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Guidelines for the Planning of Bus Layover Parking

Version 1



Transport
for NSW

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1 Introduction

Bus layover parking is a place where driver's park buses between services and may be situated on-street or off-street. The time a bus spends in a layover can vary from a few minutes to approximately an hour depending on the purpose of the layover. A layover may provide facilities for drivers, such as a meal room and toilet.

The location of bus layover parking, as well as the number of layover spaces at each location, has a direct impact on how the bus network is scheduled. The more options for layover the more efficient a network schedule can be.

As more buses are added to the network there is an increased demand for layover space. At the same time, development, deliveries and increasing traffic are competing for on-street space. Off-street layovers require dedicated land and facilities and may impact the livability and amenity of places as provided for in the Movement and Place framework.¹

Bus layover parking will need to be responsive to service delivery changes. Changes such as the introduction of on-demand services will impact traditional scheduling of recovery time and therefore layover requirements. The Guidelines for the Planning of Bus Layover Parking reflect the need to be responsive to service delivery changes.

1.1 Background

The provision of layover parking is essential in managing on-time running, as well as in managing the cost of service delivery. Layover allows for recovery time between services. In addition, appropriately located layover means that drivers can take their designated breaks close to their last stop and not have to travel back to the depot.

Ideally the location of layover parking would be determined by the bus network, with multiple options available to allow for future growth and changes in the network. However, existing bus layover parking arrangements have grown out of a number of ad hoc processes. Transport for NSW owns some land dedicated to off-street layover and the facilities located on it, such as Lee Street, Chippendale. Operators may own the land on which layover occurs or the land may be leased. On-street layover is provided at the discretion of council.

A number of layover arrangements have developed informally in the past, for example an organisation such as a university or shopping centre may have requested that bus services operate to that location. Transport for NSW or the bus operator may have agreed, provided the organisation could provide space for buses to layover. Often these informal arrangements are not documented and continue at the discretion of the organisation.

The need for layover is now recognised for major transport investments, such as interchanges. When an interchange is developed layover forms part of the considerations and negotiations. Thus the process for identifying bus layover parking is becoming more proactive and formal.

Layover parking has often been seen as an ongoing requirement with no review of arrangements. The introduction of the Future Transport Strategy and the delivery of responsive and innovative services mean the need for layover will evolve as transport delivery methods change. Bus layover parking requirements should be reviewed regularly and considered as part of all major transport development projects.

¹ Information on the Movement and Place framework is provided at Appendix 1

1.2 Purpose

The Guidelines for the Planning of Bus Layover Parking provide guidance to planners, operators, developers and traffic engineers across New South Wales to support the design and location of layovers, so that public transport can be successfully delivered now and into the future. The guidelines address the types of layover, design and location considerations and baseline information for calculating costs associated with layover.

The guidelines are intended for use by government agencies, local government, road authorities, as well as transport operators and developers and are for use across all of New South Wales.

1.3 Objectives of the guidelines

The objectives of the guidelines are to:

- define the strategic principles and policy context for layover
- define the types of bus layover
- provide guidance on design and location of layover
- future proof public transport provision

2 Strategic Principles

The strategic principles are common across all bus layover and provide an overarching framework for the performance of bus layover parking, with a focus on flexibility and adaptability to cater for future requirements. Further considerations may need to be made for individual sites. The policy context that guides the strategic principles can be found at Appendix 2.

2.1 The location of bus layover supports productive places

Bus layover is required where a service terminates, where recovery time is scheduled or where a meal break is scheduled. The location of bus layover can have a direct impact on the amenity, liveability and economic success of places.

The location of bus layover should support productive places. To this end locating layover outside of centres where compact form and walkability are key features should be considered. Where layover is located within a centre it should be located away from streets with high levels of active frontages and areas of pedestrian activity. Within centres options to minimise the footprint of the layover should be thoroughly investigated.

2.2 Layover is a function of service delivery

Bus layover exists to enable service delivery. The customer and service requirements should be established first, with bus layover requirements determined to enable service delivery.

