Guideline

Bicycle awareness zones

November 2021

Queensland Government

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1 Purpose

This guideline provides guidance for the provision of Bicycle Awareness Zones (BAZs) as an advisory treatment. Traffic engineering judgement needs to be applied to site-specific treatments to ensure that BAZ treatments are used safely, taking into account local conditions.

BAZ treatments are 'retrofit only' facilities for application to the existing road surface. BAZs must not be used in greenfield or capital improvement projects.

1.1 Introduction

Advisory treatments are defined as*:*

> *…treatments are used to indicate or advise road users of the potential presence of cyclists and of the location where cyclists may be expected to ride on a road (AS1742.9: 2018)*.

Within Queensland, there are currently different approaches to implementing advisory treatments for people riding bikes. This guideline has been developed to assist with broader application of the BAZ treatment in Queensland and to ensure that the treatment receives consistent applications across both state and local governments.

1.2 Transport and Main Roads policy

BAZ treatments are not considered 'explicit provision' under the Transport and Main Roads *Cycling Infrastructure Policy*. BAZ treatments are considered 'implicit provision' if used in accordance with the instructions provided in this guideline. At all times, Transport and Main Roads will strongly pursue the implementation of safer bicycle facilities in lieu of BAZs.

The BAZ treatment attempts to promote safer road user behaviours; its ability to improve road safety is weak compared to dedicated facilities that separate motor vehicles and bicycles. BAZ treatments shall only be used as a treatment of last resort where the existing road surface cannot be manipulated to support visual of physical separation of motor vehicles and bicycles. BAZs must not be used as a mid-block treatment in greenfield or capital improvement projects.

1.3 Related documents

This guideline should be read in conjunction with the following guidelines:

- Queensland Department of Transport and Main Roads:
  - Queensland *Manual of Uniform Traffic Control Devices* (MUTCD)
    - Part 9: *Bicycle Facilities,* and
    - Part 11: *Parking Controls*.
  - *Road Planning and Design Manual*
  - *Selection and design of cycle tracks* guideline
  - *Traffic and Road Use Management manual* Volume 1*: Guide to Traffic Management,* Part 8: *Local area traffic management,* and
- Australian Standard AS 2890.5 *Parking facilities, Part 5: On-street parking.*

2 Bicycle Awareness Zones: description and use

BAZs are advisory treatments, similar to warning signs. BAZs are used to indicate or 'advise' road users of the potential presence of people riding bikes and the position where people riding bikes may be expected to ride on the road. A BAZ treatment gives a similar message to, and may be used in conjunction with, a W6-7 (Bicycle warning) sign as specified in the Queensland MUTCD Part 9.

BAZ are not dedicated bicycle facilities –they do not serve a route provision function. They serve only as a warning function. Dedicated on-road bicycle facilities are represented by white-painted bicycle symbols, pole-mounted signs and unbroken lane lines as per the Queensland MUTCD Part 9.

The BAZ symbol is used to alert motorists that people riding bikes must temporarily leave the far left of the road space to ensure their own safety. **The use of the BAZ symbol does not override the road rule (S129) requiring drivers (including riders of bicycles) to keep as near as practicable to the far left side of the road; r**ather, the BAZ symbol is to be used in situations that have been identified by a road authority as being ones where it is not possible to ride safely on the far left side of the road.

2.1 Pavement marking specification

A BAZ is marked by on-road yellow bicycle symbols. The bicycle symbol shall comply with Figure 2.2(1) in Australian Standard AS 1742.9 *Manual of Uniform Traffic Control Devices Part 9: Bicycle Facilities*, with a preferred dimension of 1100 mm x 1800 mm. For extra emphasis over short lengths (for example, 100 m or less) of highly constrained road (for example, over a narrow bridge), 1530 mm x 2500 mm symbols may be used. Symbols are to be coloured yellow (Y14 Golden Yellow colouring as defined in AS 2700 *Colour standards for general purpose*) and placed at nominal intervals of 200 m or less. Additional symbols may be required on curves and crests to ensure the symbols remain visible to drivers. The markings and their application to streets and roads are described fully in Section 3 *Design and implementation of Bicycle Awareness Zones* of this guideline.

