Bicycles and bus lanes

Purpose

This note aims to raise awareness of the policy, design and management issues associated with bicycles travelling in bus lanes and other High Occupancy Vehicle (HOV) lanes.

Definitions

Bus lanes are traffic lanes reserved solely for the use of buses, bicycles, taxis, limousines, emergency vehicles and any other vehicles turning within 100m of an intersection, regardless of occupancy.

HOV lanes (sometimes referred to as transit lanes) are physically and operationally similar to bus lanes. In addition to the above users, they may also be used by cars carrying the appropriate number of occupants. Cars in T_2 lanes must carry two or more persons; cars in T_3 lanes require three or more persons. Buses, taxis, limousines, motorcycles, bicycles, emergency vehicles and any vehicle turning within 100m of an intersection are allowed in HOV lanes regardless of occupancy.

Busways are usually segregated facilities that give priority movement to buses.

Principles

A dedicated bicycle lane is generally preferred for on-road cycling. A shared lane is the next best option.

Bus lanes and HOV lanes, like on-road and off-road bicycle facilities, promote more sustainable transport modes. Bicycle riders can legally use these facilities so their needs should be considered in the planning, design and funding of all bus lane and HOV lane projects. Design that delivers greater priority to one mode of transport should not constrain, prohibit or reduce the safety of other modes, such as cycling. Many conflicts between buses and bicycles may be overcome by appropriate design and education.

Where space is constrained or other factors limit the possibility of bicycle riders sharing a bus lane or other facility, an alternative route should be made available. Preferably this route is along the same corridor, otherwise via an alternative route that uses other roads or paths (e.g. local government roads that are parallel to the original route). Whether off-road or on-road, the alternative route should offer a similar level of service.

Bus lanes

The legitimate use of bicycles in bus lanes reflects their priority importance in a more sustainable transport system.

Aim

This series of notes aims to assist planners and engineers to provide for cycling in their local area.
The Cycle Notes should be read in conjunction with:

- Guide to Traffic Engineering Practice, Part 14 – Bicycles (Austroads, 1999)
- Queensland Manual of Uniform Traffic Control Devices, Part 9 Bicycle Facilities
- Road Planning and Design Manual (Queensland Department of Main Roads).

Contents

Queensland Government
Queensland Transport

B9

Potential conflicts between buses and bicycles

Shared use of a bus lane between bicycle riders and buses can create conflict where there is insufficient room for users to safely overtake each other within the same lane. On occasions buses fail to acknowledge the rider's right to be in a bus lane and bus drivers can 'squeeze' the rider between the gutter and the bus. Wind turbulence generated by buses can also be hazardous to cyclists. Bus lanes may need signs or bicycle logos on the road to indicate that people are permitted to cycle in these lanes. Cyclist safety in bus lanes may also be improved if bus drivers are educated about their needs during training.

It is often perceived that bicycles delay buses. Buses stopping frequently can create 'leap-frogging' where the bicycle rider overtakes the bus while stopped, the bus then overtakes the rider etc. Planners and designers can help to mitigate problems associated with this pattern by ensuring that the bus lane is wide enough for safe overtaking (i.e. providing a wider shared lane) where space permits. Alternatively, short off-road bicycle facilities on the footpath would allow bicycles to safely overtake buses loading and unloading passengers. In any of these cases, specific provision for on-road cycling is only required for a bus lane that forms part of a designated cycling route or will form part of one in the future.

Bus lane design

The design of bus/bicycle facilities requires consideration as to the likely interaction between bicycles, buses, pedestrian and passenger traffic. When provision for on-road cycling is made by a separate cycling lane, there is no need to make provision (e.g. wide bus lane) for cyclists in the bus lane. The bus lane therefore should be designed to relevant bus lane standards. However, interaction that occurs between buses and cyclists still needs to be considered. By considering this interaction, the planner/designer can select the best option to meet complex traffic situations and changing conditions.

Unless explicitly banned or limited, cyclists may use any bus lane at any time. Where a bus lane forms part of a designated cycling route or will form part of one in the future, the width of the bus lane should be increased where it is practical to do so (see Table 1 for desired widths for different speed environments).

Similarly, in cases where the bus lane is identified as part of an existing or future cycling route, a greater minimum width is desired for bus lanes on existing roads. Planners and designers should investigate the possibility of finding space (refer to Cycle Note B5 – *Finding space for on-road bicycle lanes*) in an attempt to provide the desired minimum width. However, it may not be possible to provide the desired minimum width on existing roads. In this case, a narrower bus lane may have to be accepted, or provision for cycling via an alternative facility or route may need to be considered.

Where a bus lane does not form part of a designated cycling route, it is not necessary to provide a wider-than-normal bus lane.

Table 1: Desired widths for speed environments.