Bus layover requirements need to be reviewed each time the bus network is reviewed. Layover planning is required under the contract and it is expected that layover requirements are reviewed each time a contract is renewed.

2.3 Layovers are flexible and adaptable for future requirements

The need for bus layover changes depending on changes to land use, increased demand for land in some areas and the changing nature of the bus network. While permanent layover may always be required in some locations layover should remain flexible and adaptable to change, as much as possible.

3 Planning and Delivery of Layover

3.1 Reasons for layover

Layover ranges from on-street with no facilities to off-street with dedicated facilities.

There are three reasons for layover and these will inform the type of layover required:

- **short term:** generally from 1 to 15 minutes between services, recovery time, access to facilities is advantageous, facilitates service reliability
- **meal breaks:** a minimum of 30 minutes for the purpose of the driver taking a rest break, facilities required, driver safety
- **stand by:** a place for stand by buses to wait until called into service, e.g. major events or headway services, facilitates service reliability and demand management

Buses may layover at bus stops or bus zones at commencement and termination stops only. Where considered necessary on-street bus layover parking can be provided at other locations with the use of appropriate Roads and Maritime Services signage². Alternatively off-street layover may be used. The need for bus layover may be temporary or permanent.

Traditionally off-street layover has been standalone but it is possible that a layover area could be part of a transport interchange or adjacent to a mixed-use facility where it shares space with other functions, such as housing, retail and offices.

3.2 When is layover required

Layover is necessary when a bus is required to dwell between services, either for recovery or meal breaks. Buses can layover at commencement and termination stops when this does not cause disruption to other services. Layover requirements should be considered when determining the length of the stop at commencement and termination stops.

When disruption may occur as a result of services laying over at a stop, alternate layover options are to be considered. On-street bus layover parking, with signage, is appropriate where sufficient space can be allocated to accommodate the number of buses likely to operate from the location and local amenity is not adversely affected. On-street layover should be minimised along streets with busy, active street frontages and best reflect the requirements of the location. Off-street layover is used where sufficient on-street layover cannot be provided or is not appropriate. Layover requirements may be met through a combination of on-street and off-street layover. Layover should make the most productive use of the space and this may change based on the day and the time of day.

Temporary layover may be required during major construction projects, for example when buses replace rail services during rail closures or on an ad hoc basis, such as special events.

² Refer to Roads and Maritime Services, Technical Direction TDT 2013/07 Bus Layover Parking, August 2013

3.3 Minimising layover in centres

It is desirable to minimise layover in centres, however, the requirement for movement needs to be considered alongside the amenity of a centre and an appropriate balance determined. The need for layover can be reduced by the way in which services are scheduled. Where it is undesirable to have services terminating in centres services can be scheduled with no recovery time. However this may impact the reliability of the service and may not be appropriate.

Services can be scheduled to through run at centres. Consideration needs to be given to the impact of through running. Factors to consider in determining whether through running is appropriate include:

- road network
- type of service
- service reliability
- service length
- operational cost
- potentially longer recovery time

Through running also needs to consider whether services are operating in a contra-peak direction for any part of the trip. The cost of running a contra-peak service with no passenger benefit, in order to layover at the terminating stop, may not be justifiable. For short term layover a number of smaller layover spaces constructed in multiple locations might be more advantageous than a single large layover at a centre.

3.4 Location of layover

The location of layover has a significant impact on service delivery. The location of layover compels service arrangements, influences service network design and impacts resources required to operate services. To determine the optimal location of layover and capacity requirements an un-constrained network design needs to be developed.

Bus network solutions are developed with known constraints taken into consideration, such as location of existing layover and number of layover spaces. An unconstrained solution will identify the optimal location of layover and the number of spaces required. From an unconstrained solution it is possible to identify options for layover and realistic solutions, and for the various solutions to be costed.

To ensure customer needs are met and innovative services are offered, the following factors should be considered when determining the location of layover.