Figure 2.1 – Bicycle Awareness Zone for insufficient lane width

This example of the preferred pavement marking layout for BAZs shows it applied to a narrowing at a two-lane bridge (Bli Bridge Eastern approach (SKM 2011)). BAZs are primarily a mid-block treatment, although the treatment may be used on the approach and departure of intersections and roundabouts.

2.2 The intended purpose of Bicycle Awareness Zones

BAZs are used on sections of roadway to:

- increase awareness among motorists and people riding bikes of the need to share road space to maximise safety for people riding bikes
- warn both people riding bikes and motorists that the road is not wide enough to accommodate a standard bicycle lane and that they should consequently be more cautious
- show the likely path of travel and positioning of people riding bikes on the road
- encourage people riding bikes to position themselves where they have maximum visibility to motorists
- reinforce that people riding bikes may use the entire lane, where there is insufficient lane width for a motor vehicle to safely pass (Figure 2.1)
- improve driver tolerance of people riding bikes at pinch points
- influence vehicle positioning within the lane (Figure 2.2) and increase passing clearance, and
- encourage considerate driving behaviour, such as motorists only attempting to pass people riding bikes where there is adequate lane width.

Figure 2.2 – Bicycle Awareness Zone to influence vehicle positioning

This photo shows the application of BAZ symbols on a narrow street to influence the positioning of people riding bikes and motorists in situations where dedicated bicycle lanes may not be possible (Grey St, South Bank).

2.3 When should Bicycle Awareness Zones be used?

When investigating the most appropriate method of providing bicycle operating space on streets and roads, higher order treatments (for example, bicycle lanes) must be considered first.
Section 3.1 *Assessment and selection process* details the required assessment and selection of possible treatments. Where there is insufficient road width or space is constrained due to road design / layout, BAZs may be considered as an advisory treatment to meet the purposes listed in Section 2.2 *The intended purpose of Bicycle Awareness Zones*. It is only appropriate to use BAZ treatments in the following circumstances (the listed examples refer to the Figures shown following):

- on a wide kerbside lane (width ≥ 3.9 m) to influence rider and driver positioning (see Figure 2.2)
- on a ‘weave right’ transition to indicate bicycle positioning crossing the left turn lane to continue straight ahead (see Figure 2.3(a))
- on a ‘left turn only’ lane with insufficient width for either a separate bicycle turn lane, an adequate width sealed shoulder (see Figure 2.3(b)) or W6-Q05 *Retrofit Bicycle Lane in a Left Turn Lane* (see Figure 2.3(c))
- in left turn slip lanes where either a bicycle lane cannot be protected from the swept path of turning vehicles or an (off-road) bypass is not feasible
- on narrow (lane width < 3.7 m) bridges as a supplement to sign TC9700 *No Overtaking Bicycles on Bridge* (see Figure 2.3(d))
- on a wide kerbside lane with a history or high likelihood of ‘dooring’ crashes (DCA Code: 604 ‘CAR DOOR’) placed outside the ‘door zone’ (1 m from vehicle) to indicate safe cycling position (see Figure 2.3(e))

- where a bicycle lane terminates mid-block due to either a physical obstruction (such as parked cars), a narrowing of the lane width (< 4 m) or inadequate width shoulder for the speed environment (see Figure 2.3(f))
- on a sight-restricted crest or curve with a narrow (width < 3.7 m) lane (see Figure 2.3(g))
- to indicate the position in the lane of people riding bikes, and
- on the descent side of a hill where the road is only wide enough for a bicycle lane on the uphill side only (see Figure 2.3(h)).

The appropriateness of existing speed limits should be reviewed in areas where BAZ treatments are required. The road authority should document the options considered and put in place measures to ensure a safer, and more attractive, treatment can be achieved in the longer term.

