking access to bus stops needs to be safe, prioritised and unobstructed.

Crossing opportunities around bus stops shapes customers' behaviour. The pedestrian environment adjacent to bus facilities must guide people towards the safest possible route, eliminating the need to take an unsafe or unprotected route.

Location - Pedestrian crossings should be located at grade near bus stops with the least distance, crossing staging and wait time possible. The location, whether at an intersection or mid-block, should be determined considering the pedestrian network, adjacent land uses and desire lines. Practitioners should consider existing as well as projected crossing demand, particularly related to bus customers.

Type - Uncontrolled crossings are generally safe on streets with low traffic volumes and speed limit. In some cases, controlled crossings may be required to support a safe walking environment. If a crossing signal is needed, the signal phasing should be configured to reduce crossing wait times, including prioritisation of pedestrian signal timings.

Other considerations - Integration with pedestrian movement around the stop (people queueing and boarding the bus), grade and geometry changes, detours, lighting, footpath quality affect the overall walking and bus customer experience and should be considered by practitioners.

See Walking Space Guide: Towards Pedestrian Comfort and Safety for more information on designing comfortable and safe walking space.

Integration with cycling

Cycling customers should also be prioritised in providing access to bus stops.

Practitioners should consider how customers can easily interchange between bus and cycling, while ensuring that the two modes can safely operate on a corridor where needed. Special consideration should be given to ensuring persons with visual impairment can safely move in the area where buses and cyclists movements meet.

Separation - Buses, boarding and alighting bus customers and cyclists need adequate separation, crossing point and inter-visibility to ensure safety. Appropriate delineation may be required depending on the road and street's configuration. Walking and cycling customers should be encouraged to move cautiously on the approach to the crossing points.

Design - Bus stops, bus lanes and cycleways must be designed together to ensure all customers have a safe and comfortable journey.

See Cycleway Design Toolbox: Designing for Cycling and Micromobility for more information.

Figure 4. All bus customers are walking customers at one point of their journeys (Transport for NSW)

A - Exclusive bus alignment

An exclusive bus alignment provides exclusive priority for buses and is the highest form of on-road public transport priority.

This bus priority type is physically separated from general traffic and incorporates signal priority at most intersections. It allows for high-capacity, high-frequency services with reliable travel time. Examples include the Northwest Transitway and the Brisbane busway.

An exclusive bus alignment supports a high movement and low place environment and belongs to the 'Main Road' classification of the Movement and Place framework.

While roads with an exclusive bus alignment belong to the Main Roads classification of the Movement and Place framework, these corridors and routes can have significant meaning to local people and require careful consideration of the needs of places and communities adjacent to the route.

The recommended bus network hierarchy for this intervention would be Rapid bus routes with buses operating at speeds of up to 80 km/h.

Figure 5. Exclusive bus alignment in Northmead as part of the North West T-way (Transport for NSW)

B - Segregated alignment in mixed environment

A segregated alignment in mixed environments provides physically separated running ways with exclusive priority for buses within a road or street that also supports general traffic, active transport and/or street-fronting land uses.

It incorporates signal priority at most intersections and allows for high-capacity, high-frequency services with reliable travel time. Examples include street-running sections of the transitways in Sydney.

This bus priority type is preferred along corridors with a high through-movement significance for buses. Along these corridors, the Movement function of the road or street can change and also caters for a range of other road users. Where buses travel to and from or through areas with high Place intensity, these corridors need to be sensitive to the adjacent land uses through lower vehicle speeds.

The recommended bus network hierarchy for this intervention would be Rapid and Frequent bus routes with buses operating at speeds of between 30 and 60 km/h.

Figure 6. Segregated bus lane in Liverpool to Parramatta T-way (Transport for NSW)

C - Bus lane

Bus lanes allow for bus priority within general traffic lanes and may also include signal priority but there is no physical separation from the other lanes. They can be 'bus-only' to allow for exclusive bus use or otherwise 'bus lane', which is shared with other vehicles such as taxis, hire cars, emergency vehicles, motorcycles and bicycles.

Bus lanes can also be flexible by time and allow for other uses (e.g. parking, general traffic) when not in use. Bus lanes can provide a high level of public transport priority and are most effective when they are continuous to minimise interactions with general traffic. As there is no physical separation between bus lanes and general traffic lanes, enforcement is key to ensure their effectiveness.

Bus lanes can be provided kerbside for easier access to bus stops or as an offset lane to allow for other kerbside uses and turning movements.

Bus lanes may require the reallocation of existing general traffic lanes for bus priority, or may require road widening to accommodate the additional lane. They are suitable for a range of street environments from Main Road to Local Street.

This type is preferred along corridors with a high through-movement significance for buses. Along these corridors, the movement function of the road or street can change and also caters for a range of other road users. Where buses travel to and from or through areas with high Place intensity, these corridors need to be sensitive to adjacent land uses, such as by travelling at lower speed.

The recommended bus network hierarchy for this intervention is Frequent bus routes with buses operating at speeds of between 30 and 60 km/h.

Figure 7. Bus lane on Liverpool to Parramatta T-way (Transport for NSW)

D - Bus-only street

A bus-only street (also known as a transit mall) allows for low-speed movements of buses within an environment of high Place intensity such as main shopping streets or major transport interchanges, such as Oxford Street in Bondi Junction (shown below).

Bus-only streets limit access to buses only, except in limited circumstances such as for emergency vehicles or freight and delivery vehicles at designated times. Bus-only streets may employ bus gates or other types of enforcement such as cameras to ensure bus-only use. Their location within an area of high pedestrian activity allows for convenient access to buses and a greater catchment of bus customers.

A bus-only street may require reallocation of road space from general vehicles to public transport and active transport. It supports street environments with high Place and lower Movement functions, e.g. Civic Space within the Movement and Place Framework.

The recommended bus network hierarchies for this intervention are Rapid and Frequent bus routes with buses operating at speeds of up to 30 km/h. Local buses can also use bus-only streets where route segments overlap.

Figure 8. Bus only street in Bondi Junction (Transport for NSW)

E - Stop design and location

The design and location of stops influence the effectiveness of bus priority measures as well as customers' comfort and the overall street environment. Effective stop design can facilitate safe access to and from stops for customers, reduced passenger boarding time and smooth entry and departure at stops. Examples include kerb extensions to reduce dwell times at stops as they remove the need to pull in and out of a traffic lane. Another example is indented bus bays adjacent to bus lanes, which eliminates the friction associated with exiting and re-entering the travel lane.

Bus stop location and spacing also affect overall travel time, so these aspects should be considered to suit a bus route's network hierarchy. Such measures when combined with lane-based bus priority can increase the effectiveness of bus priority at a corridor or network-wide scale.

As stops are located in many different road environments, the design and location guidance for stops provided under Step 4 apply to all Movement and Place classifications and would benefit all types of bus routes.

See the ASA Bus Stop Guidelines (under development) for more information on bus stop design and lcocation.

Figure 9. Bus stop on kerb extension in Surry Hills (Transport for NSW)

F - Intersection priority

Intersections and signals can slow down and constrain bus movements even if other interventions such as bus lanes are used.

Priority measures at intersections and signals allow buses to move through these points with minimal delay by prioritising their movement over other modes. Examples include bus signals, bus queue jumps, signal priority and pre-signals. Combined with lane-based bus priority, such measures can increase the effectiveness of bus priority at a corridor or network-wide scale.

As intersections and signals are found in many different environments, bus priority at these locations apply to all Movement and Place classifications and would benefit all types of bus routes.

Figure 10. Bus Intersection Priority in Dee Why. Bus queue jumps infrastructure is already available at over 1,500 locations in Greater Sydney

Step 4 – Select specific bus priority design

With a broad bus priority type selected in Step 3, this step involves the selection of a more specific preliminary design for the chosen bus priority type.

Road width is often the main geometric constraint in providing bus priority within the road reserve. Except for some exclusive bus alignments, the extent of bus priority infrastructure that can be provided is influenced by the number of traffic lanes available for (re)allocation to bus priority and access to bus stops and the urban environment.

Step 4 provides a range of preliminary designs under different road width scenarios (two-lane, four-lane and six-lane carriageway) to support decision-making once a higher-level decision to (re)allocate road space for bus priority has been made. Each option requires context-sensitive design that safely integrates the needs of all customers. The bus priority treatment design must prioritise safe and efficient access to and from bus stops for people walking and cycling.

Table 3 and 4 highlight the preliminary design options available for the chosen bus priority type under each road width scenario.

Step 4 involves:

- Selecting a lane-based bus priority concept in Table 3; plus
- Selecting a stop and intersection-based bus priority concept in Table 4.

The reference numbers for the preliminary design options in the tables cross-reference to the preliminary design sheets provided in this chapter.