- Layover location is to consider the service network and the impact the location may have on this:
 - aim to minimise bus circulation
 - what is the relationship to an interchange, if applicable
 - stand by layover needs to be in close proximity to the location it is serving
 - cost and efficiency

- In centres where layover is to be provided the following needs to be considered:
 - near side termination reduces bus circulation in the centre but may require customers to transfer to other transport services or walk further to their destination
 - far side termination may deliver more customers to their destination but increases bus circulation at the destination area
 - where on-street layover is used smaller layover in a number of locations may better support productive places
- Layover location must be safe and minimise the impact on traffic and pedestrian movements
- Within the layover safe walking routes must be provided for staff
- Layover location must be sensitive to local land use
- Bus are permitted to idle for two minutes, after which they are required to turn off their engines
- Layover location should consider future land use changes
- Layover may be funded by government funds, private developer contributions or a combination of both. When government funds are being invested the following should be considered:
 - opportunities to use government owned land
 - document the conditions of use of land, e.g. exclusive use and the term of the agreement
- New infrastructure projects are to consider bus layover, include a layover plan and identify layover for meal breaks within close proximity of the project if buses terminate here
- Selection of suitable layover locations should also consider access to existing facilities (such as toilets, food outlets) to help minimise cost and improve functionality

3.5 Calculating capacity requirements

The capacity of layover, as with the location, compels service arrangements, influences service network design and impacts resources required to operate services. In order to calculate the optimal location and capacity requirements for layover an unconstrained network solution needs to be developed. Once an unconstrained solution is developed it is possible to introduce known constraints to the network. As a general rule, the more constraints that are added to a network the greater the compromise to the network.

Layover capacity requirements can be expressed as:

$$\text{Capacity requirement} = \text{no. of buses scheduled to arrive} - \text{available bus stops}$$

Capacity requirement = capacity calculated for the peak 1 hour at the location

Scheduled to arrive = needs to incorporate average dwell time of buses at the stop

4 Off-Street Layover

4.1 Lifecycle of a layover

From the time an off-street layover facility is proposed to when it is no longer in use there are a number of stages. It is important to be aware of the stages as there is a cost to each component that needs to be considered when calculating the cost of layover:

- inception – the need for layover is identified, various options may be considered and detailed design developed
- development – the layover space is developed and may include the cost of purchasing property or construction of assets
- operation – the cost of operating and maintaining a layover
- decommissioning – the costs associated with returning the land to its original condition

4.2 Configuration

There are a number of different options for how off-street bus layover can be configured. The layout should be determined by the available land and integration with surrounding infrastructure. The configuration of the layover needs to take into account the location of access and egress points and the street interface management at these points.

The configuration of off-street bus layover needs to allow for the safe movement of buses and people. The following lane widths are required to allow a bus to operate safely and efficiently:

- minimum 3.5m lane widths are desirable for all traffic movement
- minimum 3.2m lane widths can be used in multiple lane 50km zone, provided there are no obstructions between lanes, e.g. median strips

Bus layover parking may operate as a two way road or a one way road with either a clockwise loop or anti-clockwise loop. Within the layover buses may park in various configurations.

4.2.1 Parallel parking

Parallel parking, where vehicles are parked parallel to the road, is also known as nose to tail parking or front to rear parking. A clear distance of 6m should be allowed between buses to accommodate draw in and draw out lengths.

Parallel parking can be configured:

- lengthwise with a running lane and parking on one side
- lengthwise with a central running lane and parking on both sides³

The decision on configuration is generally based on the available land size and the number of buses to be accommodated.

4.2.2 Angle parking

Angle parking, where vehicles park at an angle generally of 45°, is also known as diagonal or sawtooth parking. Sufficient space is required for buses to be able to safely enter, exit and pass parked buses within the layover, when all spaces are occupied.

³ See example of Warringah Freeway Bus Layover, Cammeray, Appendix 4

Angle parking can be configured:

- Front in to kerb
- Back in to kerb
- Central, single row, with running lanes on the sides⁴
- Central, double row, with running lanes on the sides⁵

Angle parking provides more parking spaces than parallel parking but is dependent on sufficient road width being available. Back in to kerb angle parking is considered to improve safety as drivers have an unobstructed view of traffic and can enter the traffic stream directly.