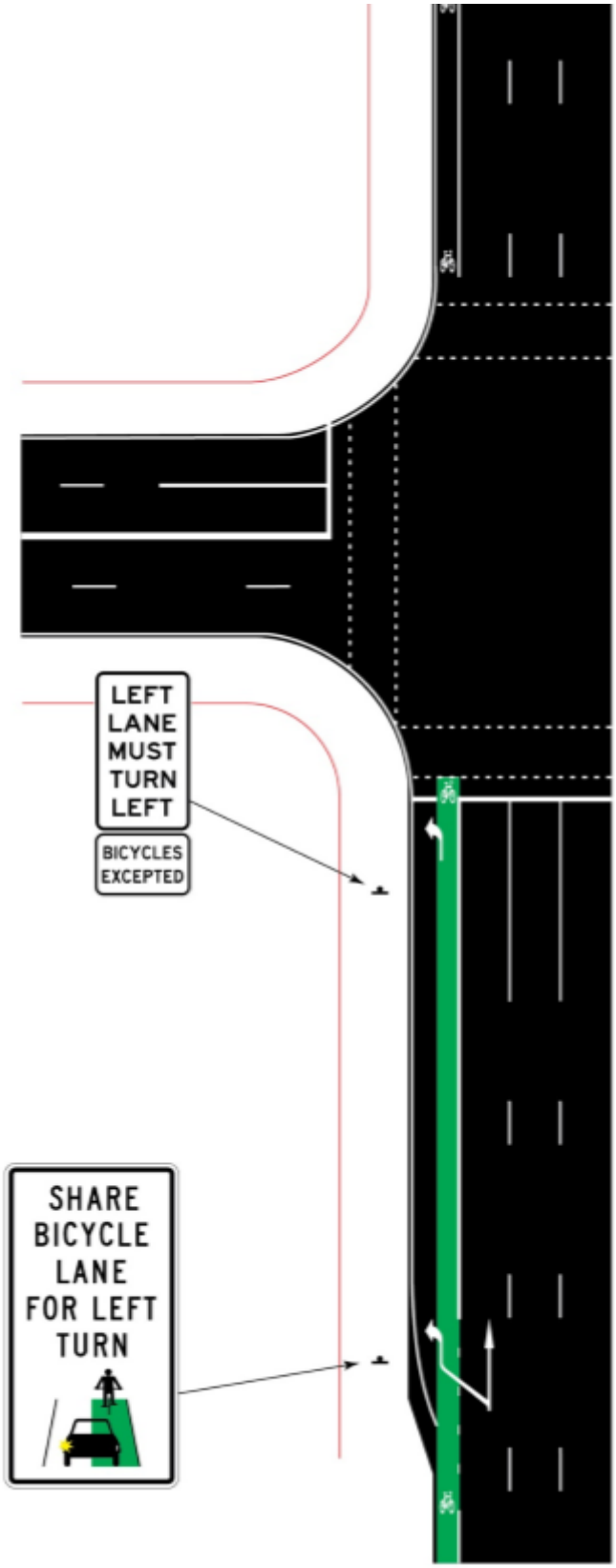
Figure 2.3(a) – Weave right transition

Weave right transition marked with a BAZ symbol to clearly indicate positioning of people riding bikes when transitioning to continue through the intersection (Gympie Road, Stafford).

Figure 2.3(b) – Left turn lane

The left turn lane is marked with a BAZ symbol to clearly indicate positioning and turning intention of people riding bikes when turning left. People riding bikes are advised to travel in the middle of the lane for their own safety (Gympie Road, Stafford).

Figure 2.3(c) – Retrofit bicycle lane in a left turn lane



W6-Q05, 'Retrofit bicycle lane in a left turn lane' is the preferred treatment for cyclists' safety in a left turn lane. Refer to W6-Q05 for full details.