Table 3: Lane-based designs by bus priority type under different road width scenarios

Bus priority type	Two-lane carriageway	Four-lane carriageway	Six-lane carriageway
A - Exclusive bus alignment	A1 Bus-only road in exclusive bus alignment		
B - Segregated alignment in mixed environment		B1 – Centre-running bus lane B2 – Side-aligned two-way bus lanes	B3 – Centre-running bus-lane with reduced traffic B4 – Centre-running bus lane with high traffic volume
C - Bus lane	C5 – Contraflow bus lane	C1 – Kerbside bus lane C5 – Contraflow bus lane C6 – Transit/high-occupancy vehicle lane	C2 – Kerbside bus lane C3 – Offset bus lane C4 – Offset to kerbside bus lane C5 – Contraflow bus lane C6 – Transit/high-occupancy vehicle lane
D - Bus-only street	D1 – Bus-only street (transit mall) D2 – Bus gate		

Table 4: Stop and intersection-based bus priority designs by bus priority type

Bus priority type	All road width scenarios
E - Stop design and location	E1 – Kerb extension E2 – Indented bus bay adjacent to bus lane E3 – Bus layover positioning E4 – Bus stop rationalisation
F - Intersection priority	F1 – Bus queue jumps/ banned turn exemptions F2 – PTIPS and SCATS activated bus signals

Potential bus priority measures may also involve technological solutions either on the road corridor, at the kerb or intersections. This document touches on some of these priority measures, particularly at the intersection, but does not provide an extensive guide to the use of technology for bus priority measures. The Toolbox will evolve over time to highlight integration with new technology, including fleet types.

Table 5 highlights two types of bus priority designs that are used overseas and have potential benefits for bus priority where space is limited. However, they do not currently exist in NSW. These designs are categorised as pilot designs for further investigation and have not yet been considered for any particular road and street environment.

Page 30 to 50 describe each design in more detail.

Table 5: Pilot bus priority designs for further investigation

Bus priority type	All road width scenarios
P - Intersection priority	P1 – Pre-signals
P - Segregated alignment in mixed environment	P2 – Bus priority filtered street

A1 - Bus-only road in exclusive bus alignment (e.g. transitway, busway)

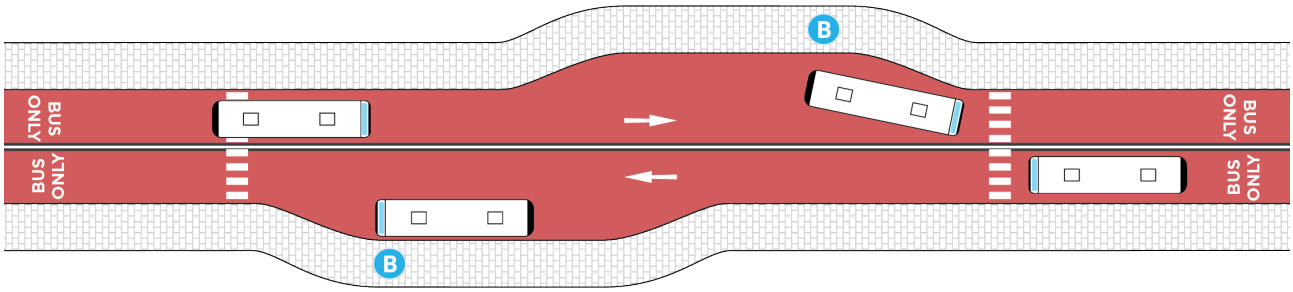

Figure 11. Schematic example of bus-only road in exclusive bus alignment

Benefits

- Provides the highest level of priority to buses due to complete segregation from general traffic and people walking and cycling
- Able to support high speeds along the transitway due to complete segregation

Considerations

- Higher capital costs to construct a segregated transitway
- Requires dedicated road corridor
- Requires integration with surrounding land uses and transport networks to ensure appropriate access to stations and to foster land use uplift
- Ideally paired with indented bus stops to allow non-stopping services to pass safely in high flow environments

Example

- Liverpool-Parramatta Transitway
- Northwest Transitway
- Bennelong Bridge, Wentworth Point

Movement and Place Classification	Suitable
Main Road	X
Main Street	
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	
Local	
On-demand	

B1 - Centre running bus-only lane

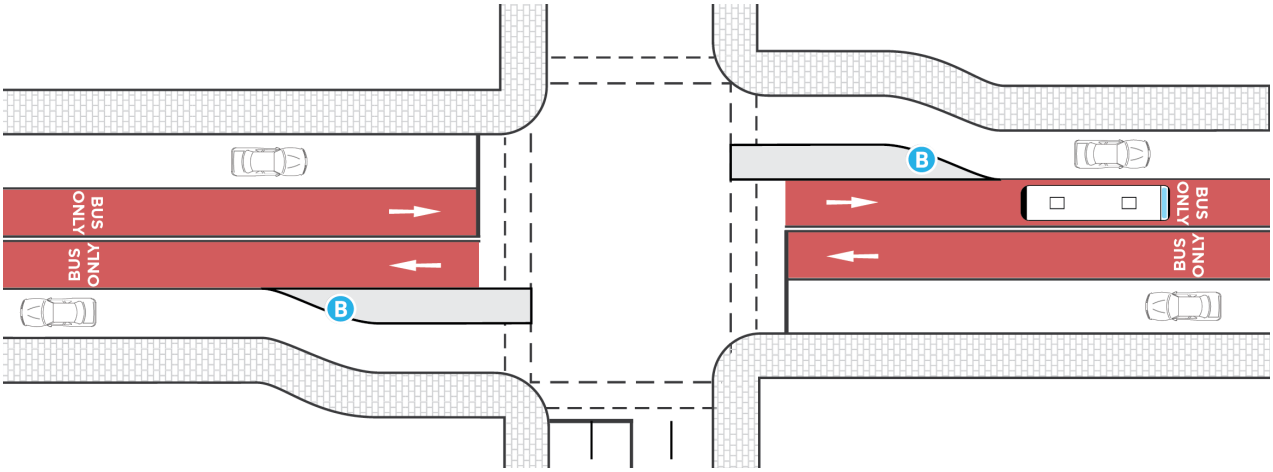

Figure 12. Schematic example of a centre running bus only lane

Benefits

- Provides continuous bus priority for frequent buses by avoiding general traffic congestion, especially at mid-block locations
- Reduces conflicts with left-turning vehicles and illegally parked vehicles
- Provides good urban amenity by moving buses further away from the kerb
- Increases safety as the road is more legible and faster buses are in the centre where they are expected

Considerations

- Mid-block stops are not appropriate where interchange is required with services running perpendicular and without safe crossing facilities to access the stop
- Requires enough road width for in line bus stops to serve bus lanes in both directions – localised widening at stop locations may be required
- Intersections with right turns can cause delay to centre-running buses; signal priority for buses should be considered
- Requires a separate right-turn facility for buses turning right at major intersection.
- Requires passing lanes at certain locations or indented bus stops for overtaking buses
- Provides separation between bus lane and general traffic lane by painted lines or mountable barriers to allow access onto the bus lane by other vehicles in the event of breakdowns or an emergency

Example

- Liverpool-Parramatta Transitway, Canley Vale Rd
- George Street light rail, Sydney

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

B2 - Side-aligned two-way bus lane

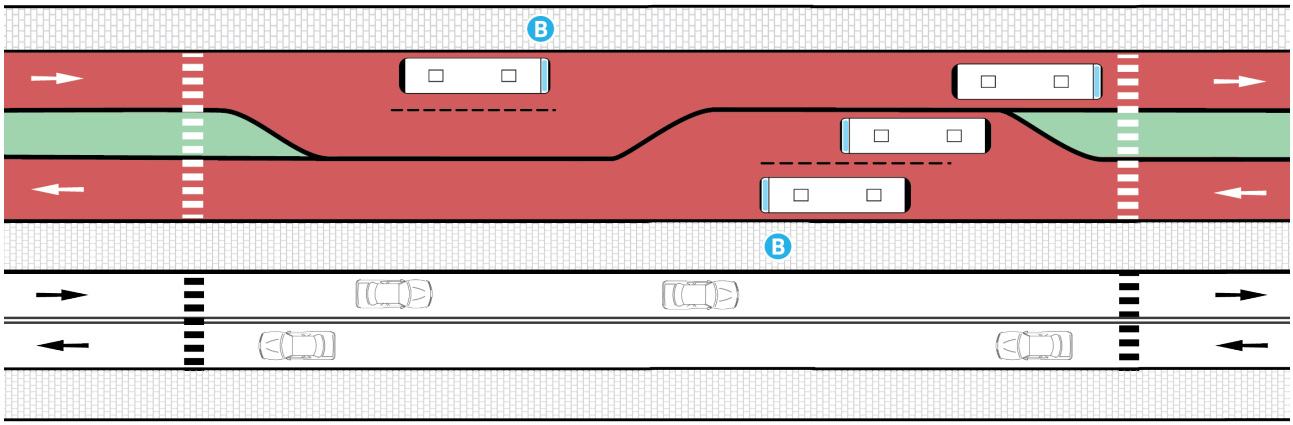

Figure 13. Schematic example of side-aligned two way bus-only lanes

Benefits

- Provides continuous bus priority for frequent buses by avoiding general traffic congestion, especially at mid-block locations
- Allows for two side-by-side traffic lanes, enabling overtaking in breakdown and emergency situations
- Advantageous in locations where there are no turning opportunities over long distances (e.g. the road adjoins open space, water, boundary wall, etc.)