4.2.3 Perpendicular parking

Perpendicular parking is where vehicles are parked side to side, perpendicular to an aisle or curb. Perpendicular parking can be configured in the same way as angle parking. Parking at 90° provides the most number of parking spots, however the greater the angle, the greater the road width needed.

4.3 Documenting existing layover

Off-street bus layover can be documented using the table at Appendix 3, Audit of Bus Layover. Undertaking an audit of bus layover will ensure that layover is documented and reviewed on a regular basis.

Documenting assets will identify:

- location of layovers, to support future planning
- whether arrangements are formal or informal, to identify potential risks
- land and asset ownership
- available capacity

Layover data documented in this manner can be captured by Transport for NSW in GIS format.

4.4 Calculating the cost of off-street layover

In some areas the increasing demand for land and the changing nature of the urban environment raises the issue of relocating bus layover parking. The cost of establishing or relocating a layover needs to consider capital and operational costs of the facility, as well as ongoing bus operational costs. The life cycle of a layover involves its inception, development, operation and potentially decommissioning. There are both capital and operational costs associated with layover. The following factors need to be considered when establishing or relocating a layover.

In addition it is important to understand who will be responsible for negotiating the terms of the layover. The layover may be negotiated by the operator under the terms of the contract or Transport for NSW may be responsible for setting up the layover.

⁴ See example of Sydney Railway Square, Regent Street, Appendix 4

⁵ See example of Canberra City bus layover, Marcus Clarke Street, Appendix 4

4.4.1 Capital costs

When calculating capital costs the following costs need to be considered, if appropriate:

- design development
- land acquisition
- construction and set up costs, including enabling works such as bus priority measures
- decommissioning

4.4.2 Operational costs

When calculating operational costs the following costs need to be considered, if appropriate:

- rent
- land maintenance
- asset maintenance
- operating costs, utilities, etc.

These costs need to be compared to the cost of not providing layover, for example if all buses return to the depot for meal breaks. Not providing layover may result in additional contract costs, both capital and operational.

4.4.3 Bus capital and operational costs

- cost of total additional annual kilometres and hours that buses are required to run to and from the new layover (dead running cost)
- cost of additional buses that may need to be purchased to deliver existing timetabled services, due to increase in dead running cost

4.4.4 Calculating the cost of layover

The cost of layover can be expressed as:

$$\text{Layover cost} = \text{capital cost} + \text{operating cost} + \text{dead running cost}$$

Dead running cost can be calculated on a per annum (pa) basis using the following formula:

$$\text{Dead running cost} = (\text{distance} \times \text{km rate}) + (\text{time} \times \text{hr rate}) \text{ per service} \times \text{trips pa}$$

distance	=	distance from last stop to the layover + distance from the layover to the first stop
time	=	time allowed to travel from the last stop to the layover + time from the layover to the first stop, generally a set period of time
per service	=	identify and calculate for every service required to undertake the trip across the timetable
trips pa	=	by the number of trips for the full year, e.g. if the timetable is weekly multiply by 52.2 weeks. To achieve a more accurate cost calculation the day type will need to also be calculated, e.g. weekday, Saturday, Sunday

4.5 Maximising use of layover

Where dedicated off-street layover exists consideration needs to be given to maximising the use of this asset. Buses can overnight at layovers, as an overflow depot, provided appropriate security is in place.

Buses will need to return to the depot during the day to refuel, be cleaned and download data; however this does not need to occur at the end of the day. Buses overnigting at off-street layover could be scheduled to return to the depot for meal breaks, thus reducing the need for layover space and better utilising the depot during the day.

5 On-Street Layover

5.1 Calculating on-street layover length requirements

Where considered necessary on-street bus layover parking can be provided at locations other than the bus stop with the use of appropriate Roads and Maritime signage. The length of the bus layover parking to be provided should be decided based on the number of buses likely to operate from the location. Similarly, the route commencement or termination bus stop or bus zone length should also consider the likely demand for layover.

The minimum lengths for draw in and draw out are shown in the table below. These lengths need to be factored into requirements.