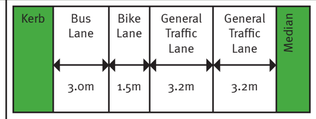
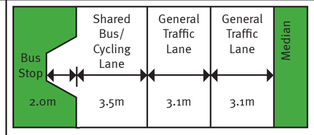
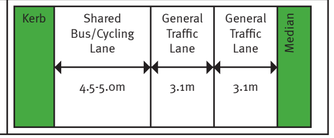
Designated route with speed environment 70 km/h	Designated route with speed environment >70 km/h but <80 km/h	Designated route is >80 km/h
The desired minimum width is 4.1m.	The desired width is 5.0m; the desired minimum is 4.5m.	Shared bus lanes are not appropriate when speed environment is >80 km/h. Provision should be made by alternative solution (e.g. exclusive lane, off-road path).

Avoid banning cycling in bus/HOV lanes if it is a designated cycling route and the speed environment is <80 km/h.
Bus lanes are frequently placed along arterial roads on corridors linking major destinations. Banning cycling in bus lanes that form part of a designated cycling route should not occur as this can leave cyclists without a route of equivalent convenience and safety. Designing and commissioning bus lanes that are too narrow to safely meet bus and bicycle needs should also be avoided.

Examples of measures that may be employed.

Table 2 gives some further guidance.

Table 2: Shared Bus/Bike Lane Arrangements (derived from *Austroads 1999, Guide to Traffic Engineering Practice*: Part 14 - Bicycles, p.34)

Conditions	Illustration
In congested city areas where the average traffic speeds in peak periods are about 40 km/h and space can be made available, it may be preferable to provide an exclusive or separate cycling lane to the right of the kerbside bus lane. Where the speed environment is <60 km/h, the preferred width of the cycling lane is 1.5m but may be 1.0m in constrained situations. Where the speed environment is >60 km/h but <70 km/h, the desired width of the cycling lane is 1.5m. (For further details of cycling lane widths, e.g. for other speed environments, refer to *Austroads Part 14* and Main Roads' *Road Planning and Design Manual*). For a 3.0m kerbside bus/HOV lane in speed environment that is <60 km/h, this would normally result in a combined (kerbside bus/HOV lane plus cycling lane) width of 4.0m to 4.5m. This solution is not always practical, in which case a shared lane or an alternative can be considered.	
The use of narrow (e.g. 3.0m to 3.5m wide) shared lanes is recommended: ■ **only under very congested conditions, or** ■ **in very constrained circumstances, or** ■ **when the lane is not, or will not, form part of a designated cycling route.** Except in the later case, this approach is generally only applicable where buses do not stop in the bus lane.	
In speed environments that are >70 km/h but no more than 80 km/h, **a shared lane 4.5m to 5.0m wide is necessary** so that cyclists and buses can safely overtake each other within the lane.	

In addition to the considerations required to develop a Local Cycle Network Plan (refer to Cycle Note A4 – *Developing a local cycle strategy and local cycle network plan*) and an Integrated Regional Cycle Network Plan, the following factors also need to be considered in choosing the most appropriate solution for a shared bus/HOV lane:

- the route preferences of bicycle riders
- the speed of buses and other traffic
- the location of bus stops
- the frequency of buses stopping along a length of road, and
- the available width, or width that can be found (refer to Cycle Note B5 – *Finding space for on-road bicycle lanes*).

It may also be appropriate to mark the bicycle lane at the bus bay, as illustrated in Figure 1.

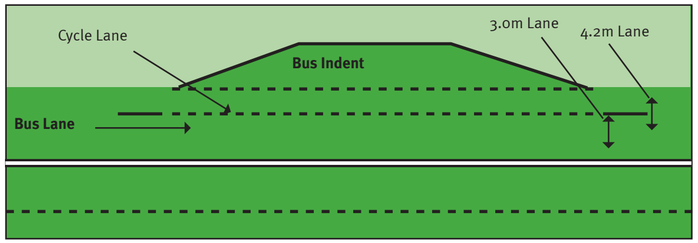


Figure 1: Cycle lanes passing bus indents.

There are other innovative international design solutions to address some of the conflicts between buses, bus passengers and bicycle riders. An example of an innovative design from Portland, Oregon, USA avoids conflict by physically segregating cyclists from bus and pedestrian traffic at the bus stop. The segregated bicycle lane passes behind the bus shelter and bay, then rejoins the bus lane. This treatment requires a wide footpath (i.e. width of bus stop, plus width of cycle path, plus width of footway).

Education strategies

Other strategies for managing potential conflict in bus lanes include educating all users about their shared responsibilities as bus drivers or bicycle riders. An advisory leaflet containing generic text for this purpose is shown in Figure 2.