Considerations

- Mid-block stops may not be appropriate where interchange is required with services running perpendicular and without safe crossing facilities to access the stop
- Requires enough road width for either in line bus stops at the kerbside and road median to serve bus lanes in both directions – localised widening at stop locations may be required
- Central bus stop in between the two bus lanes is also possible, requiring buses to drive on the right hand side of the two-way bus lanes – localised widening at stop locations may be required

Example

- AMETI Eastern Busway, Auckland (under construction)
- Northwest Transitway, Sunnyholt Road (within a road reserve greater than six lanes in width)

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

B3 - Centre running bus-only lane with traffic reduction

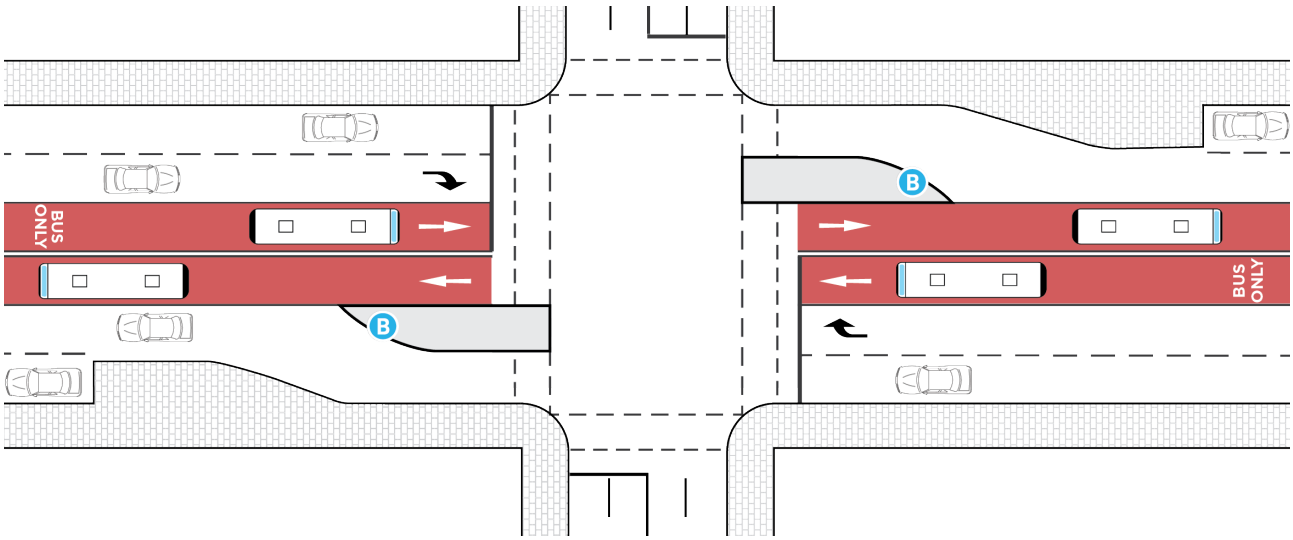

Figure 14. Schematic example of centre running bus only lane with traffic reduction

Benefits

- Provides continuous bus priority for frequent buses by avoiding general traffic congestion
- Avoids conflicts with left-turning vehicles at the intersection
- Provides good urban amenity by moving buses further away from the kerb
- Increases safety as the road is more legible and fast vehicles are in the centre where they're expected
- Allows for landscaping or parking on the second lane from the kerb to improve amenity on an otherwise busy road environment to support nearby land uses

Considerations

- Mid-block stops are not appropriate where interchange is required with services running perpendicular and without safe crossing facilities to access the stop
- Localised widening may be required to support bus stop platforms

Example

- Petersburger Strasse, Berlin

Movement and Place Classification	Suitable
Main Road	
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

B4 - Centre running bus-only lane with high traffic

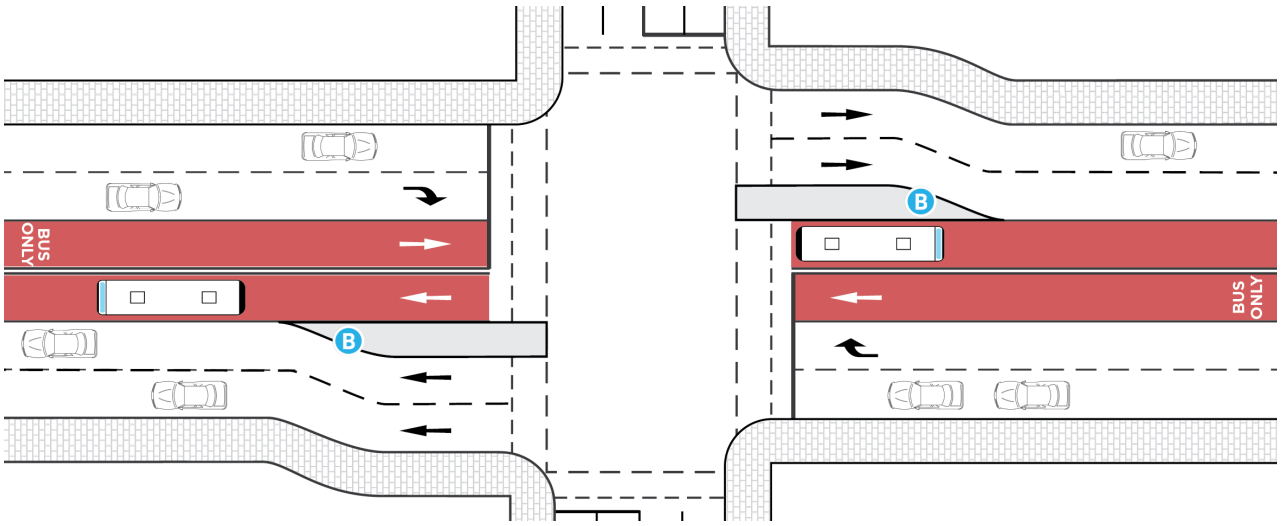

Figure 15. Schematic example of centre running bus-only lane with high traffic

Benefits

- Provides continuous bus priority for frequent buses by avoiding general traffic congestion
- Avoids conflicts with left and right turning vehicles at intersections
- Provides good urban amenity by moving buses further away from the kerb
- Increases safety as the road is more legible and fast vehicles are in the centre where they're expected
- Provides two continuous general traffic lanes in Main Road environments where general traffic capacity needs to be maintained

Considerations

- Six-lane road environment for frequent buses may discourage street-facing resident, commercial or mixed-use land use that increases the customer catchment
- Mid-block stops are not appropriate where interchange is required with services running perpendicular and without safe crossing facilities to access the stop
- Localised widening may be required to support bus stop platforms

Example

- Westmead Transitway stop, Darcy Road, Westmead

Movement and Place Classification	Suitable
Main Road	X
Main Street	
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

C1 - Kerbside bus lane

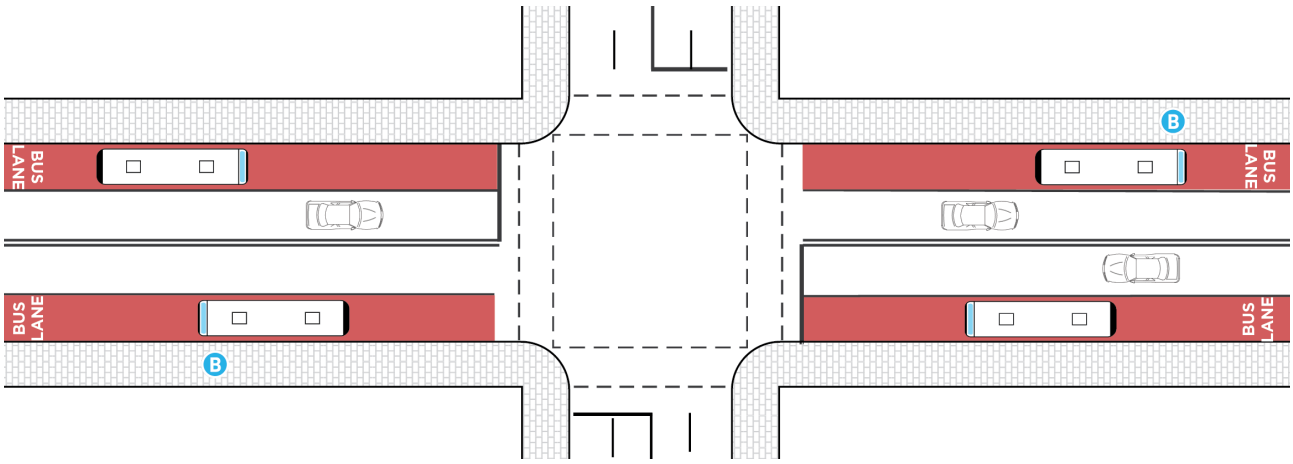

Figure 16. Schematic example of kerbside bus/bus-only lane

Benefits

- Typically easy to install and retrofit on existing streets with minimum infrastructure investment required
- Provides continuous bus priority for frequent buses by avoiding general traffic congestion, especially at mid-block locations
- Able to be flexibly used throughout the day, such as for parking, loading, freight, general traffic, where traffic conditions allow

Considerations

- Conflicts with left turning vehicles as bus lanes can be used by vehicles to turn left 100 m before intersection, so require special attention
- Provides passing lanes at certain locations or indented bus stops for overtaking buses
- Potential delays from delivery vehicles, ride share, taxis infringing the lane. Consider providing alternative space for these activities on side streets where conditions allow.
- Amenity issues with footpath uses
- Safety issues with potentially fast moving buses in kerbside lane when other traffic is slow or at a standstill
- May require the removal of street parking
- Conflicts with people cycling where they use the bus lane

Example

- Church Street, North Parramatta

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	X
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	
Frequent	X
Local	
On-demand	