Minimum Bus Draw In and Draw Out Lengths				
Type of bus	Length (metres)	Min. draw-in length (metres)	Min. draw-out length (metres)	Length for one bus (metres)
Standard (inc double decker)	12.5	11.5	6.0	30.0
Long Rigid	14.5	14.0	6.5	35.0
Articulated	18.0	14.0	8.0	40.0

Where a bus interchange has terminating services, dedicated layover stands should be considered, so that buses can layover between trips and not impact the function of the bus interchange.

6 References

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7 Glossary

bus layover	Where drivers park buses and prepare services between journeys
bus stop	A place where public buses stop to pick up or set down passengers
contra-peak	Refers to public transport services running in the opposite direction to the direction of the highest passenger volumes
dead running	Running out of service, unavailable for passengers
far side termination	Buses travel through the centre and terminate on the opposite side of the centre
layover	A scheduled break for driver and vehicle between trips, and the recovery time scheduled to ensure on-time departure.
layover parking	A place to park buses during scheduled breaks, between services and during scheduled recovery time
meal break	National driving hour regulations require bus drivers to have minimum periods of rest based on the number of hours they are working – these are generally referred to as meal breaks and most bus driver awards require a minimum of 30 minutes in order to be classified as an unpaid meal break.
near side termination	Buses terminate just inside the centre, rather than travelling through congested streets to terminate on the opposite side of the centre
recovery time	A planned time allowance between the arrival time of a trip and the departure time of the next trip to allow the service to return to schedule if traffic, loading or other conditions have made the trip arrive late
sensitive receptors	Areas where the occupants are more susceptible to the adverse effects of exposure to pollutants. Sensitive receptors include, but are not limited to, hospitals, schools, day-care facilities, housing for the elderly and convalescent facilities.
stand by bus	A bus located strategically to be immediately called into service to ‘work as directed’. Generally associated with major events.
through running	Services travelling into centres continue through the centre and out again as a different route or as an extension to an existing route. This negates the need for layover in centres

Appendix 1 – Movement and Place Framework

The following is an extract from Future Transport Strategy 2056.

Successful Places

The liveability, amenity and economic success of communities and places are enhanced by transport.

Activating centres with a new Movement and Place framework

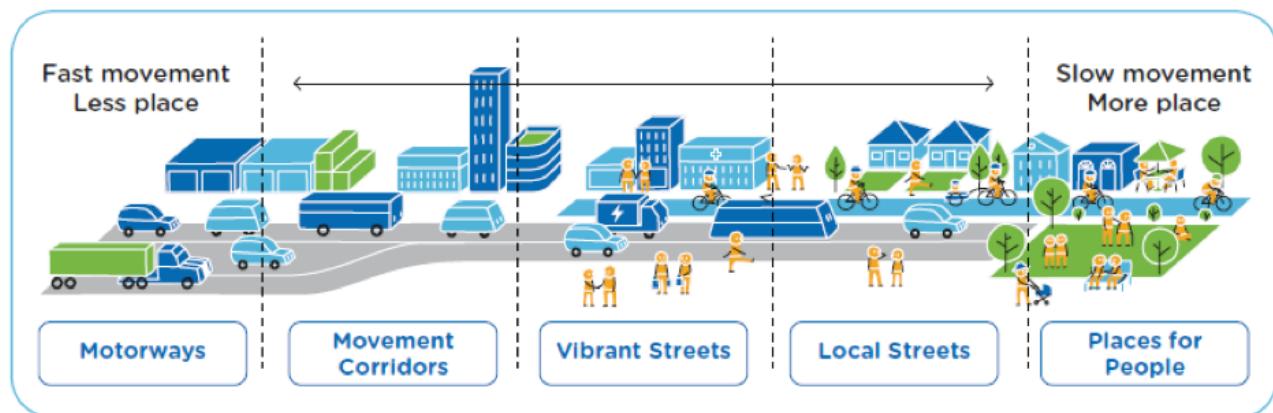
Successful places include attractive spaces where people can meet and enjoy their leisure time, such as town squares, libraries and community centres, parks, sportsgrounds and waterways. Being able to access these spaces easily by active or public transport encourages people to be more physically active and increases social interactions in communities.