Bicycles and bus lanes	
Who can legally use bus lanes?	■ Buses, taxis, limousines, emergency vehicles, bicycles and any vehicle turning within 100m of an intersection.
Bus drivers:	■ People riding bicycles are legitimate road users and are allowed in bus lanes. Try to be patient and leave as much room as possible when passing. ■ Don't travel too close to bicycle riders or act in an intimidating manner. Bicycles can stop quickly, do not have brake lights and riders can sometimes lose control and fall. People on bicycles are vulnerable in traffic.
Bicycle riders:	■ If the right-hand indicator of a bus switches on and you are still behind the bus, you must give way and allow the bus to pull out. ■ If a bus is stopped at a bus stop with no indicators on or with both indicators on, it is likely to be stopped for some time. However, if its right hand indicator is on it may start moving at any moment. ■ Try to stay either well in front of, or well behind a bus. If you hold up the bus, it may try to overtake you where it cannot do so safely. ■ Do not take risks in front, alongside or immediately behind a bus. Buses take longer to stop than cars and block your forward vision when you are following too closely. ■ If the kerb lane is too narrow to allow cyclists and buses to pass one another and a suitable footpath is available for a long uphill or slow section, then consider using it. Footpaths with driveways and poor visibility are generally not suitable for use by cyclists. Cyclists must give way to pedestrians when riding on a footpath. ■ Set a good example by obeying the road rules. This will motivate other riders to do the right thing and will encourage drivers to look out for, respect and assist bicycle riders.

Figure 2: Generic bicycles and bus lanes educational leaflet

HOV Lanes

HOV lanes are physically and operationally similar to bus lanes. They therefore have many things in common for cycling design. Given that cyclists can legitimately use HOV lanes, the needs of bicycle riders should be considered during the planning, design and funding of HOV projects- see Cycle Note A3 – *Funding mechanisims for cycling infrastructure* and Cycle Note A4 – *Developing a local cycle strategy and local cycle network plan*. Where the speed of buses and other motorised traffic is relatively high (more than 60 km/h) HOV lanes should be 4.5 metres to 5.0 metres wide so that cyclists and buses can safely overtake each other within the lane.

HOV lane design

The design principles of: not providing for cyclists (e.g. wide HOV lane) where a separate bike lane is already available; increasing width where the lane forms part of the existing or future cycling route; and desired widths for speed environments (see Table 1) also apply to HOV lanes.

Avoid banning cycling in HOV lanes if it is a designated bike route and the speed environment is >80 km/h. HOV lanes are frequently placed along arterial routes on corridors linking major destinations. Banning cycling from HOV lanes that form part of a designated bike route should be avoided.

Busways

Busways are segregated facilities designed and dedicated to the priority movement of buses for public transport operations. Busways offer commuters direct, safe and convenient routes. They also often parallel identified priority bicycle routes. If off-road cycling facilities are not incorporated into the early planning and design of busways, it may prove expensive and technically difficult to retrofit cycling facilities into the corridor. Therefore, where an off-road cycling facility along a busway corridor is identified as part of a designated cycling route route, or will form part of one in the future, the funding, planning and design of a busway should include provision for an off-road cycling facility.

Planners and designers should give particular attention to the treatment of bicycle facilities at busway stations and consider how best to provide access to stations for cyclists and pedestrians.

Light rail

There is currently no light rail in Queensland. However, provision of bicycle facilities should be identified in future light rail planning and development activities where a cycling facility along a light rail corridor is identified as part of a designated bicycle route, or will form part of one in the future. It should be noted that cycling facilities along light rail corridors should either be a separate bicycle lane or an off-road facility. It is important not to ignore bicycles along light rail corridors as they frequently provide the direct and convenient routes favoured by bicycle riders. They may also parallel identified priority bicycle routes.

Light rail can cause problems for cyclists (e.g. wheel slippage/skidding on the rail surface, catching a wheel in the flange (i.e. the vertical web between the base and the top of the rail). Important design considerations for cyclists at crossings of light (or heavy) rail are smoothness, the angle of crossing and flange depth and width. It is recommended the crossing angle between the bicycle direction of travel and rail should be as perpendicular as possible. Desirably, it should be more than 45 degrees. Concrete pavements are preferred at rail crossings to flexible (e.g. bituminous) pavements. When designed correctly, they provide a durable crossing that generally remains smooth but not slippery. Heavy duty asphalt pavements may also be suitable. In either case, advice should be sought from a specialist pavement engineer to determine the best solution (e.g. pavement design and pavement surfacing).

Where light rail operations in urban areas are on-street in mixed traffic, treatments to manage bicycle manoeuvres (i.e. ability to cross light rail tracks when turning) and signage are needed to ensure that light rail is bicycle-friendly.

Where there are significant conflicts between cyclists, light rail and other road users, an alternate flange width may be considered. This approach is regularly used in the Netherlands (see CROW, 1996, pp.114-15).

Planners and designers should also give particular attention to the treatment of bicycle facilities adjacent to light rail stops.

Other references

1. Dublin Transportation Office 1999, *Provision of Cycle Facilities: national manual for urban areas*, Dublin, Ireland.
2. CROW, 1996, *Sign up for the Bike: design manual for cycle-friendly infrastructure*, Centre for Research and Contract Standardization in Civil and Traffic Engineering, Galvanistraat, The Netherlands.

This Cycle Note is published by
Queensland Transport.

Phone: (07) 3253 4437
Fax: (07) 3253 5858
Email: cycles@transport.qld.gov.au
Website: www.transport.qld.gov.au/cycling

Postal Address
PO Box 673
Fortitude Valley Q 4006

June 2006

Queensland Government
Queensland Transport