C2 - Kerbside bus lane

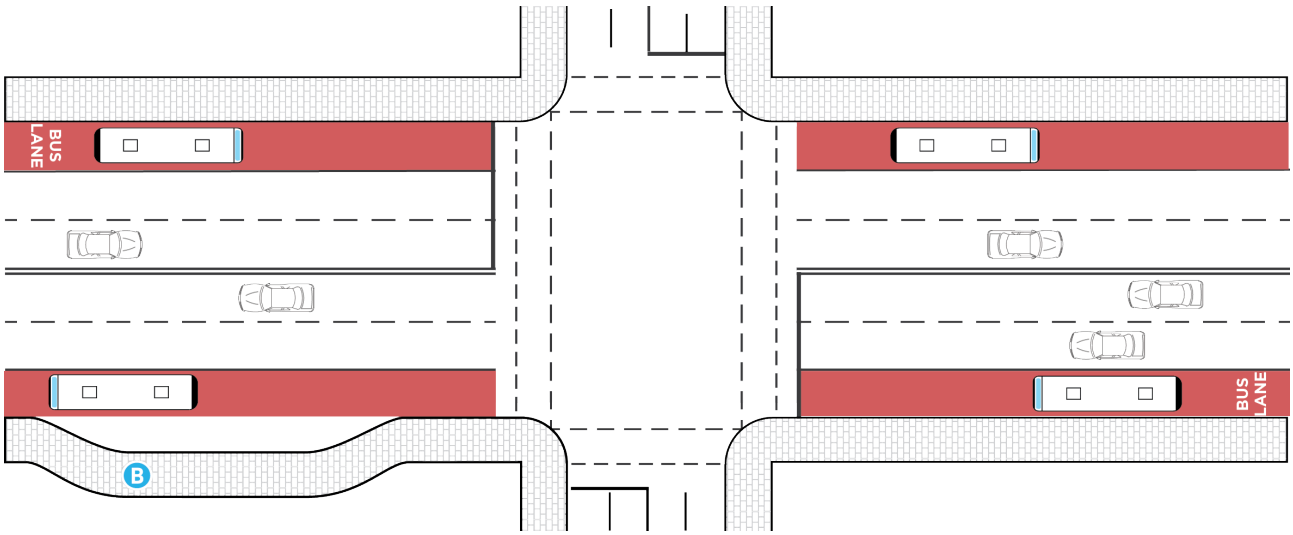

Figure 17. Schematic example of kerbside bus/bus-only lane

Benefits

- Typically easy to install and retrofit on existing streets with minimum infrastructure investment required
- Provides continuous bus priority for frequent buses by avoiding general traffic congestion, especially at mid-block locations
- Can be flexibly used throughout the day, such as for parking, loading, general traffic, where traffic conditions allow
- Can re-enter a bus lane from an indented bus stop rather than general traffic, minimising delays associated with turning out
- Dwelling buses do not impede buses going straight through

Considerations

- Six-lane road environment for frequent buses discourages street-facing residential, commercial or mixed-use land use that increases the customer catchment
- Conflicts with left turning vehicles as bus lanes can be used by vehicles to turn left 100 m before intersection, so require special attention
- Delivery vehicles, ride share, taxis may infringe on the lane delaying buses. Consider providing alternative space for these activities on side streets where conditions allow.
- Amenity issues with footpath users
- Ideally paired with indented bus stop facilities
- Safety issues with potentially fast moving buses in kerbside lane when other traffic is slow or at a standstill

Example

- Victoria Road, West Ryde

Movement and Place Classification	Suitable
Main Road	X
Main Street	
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	
Frequent	X
Local	
On-demand	

C3 - Offset bus lane

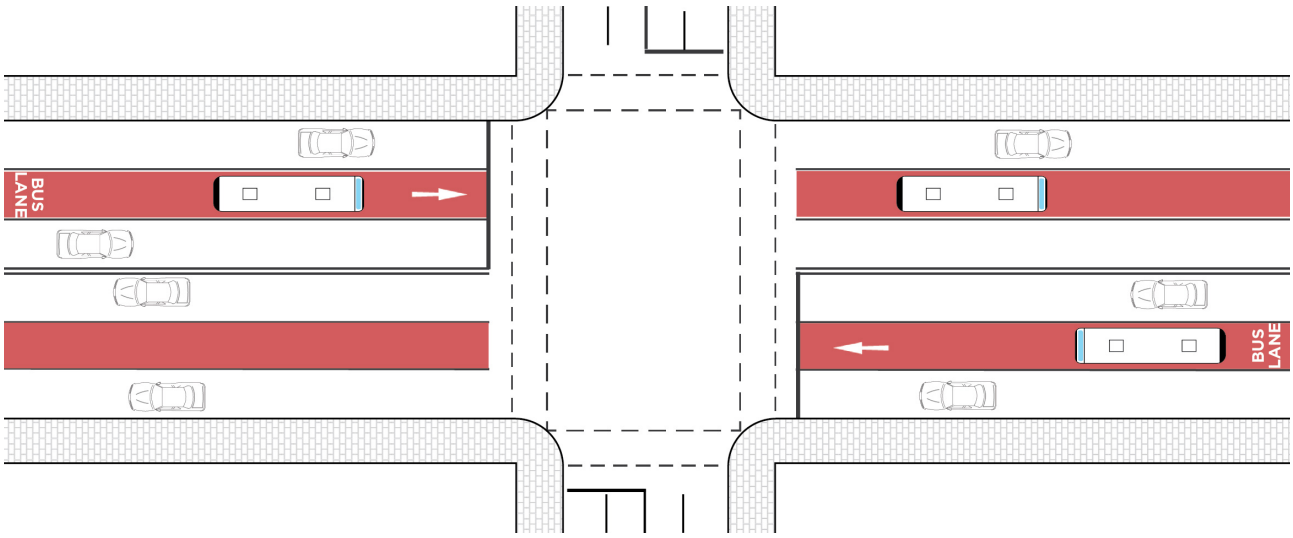

Figure 18. Schematic example of offset bus lane

Benefits

- Provides continuous bus priority for frequent buses by avoiding general traffic congestion
- Reduces conflicts with left turning vehicles
- Typically easy to install and retrofit on existing streets with minimum infrastructure investment required
- Shifts faster-moving buses away from the footpath and kerbside land uses for greater amenity

Considerations

- Six-lane road environment for frequent buses discourages street-facing residential, commercial or mixed-use land use that increases the customer catchment
- Other traffic must cross over the bus lane when switching lanes
- Buses must pull into kerb lane to set down passengers, potential conflict with cyclists depending on the street configuration

Example

- Elizabeth Street, Sydney

Movement and Place Classification	Suitable
Main Road	X
Main Street	
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

C4 - Offset to kerbside bus lane

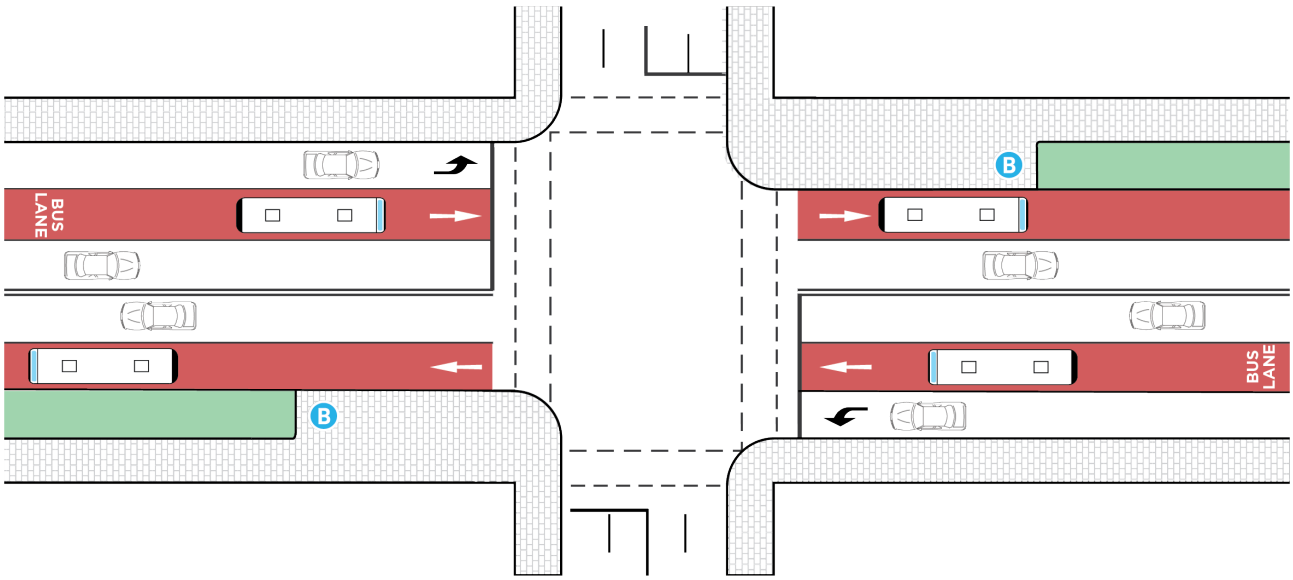

Figure 19. Schematic example of offset to kerbside bus lane

Benefits

- Provides continuous bus priority for frequent buses by avoiding general traffic congestion
- Avoids conflicts with left turning vehicles through the transition from offset to kerbside bus lane at the intersection
- Typically easy to install and retrofit on existing streets with minimum infrastructure investment required
- Allows for other considerations such as parking lanes