Centres, both in metropolitan and regional areas, are the places where the majority of jobs and services are located as well as attractions like shops, restaurants and parks. Roads through and around these centres serve an important movement purpose, allowing people travel to and from the centre and move around easily within it. They also serve a place function by operating in a way that allows attractive places for people and strong local economies to develop and thrive.

The Movement and Place framework provides a tool to manage the road network in a way that supports safe, efficient and reliable journeys for people and freight while enhancing the liveability and amenity of places.

The Framework will guide specific corridor and place plans to be developed as supporting plans of Future Transport 2056. A Movement and Place Practitioners Toolkit will be made available to provide guidance to stakeholders involved in planning, designing and operating the road network.

Figure 1: Movement and place



Source: Future Transport Strategy 2056

Appendix 2 – Policy Context

The following policies and guidelines need to be considered in planning for bus layover parking.

Policies and Guidelines Applicable to Bus Layover Parking	
Document	Description
NSW State Priorities	There are 18 state priorities being actioned by the NSW Government. Building infrastructure – Improving road travel reliability is one of these priorities.
Future Transport Strategy 2056	The strategy, released March 2018, is the refresh of the Long Term Transport Master Plan. Future Transport will be a suite of policies, strategies and guidelines which will provide an innovative and contemporary guide for the NSW Government's transport response to change over the next 40 years.
TfNSW Disability Action Plan 2012 – 2017 / TfNSW Disability Inclusion Action Plan 20017 – 2021 Consultation Draft	Plans to ensure that the needs of the customer, including those with a disability or limited mobility, are placed at the centre of planning and decision-making for the transport system.
Integrated Public Transport Service Planning Guidelines Sydney Metropolitan Area	<p>Provide guidance for service planning activities in the Sydney Metropolitan area to support the implementation of state government policy. The guidelines align with the actions of the NSW Long Term Transport Master Plan and individual modal delivery plans for bus, ferry, light rail and train.</p> <p>The Guidelines were published December 2013 and support improvements to services in the area over the short to medium term (up to ten years).</p> <p>Of particular note are the Service Coverage Guidelines that support the development of a connected and integrated public transport network that facilitates travel opportunities to meet the needs of different customer groups.</p>
Integrated Public Transport Service Planning Guidelines Outer Metropolitan Area	<p>Provide guidance for service planning activities in the Outer Metropolitan area to support the implementation of state government policy. The guidelines align with the actions of the NSW Long Term Transport Master Plan, individual modal delivery plans for bus, ferry, light rail and train and Regional Transport Plans.</p> <p>The Guidelines were published June 2016 and support improvements to services in the area over the short to medium term (up to ten years).</p> <p>Of particular note are the Service Coverage Guidelines that support the development of a connected and integrated public transport network that facilitates travel opportunities to meet the needs of different customer groups.</p>

Policies and Guidelines Applicable to Bus Layover Parking

Document	Description
Public Transport Service Planning Guidelines Rural and Regional NSW	<p>Provide guidance for service planning activities in Rural and Regional NSW to support the implementation of state government policy. The guidelines align with the actions of the NSW Long Term Transport Master Plan and individual modal delivery plans for bus, government funded coach and train and Regional Transport Plans.</p> <p>The Guidelines were published October 2015 and support improvements to services in the area over the short to medium term (up to ten years).</p> <p>Of particular note are the Service Coverage Guidelines that support the development of a connected and integrated public transport network that facilitates travel opportunities to meet the needs of different customer groups and the Rural and Regional Service Planning Process.</p>
NSW Road Safety Strategy 2012 – 2021	<p>The NSW Road Safety Strategy 2012 – 2021 establishes the direction of road safety in NSW for the next ten years. The strategy sets out the safe system approach with the end goal of no death or serious injury occurring on the road transport network.</p>
Local council guidelines	Bus layovers should comply with relevant local council guidelines.