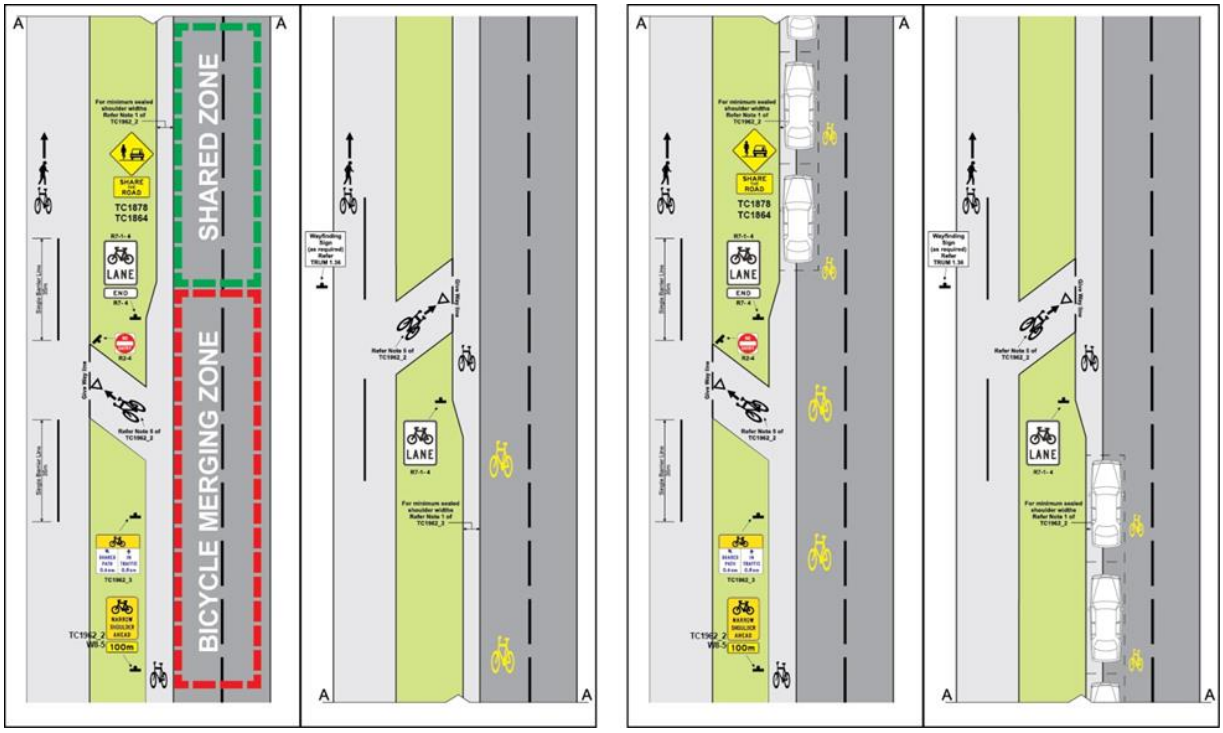
Figure 2.3(d) – Narrow bridge

This narrow bridge in Noosa has no bicycle lane or adequate-width shoulder. BAZ symbols have been applied to the travel lanes. The positioning of the BAZ symbols indicates to people riding bikes that they travel in the centre of the travel lane for their own safety. The sign erected on the bridge approach is a specific LGA response to the issue. The sign TC9700 *No overtaking bicycles on bridge* (see inset) is recommended for erection on both bridge approaches.

Figure 2.3(e) – Wide kerbside lane

BAZ symbols used in a wide kerbside lane with a history or high likelihood of ‘dooring’ crashes. The pavement symbols are placed outside the ‘door zone’ (1 m from vehicle) to indicate a safe position for people riding bikes. See Figure 4 and Figure 4.1.1(a), Figure 4.1.1(b) and Figure 4.1.1(c) for detailed guidance on the placement of BAZ symbols.

Figure 2.3(f) – Bicycle lane terminates mid-block



BAZ symbols are used to clearly indicate the positioning of people riding bikes when a bicycle lane terminates mid-block due to a narrowing of the lane or an obstruction, for example, parked cars. The right pair of diagrams shows the layout for a clearway with parking out of peak. Where the lane narrows, people riding bikes are advised to travel in the middle of the lane for their own safety to keep clear of the 'door zone'.

Note: The drawings in this figure are indicative only. For greater detail, refer to TC1962 and Figure 4 and Figure 4.1.1(a), 4.1.1(b) and Figure 4.1.1(c) for dimensioning.

Figure 2.3(g) – Narrow road lanes on sight-restricted corners

Narrow road lanes on a sight-restricted corners where BAZ symbols clearly indicate the positioning of people riding bikes. People riding bikes are advised to travel in the middle of the lane for their own safety (St Lucia, Brisbane and Noosa).

Figure 2.3(h) – Bicycle Awareness Zone on descending hill

The use of BAZs would be appropriate in this situation on the descending side of a hill where the road is only wide enough for one bicycle lane on the uphill side. The median is required to accommodate a right-turn lane and parking prohibitions are in place on the descending lane. Refer also to Queensland MUTCD Part 9 *Bicycle facilities* Section 2.4.1 and Part 2 *Traffic control devices for general use* Figure 4.16(a) *Zip Merge* (Hamilton Rd, Brisbane).