Considerations

- Six-lane road environment for frequent buses discourages street-facing resident, commercial or mixed-use land use that increases the customer catchment
- Other traffic and cyclists must cross over the bus lane when switching lanes
- Buses must pull into kerb lane to set down passengers, which may not be appropriate in high traffic environments
- Left turn only kerbside general traffic lane required at the intersection transition

Example

- Elizabeth Street, Sydney

Movement and Place Classification	Suitable
Main Road	X
Main Street	
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	
Frequent	X
Local	
On-demand	

C5 - Contraflow bus-only lane

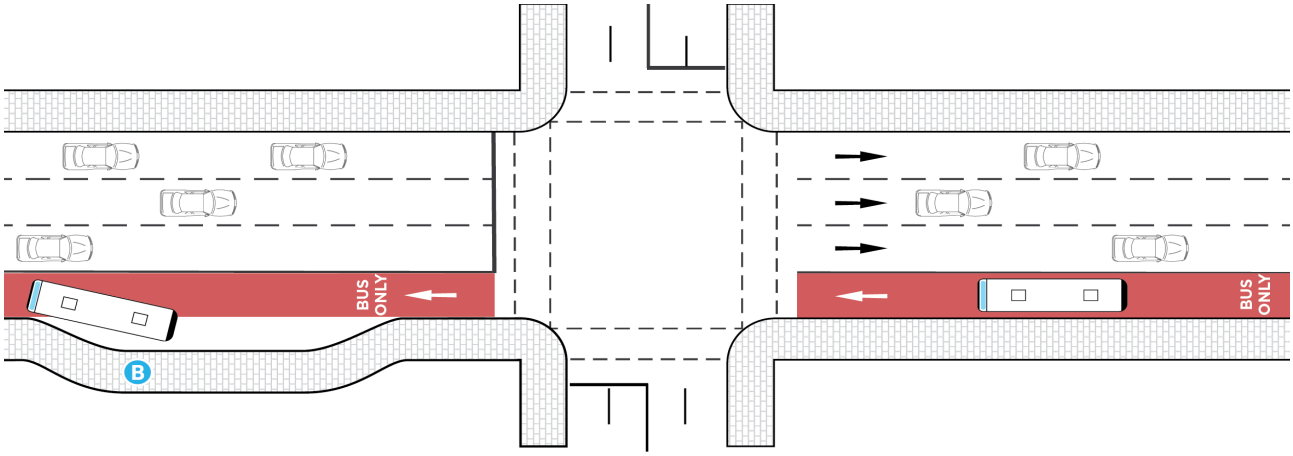

Figure 20. Schematic example of contraflow bus lane

Benefits

- Provides an opportunity for buses to shorten journey times and increase connectivity by taking a more direct route against the flow of general traffic on an otherwise one-way street

Considerations

- Clear signage and strict enforcement needed to ensure effectiveness of this bus priority measure
- Safety concerns due to potential conflict with opposing traffic, which can be mitigated with painted or physical buffers where the road width allows
- Requires intersection geometry and swept path for turning buses

Example

- Pitt Street, Parramatta
- Petrie Terrace, Brisbane, Queensland

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	
Frequent	X
Local	
On-demand	

C6 - Transit/ high-occupancy vehicle lanes

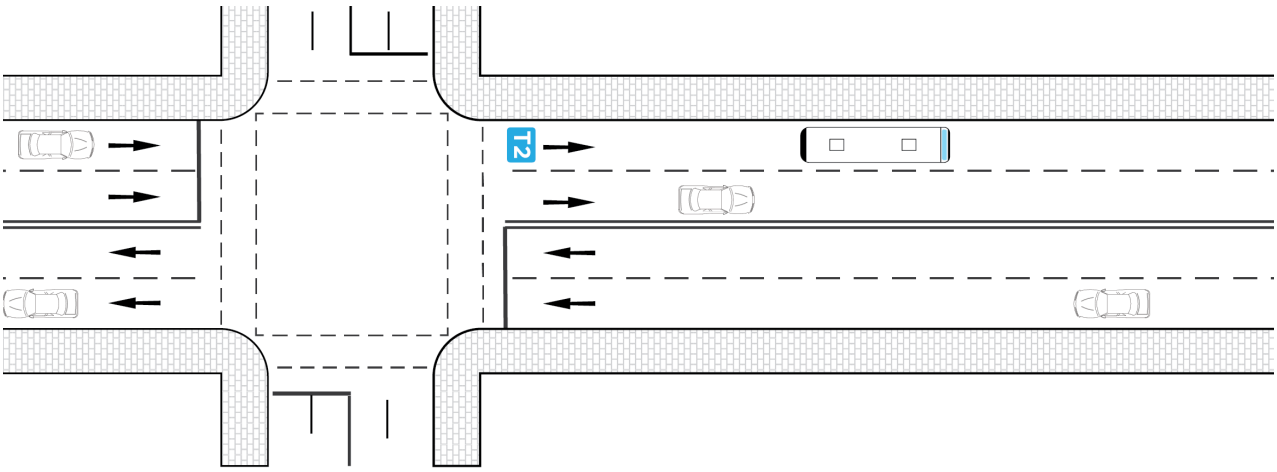

Figure 21. Schematic example of transit/high-occupancy vehicle lanes

Benefits

- Provides a lower level of priority for buses that is shared with high-occupancy vehicles such as trucks and cars with two or more passengers
- Incentivises higher occupancy of private vehicles through carpooling
- Suitable in situations where there is flowing traffic in adjacent traffic lanes and only low levels of priority for buses are required

Considerations

- Not used where the volume of high-occupancy vehicles and trucks using the lane would cause delays to bus movements
- Lower priority for buses compared to bus or bus-only lanes
- Transitioning transit lanes to bus lanes can be difficult as adjoining general traffic lanes may become saturated with little capacity to accommodate high-occupancy vehicles when higher order priority for buses is required. Therefore, transit lanes are not suitable where future growth in general traffic is anticipated.
- Relies on strict enforcement and compliance to be effective

Example

- William Street, Darlinghurst

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	
Frequent	X
Local	X
On-demand	

D1 - Bus-only street/transit mall

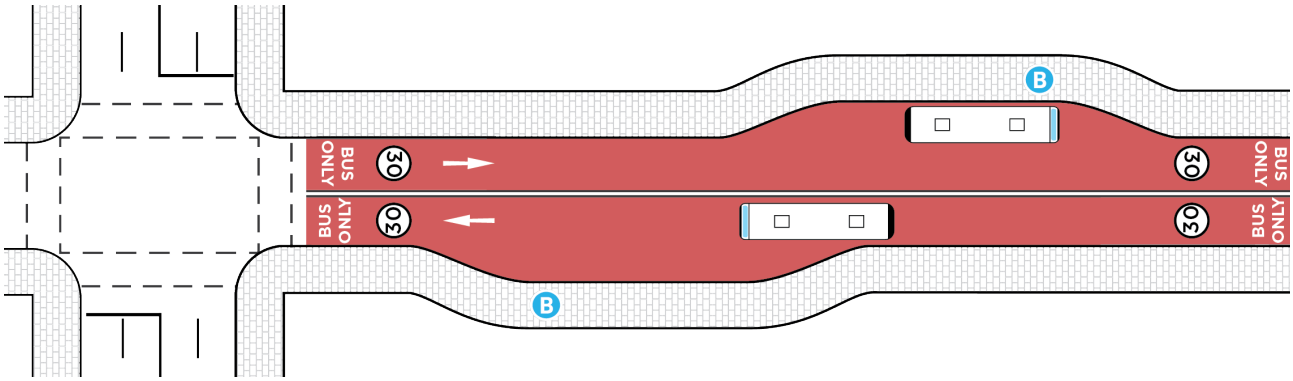

Figure 22.Schematic example of bus-only street/transit mall

Benefits

- Provides bus priority for high frequency bus routes through areas of high pedestrian activity
- Reserving the carriageway for buses only allows more space for walking movement in high pedestrian activity areas

Considerations

- Relies on clear signage and strict enforcement to ensure effectiveness of this bus priority measure
- Requires low speed limits for buses to reduce conflict with people and to support amenity of high pedestrian activity environment, especially people crossing the street

Example

- Oxford Street, Bondi Junction
- Manners Street, Wellington, New Zealand

Movement and Place Classification	Suitable
Main Road	
Main Street	
Local Street	X
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	X

D2 - Bus gate

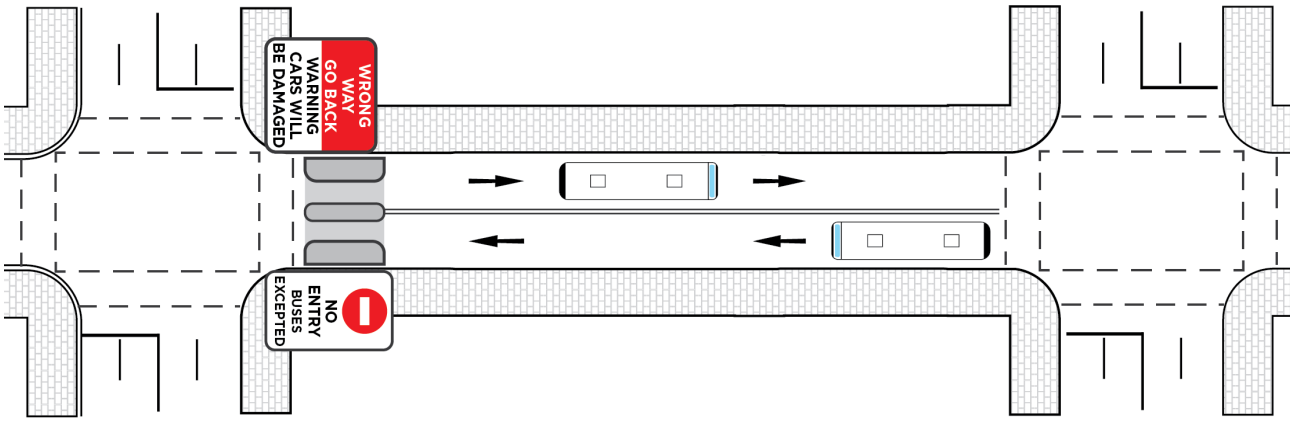

Figure 23. Schematic example of bus gate

Benefits

- Provides short section of a street for buses
- Allows buses to bypass general traffic or cut through a street block to shorten journey times and increase connectivity by taking a more direct route