Appendix 3 – Audit of Bus Layover

	Location 1 (name)	Location 2
Location	Description of location and hard copy map	Add locations as required
Operation	Hours of Operation (restricted – state hours / unrestricted)	
	Bus capacity	
	Operators using the layover	
	Routes using the layover	
	Distance from terminating stop	
	Depot of origin	

Audit of Bus Layover continued

		Location 1 (name)		Location 2		
Asset & Maintenance	Land ownership					
	Land use arrangements (owned / leased, inc exp date / informal, paid or unpaid)					
	Facilities (no / shared / DDF)					
	Asset 1 / Ownership/Maintenance	Toilet	TfNSW	Operator X	Meal room and toilet	City of Ryde
	Asset 2 / Ownership/Maintenance					
	Asset 3 / Ownership/Maintenance					
	Asset 4 / Ownership/Maintenance					
	Asset 5 / Ownership/Maintenance					

Appendix 4 – Bus Layover Diagrams

The following diagrams show examples of bus layover parking. All sites have separate access and egress points. Lengthwise sites have been found to allow for a greater number of bus spaces.

Layover sites	Bus spaces	Surface area (sqm)	~ sqm / bus space	Spaces arrangement
Sydney railway square Regent Street	23	5800	252	square/central with running lanes on the sides
Canberra Marcus Clarke St	12	2500	208	square/central with running lanes on the sides
Warringah Freeway Bus Layover – Cammeray, NSW	30	3100	103	lengthwise with central running lane
Blacktown bus interchange	9	1000	111	lengthwise with central running lane

Source: AECOM, Macquarie University Interchange Bus layover analysis, AECOM, 2017