Considerations

- 'Bus gate' is not an official traffic control device in NSW so this priority measure would effectively be a short section of a bus or bus-only lane.
- Relies on clear signage and strict enforcement (preferably using CCTV) to ensure effectiveness of this bus priority measure

Example

- Australia Road-Carter Road Link, Menai
- Rawson Place, Haymarket
- Holker Street, Sydney Olympic Park
- Reconciliation Rise, Pemulwuy
- Chiswick Road, South Granville

Movement and Place Classification	Suitable
Main Road	
Main Street	X
Local Street	X
Civic Space	X

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

E1 - Kerb extension (kerb outstand or bus bulb)

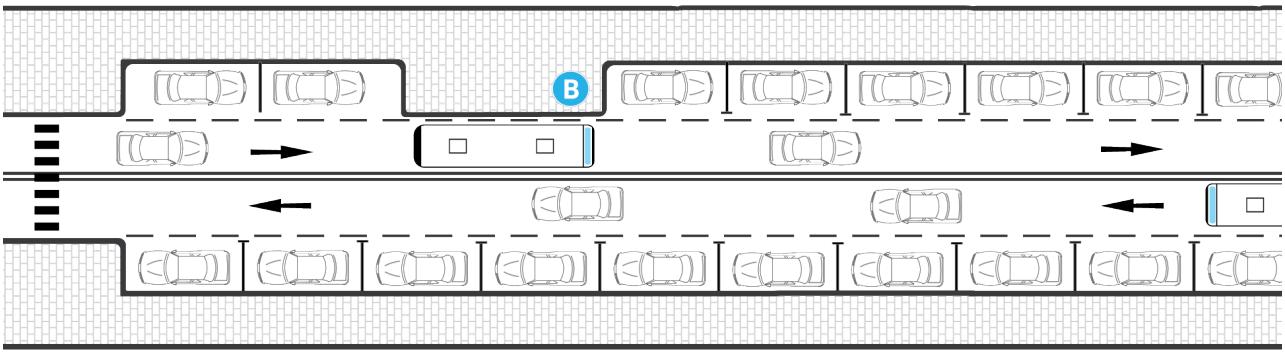

Figure 24. Schematic example of kerb buildout

Benefits

- Prioritises bus movements by making passenger boarding quicker and reducing dwell times as buses do not have to pull into a stop and pull out into general traffic
- Provides more space on the footpath for waiting passengers and acts as a traffic calming measure
- Makes boarding easier for passengers as buses can stop very close to the kerb line.

Considerations

- Not suitable where bus frequency or dwell times will cause delay to following buses
- Requires lower speed environments (e.g. 50 km/h speed limit or less) so that stopping buses do not abruptly stop high-speed trailing traffic

Example

- Bourke Road, Alexandria
- Crown Street, Surry Hills

Movement and Place Classification	Suitable
Main Road	
Main Street	X
Local Street	X
Civic Space	X

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	

E2 - Indented bus bay

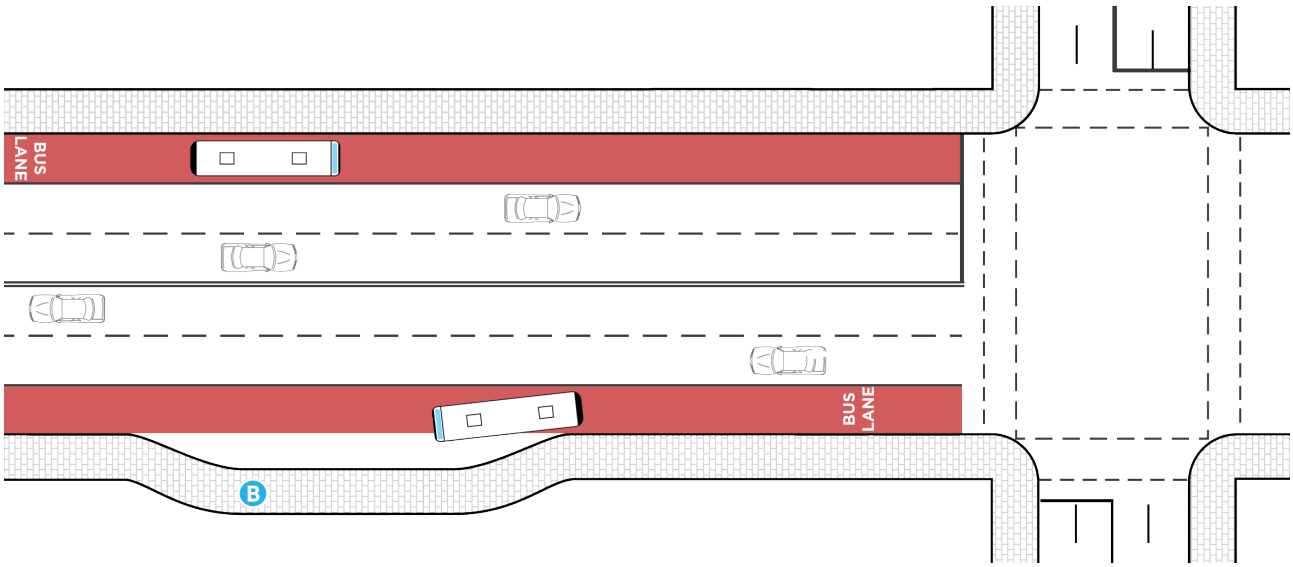

Figure 25. Schematic example of indented bus bay

Benefits

- Provides space for buses to stop next to a bus or bus-only lane without delaying trailing buses on roads with a high frequency of buses
- Locating an indented bus bay on the departure side of a signalised intersection allows stopping buses to not obstruct trailing buses going straight, and avoids holding up a B-signal or green light for buses on the approach side.
- Useful for frequent buses or local buses that share part of a corridor with Rapid/frequent buses to stop while allowing trailing Rapid buses to travel through (due to longer stop spacing)

Considerations

- Requires a bus or bus-only lane adjacent to the stop so that buses can turn out without being delayed by general traffic
- Suitable for high-speed environments (e.g. 70 km/h speed limit or over) where a standard kerbside (online) bus stop would cause safety issues by stopping high speed trailing general traffic
- May result in localised narrowing of footpath and other public domain changes

Example

- Windsor Road, Baulkam Hills

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	

E3 - Bus layover positioning

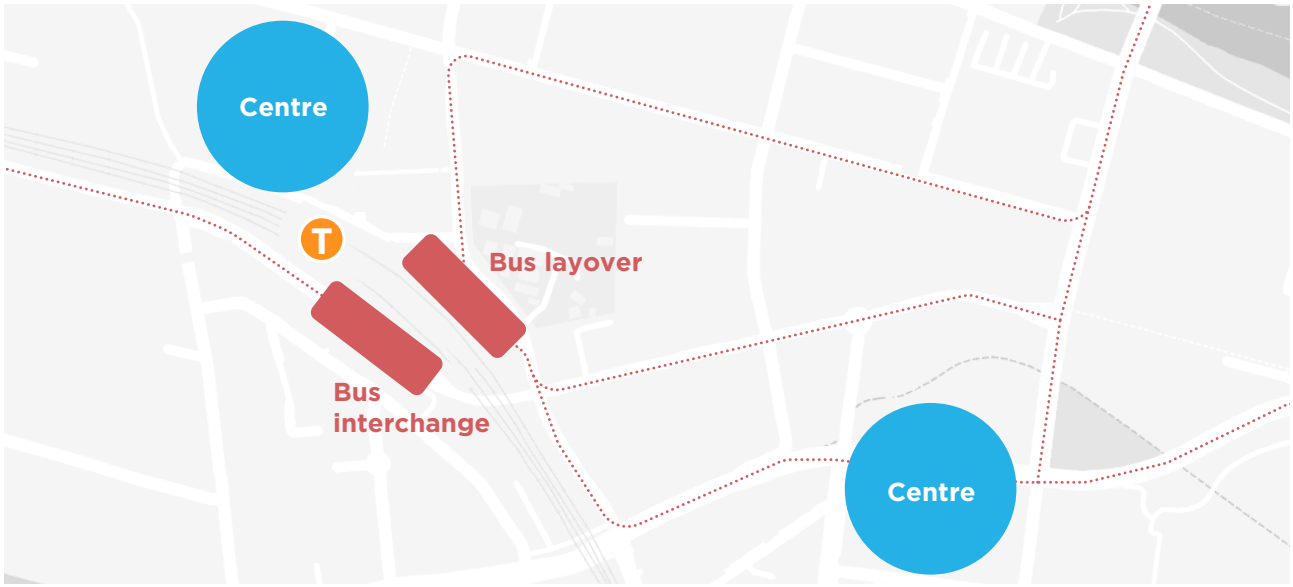

Figure 26. Illustration of bus layover positioning

Benefits

- Placing sufficiently-sized bus layovers near the start/end of an agglomeration of bus routes (e.g. bus interchanges) increases bus reliability by minimising dead running time and avoiding potential congestion leading to a centre

Considerations

- Requires consideration of bus service rationalisation opportunity, minimising circulation of empty buses and the function of adjacent land uses to avoid oversizing bus layover on valuable urban land or road space.
- Requires support by infrastructure to discourage inappropriate walking access (e.g. walking between parked buses)
- Requires clear customer information and wayfinding to help customers safely navigate to the interchange

Example

- Parramatta Transit Hub, Parramatta

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	X
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	X

E4 - Bus stop rationalisation

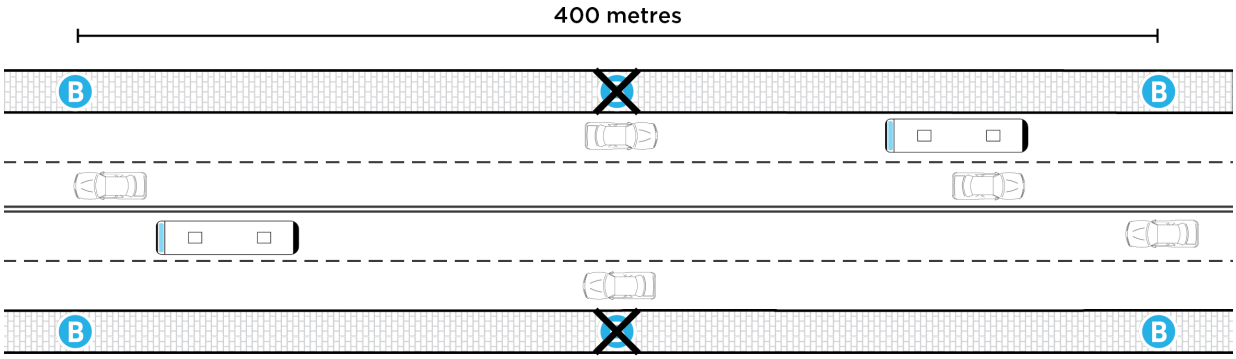

Figure 27. Bus stop spacing by bus network hierarchy

Benefits

- Reduces journey times and increases reliability by reducing the number of times a Rapid service stops and the associated dwell times. This rationalisation helps facilitate fast and direct bus routes for longer distance cross-city travel.
- Ensures local accessibility to bus stops and connectivity to the public transport network by retaining stop spacing of around 400 m for Frequent, Local and On-demand service

Considerations

- While stop spacing of at least one kilometre for Rapid routes is recommended to the greatest extent possible, consideration of local accessibility needs is important to ensure access to key land uses is not overlooked

Examples

- Willoughby Street near Park Street, Epping
- Salisbury Road, Stanmore

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	X
Civic Space	X

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	

F1 - Bus queue jumps and banned turn exemptions

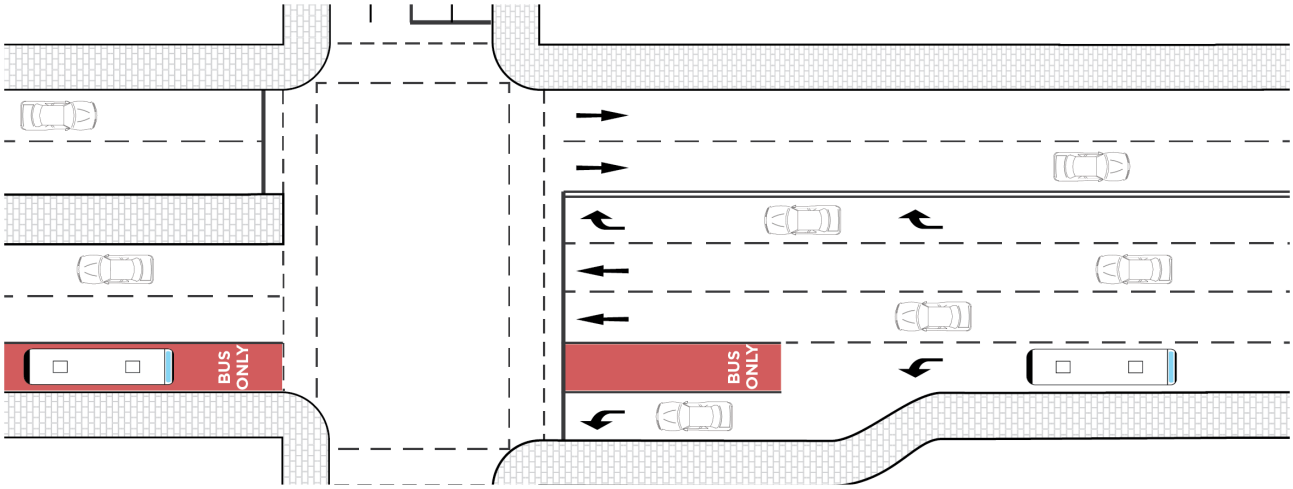

Figure 28. Schematic example of bus queue jumps and banned turn exemptions

Benefits

- Gives an opportunity for buses to skip general traffic queues
- Gives buses a head start over general traffic at the intersection when combined with bus signals (e.g. B-signal)

Considerations

- At locations with high traffic volumes going straight or making a turn, there may be queuing across the bus queue jump lane, preventing buses from accessing it and negating any time-saving benefits
- Requires continuous bus lanes and selective vehicle detection (see 4.2.3.19). Time-saving benefits are marginal when implemented in isolation due to general traffic queuing over the bus queue jump in congested conditions
- Stops located on the departure-side of the intersection negates most of the benefits of the queue-jump. Best used with approach-side stops, or on sections of the route without stops.

Examples

- Epping Road, Lane Cove
- Pittwater Road, Dee Why

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	X
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	

F2 - PTIPS and SCATS activated signal priority (selective vehicle detection)

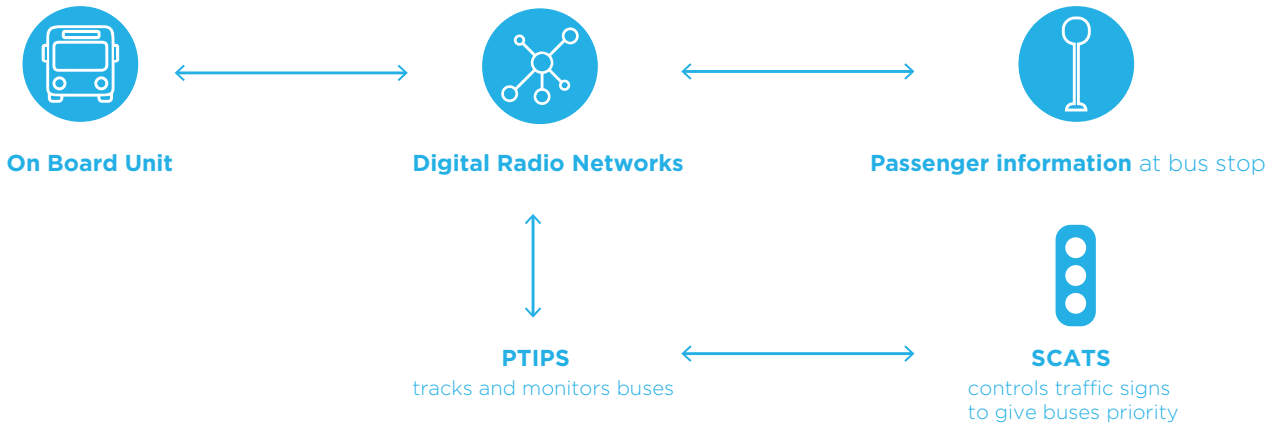

Figure 29. Schematic illustration of PTIPS and SCATS activated signal priority

Benefits

- Allows traffic signals to give buses a green light as it approaches the intersection, reducing intersection delays and keeping buses moving using the Public Transport Information and Priority System (PTIPS) and the Sydney Coordinated Adaptive Traffic System (SCATS)
- Can be implemented in conjunction with bus queue jumps and continuous bus lanes to provide a high degree of priority and seamless movement for buses
- Can be implemented to prioritise customers going to/from bus stops to reduce wait time

Considerations

- Requires bus fleet servicing Rapid and frequent bus routes and the traffic signals on roads plied by these routes to be equipped with this technology. E.g. expanding the use of linking PTIPS and SCATS technology
- PTIPS and SCATS activated signal priority coverage to be expanded to support greater extent of Rapid and frequent bus routes.
- PTIPS is only activated when the bus is running behind schedule

Example

- Along B-Line corridor, Sydney

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	X
Civic Space	X

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	
On-demand	

P1 - Pre-signals (pilot concept – subject to further investigation)