Figure 2: Sydney Railway Square, Regent Street



Figure 3: Canberra City bus layover, Marcus Clarke Street

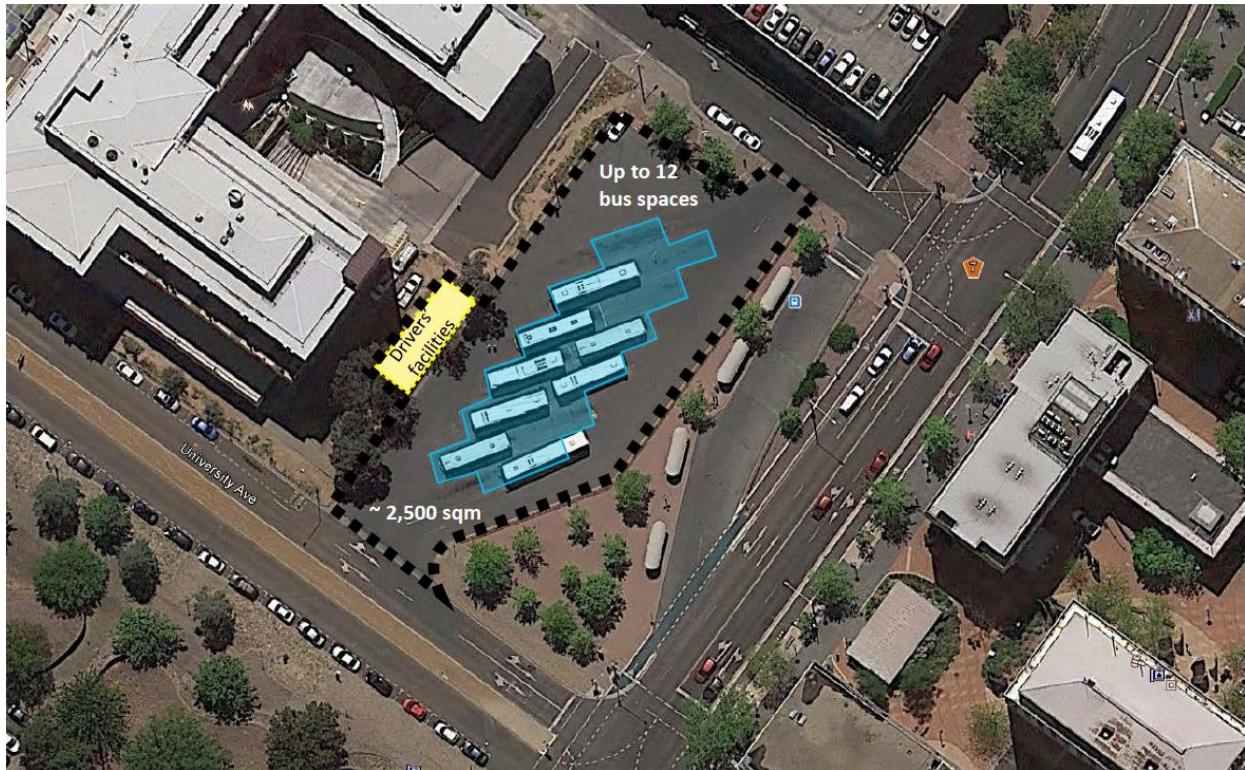


Figure 4: Warringah Freeway Bus Layover, Cammeray

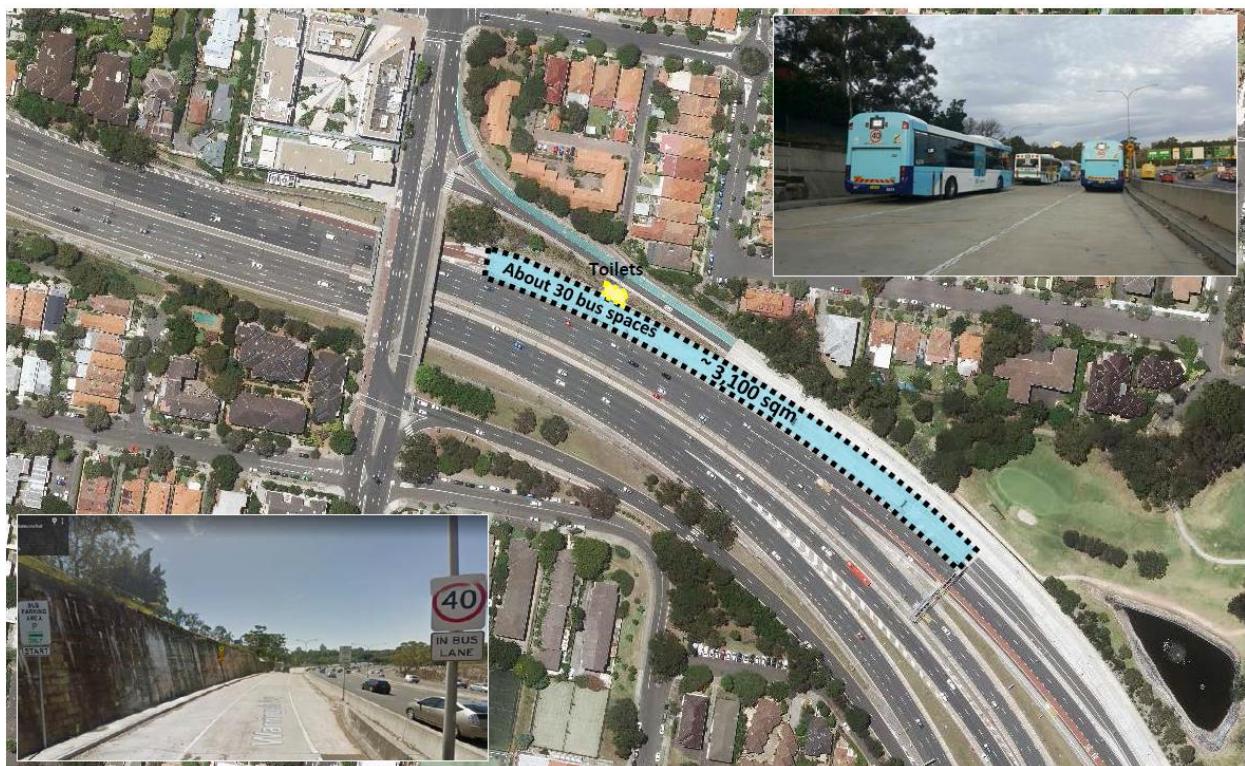


Figure 5: Blacktown Bus Interchange