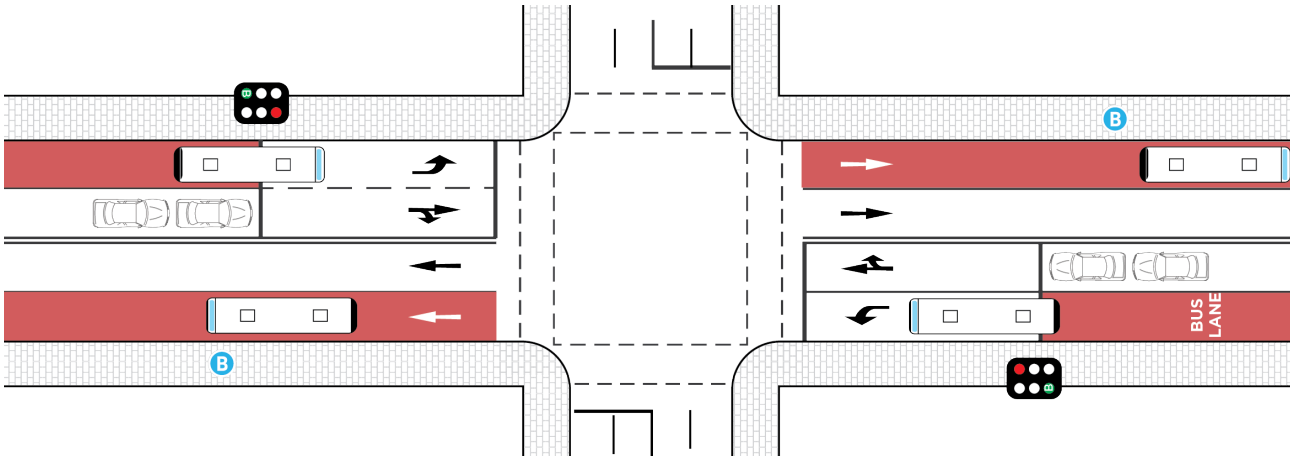

Figure 30. Schematic example of pre-signals

Benefits

- Provides additional signals placed upstream of signalised intersections
- Prioritises buses by allowing them to bypass general traffic.
- Useful for prioritising straight-moving buses ahead of left-turning general traffic that would otherwise conflict with buses
- Useful for constrained road environments where continuous bus priority is not possible; pre-signals allow buses to bypass general traffic at a point where a bus lane disappears before re-entering a bus lane further downstream

Considerations

- Requires further investigation, including benefits of applying pre-signals versus using alternative routes which could avoid pre-signals, as pre-signals usage in Australia is limited
- Safety concerns for people attempting to cross the street at the pre-signal

Example

- Langstrasse, Zurich, Switzerland

Movement and Place Classification	Suitable
Main Road	X
Main Street	X
Local Street	X
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	
Frequent	X
Local	X
On-demand	

P2 - Bus priority filtered street (four lane carriageway) (pilot concept – subject to further investigation)

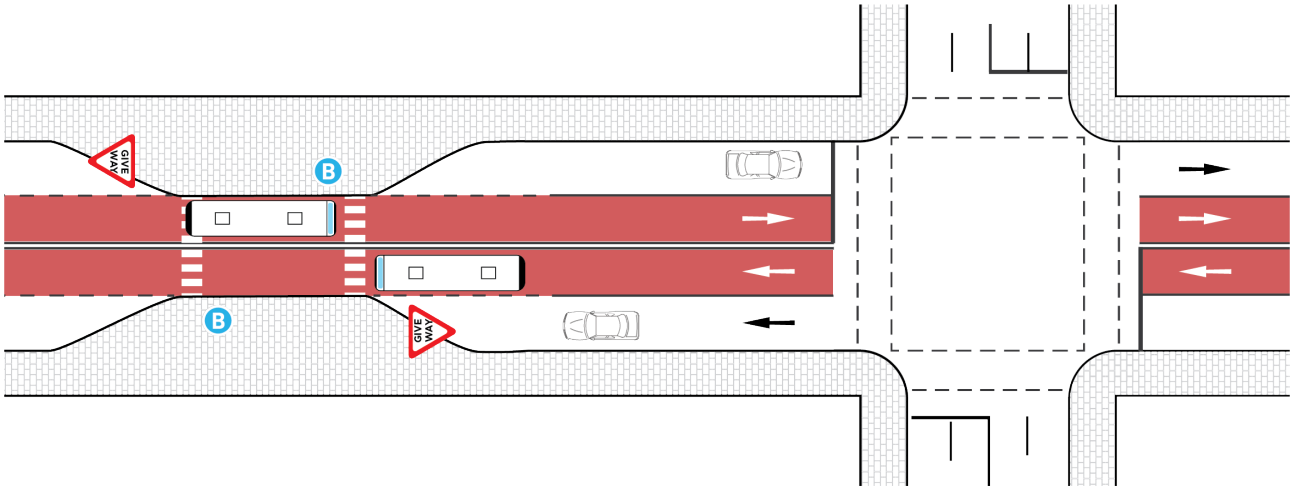

Figure 31. Schematic example of bus priority filtered street

Benefits

- High degree of bus priority while discouraging through traffic at narrow pinch points at bus stops through the use of bus bulbs (E1)
- Allows more space for people movement in high pedestrian activity areas
- Reduces conflicts with left-turning vehicles and illegally parked vehicles
- Provides good urban amenity by moving buses further away from the place function
- Increases safety as the road is more legible and faster buses are in the centre where they are expected

Considerations

- Requires further investigation on suitability to NSW (particularly signage conflicts and legalities)
- Requires clear signage and strict enforcement to ensure effectiveness
- Requires accompanying signage and marking following bus lane removal at the kerb build-out and bus lane resumption, which may result in signage clutter and driver confusion
- Suitable for streets with low traffic volumes otherwise it would result in queuing of general traffic onto bus lanes
- Considers traffic calming devices on general traffic lanes approaching the bus stop to discourage cars speeding up to travel in front of a stopping bus
- Potential conflict with people cycling where they use the bus lane

Example

- Avenue Raymond Queudet, Lorient, France

Movement and Place Classification	Suitable
Main Road	
Main Street	X
Local Street	
Civic Space	

Bus Network Hierarchy	Suitable
Rapid	X
Frequent	X
Local	X
On-demand	

4.2.1 Step 5 – Evaluate the preliminary bus priority design

After having reached an outcome or series of outcomes following the preceding four steps, it is important to re-examine those potential outcomes to ensure customer needs are met following the Future Transport 2056 customer outcomes that are important to bus customers: safety; time; system and efficiency; reliability; and convenience. Achieving these outcomes would address some of the challenges identified in Section 2.

Before finalising a strategic or concept design, practitioners are advised to apply the following evaluation criteria to evaluate whether the selected preliminary bus priority design would meet these important customer needs. Practitioners must also consider interfaces with other customer groups such as people walking and cycling.

These criteria could be used in a multi-criteria analysis or similar type of assessment to evaluate the effectiveness of a chosen bus priority design.

Involvement of the Transport for NSW is required in this evaluation step, both in terms of providing necessary customer and bus performance data; as well as ensuring designs are strategically and operationally appropriate, before progressing to the detailed design stage.

Figure 32.B-Line has been successful in increasing bus patronage (Transport for NSW)

Table 6: Design evaluation criteria

Customer outcome type	Specific criteria
Time and speed	• Improved end-to-end bus journey time • Equal or faster average travel speed compared to all traffic (for bus lanes) or faster average speed (for exclusive or segregated bus alignment) for any given road segment • Increased directness as much as possible, as measured by a directness ratio (length of bus route divided by shortest road distance): - Rapid/Frequent – 1.0 - Local – 1.25 to 1.75
System and efficiency	• Increased number of passengers served with the same amount of, or fewer buses • Increased number of passengers served with the same amount of, or reduced bus service hours/kilometres
Reliability	• Improved bus reliability, as measured by the on-time performance impact on a passenger basis i.e. measuring the lateness of the bus at each stop, multiplied by the number of passengers alighting at that stop. This should be calculated per route
Convenience	• Enablement of improved bus service frequency
Safety	• Improved safety for: - people walking to and from a bus stop - people walking, cycling or driving near bus priority infrastructure - people interchanging between services
Supporting place	• Better support for land use adjacent to the bus infrastructure • Enablement of further uplift of adjacent or nearby land uses
Mode shift	• Improved bus patronage
Environmental benefit	• Reduced emission from mode shift • Reduced emission from lower bus idle time and overall congestion

4.3 Additional considerations

For all bus priority designs chosen, the following additional design considerations are important for maximising customer benefits from bus priority.

1. Routes with extensive provision of roundabouts, speed bumps and other traffic calming devices are not ideal candidates for bus priority as these devices inhibit bus travel speeds and affect customer comfort.
2. Speed cushions can be an exception if they are designed well but they tend to still impact on bus travel speeds and customer comfort
3. Significant continuous links with low speed limits are also not ideal candidates for bus priority as the required slow operating speeds negate the travel time benefits from bus priority
4. The caveat to point 3 is that buses operating at slow speeds through low-speed, pedestrian-oriented environments are crucial for pedestrian and bus customer safety (e.g. through bus-only streets). However, extensive lengths of slow speed environments are recommended to be avoided.
5. Once a concept design is complete a road safety audit is recommended to be carried out to assess the location for any road safety risks for all road users. Mitigation measures should be applied So Far As Is Reasonably Practicable (SFAIRP) and in a time frame that aligns with the risk rating.
6. Information for detailed design of bus lanes is provided in the Transport Delineation Guide, AS 1742.12:2017 and other relevant Transport Supplements and Technical Directions.

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