2.4 When are Bicycle Awareness Zones not suitable?

BAZs are not suitable treatments in the following situations:

- in greenfield applications – higher-order bicycle facilities, such as bicycle lanes and paths, should always be provided in newly-developing areas
- on roads with posted speeds greater than 70 km/h
- where bicycle lanes are achievable through minimal infrastructure works (for example, lane width reallocation after resurfacing program), and
- as a wayfinding device or ‘gap-filling’ in mixed off-road / on-road routes.

The BAZ treatment is used primarily as a warning symbol, similar to green pavement treatment. Its use needs to be limited to conflict / danger points.

The images following illustrate outdated applications of the BAZ treatment although they met the relevant guidelines at the time of installation. Research undertaken by Transport and Main Roads has shown that motorists confuse this treatment with bicycle lanes, which pressures people riding bikes to ride in the ‘door zone’. Rather, people riding bikes should be encouraged to ride away from the ‘dooring’ zone through the use of painted buffers, shared lane markings and traffic calming that encourages lane sharing. At the same time, authorities must ensure the road space is most effectively used by marking parking bays that are no wider than absolutely necessary in order to encourage parking discipline as close to the kerb as possible.

Figure 2.4(a) – Inappropriate use of Bicycle Awareness Zone on the inside of an edge line

BAZ symbol used inappropriately on the inside of an edge line, encouraging cyclists to travel in the ‘door zone’, increasing the likelihood of a serious crash (Tahiti Ave, Palm Beach).

Figure 2.4(b) – Inappropriate application of a Bicycle Awareness Zone in the ‘door zone’

Inappropriate application of a BAZ, encouraging people riding bikes to travel in the ‘door zone’, with symbol set into an edge line adjacent to parking (Richmond Road, Morningside).

3 Design and implementation of Bicycle Awareness Zones

All issues and options for a particular link or site should be evaluated and documented before concluding that a BAZ is a suitable treatment. BAZs are used to advise people riding bikes regarding

their travel position within the lane and, therefore, it is essential that all options are evaluated to ensure that this treatment is an improvement on a 'do nothing' option.

3.1 Assessment and selection process

BAZs shall only become an option once the three-step assessment process following determines that safer facility options are not feasible. The reasons why safer facility options cannot be provided shall be documented. The assessment steps are:

1) Route investigation – understand existing road space and how it is used. Section 5 *Bicycle lane design worksheet* is provided to document the existing road environment.
2) Identify all practical options – assess the site to determine the preferred treatments. Section 5 *Bicycle lane design worksheet* details options to find space to achieve Austroads-compliant facilities. Table 4(a) and Table 4(b) provide guidance on the choice of appropriate cycling treatments, given varying road environments. These treatments are shown diagrammatically in Figure 4 and Figure 4.1.1(a), Figure 4.1.1(b) and Figure 4.1.1(c). Table 4(b) also includes an example of how to achieve an Austroads-compliant bicycle lane in lieu of BAZs.
3) Identify the preferred option – from among the preferred treatments identified in Step 2, evaluate these against considerations such as construction cost, difficulty of construction, impact on other stakeholders, level of service and consistency along the route. Document the preferred option using the Section 5 *Bicycle lane design worksheet.*

3.1.1 Documentation and approval

Section 5 *Bicycle lane design worksheet* must be completed for every BAZ treatment and signed off by a Registered Professional Engineer of Queensland (RPEQ).

3.1.2 Design audit

The design audit is a risk assessment to be carried out pre-installation to identify any additional factors or problems that might make the proposed location unsuitable for installation of a BAZ.

3.1.3 Post-installation audit

A post-installation audit should be undertaken by a qualified road safety auditor to identify any safety issues in the operation of the BAZ. Austroads *Guide to Road Design* Part 6A (Appendix D) outlines an example of a Bicycle Safety Audit checklist – this should be used as the basis for the whole-of-route bicycle safety audit. Further information can be obtained from the Austroads *Guide to Road Safety* Part 6: *Road Safety Audit*.

3.1.4 Education

In order to enhance road users' understanding of the role of BAZ, a local education campaign targeted at motorists and cyclists should be implemented following the infrastructure works.

4 Bicycle Awareness Zones lane configurations and pavement marking layouts

This section outlines the lane width requirements and pavement marking layouts required. All dimensions shown are for a single lane of traffic. In some instances, it may be necessary to relocate the centreline to accommodate both parking and safe advisory treatments for people riding bikes – for example, providing parallel parking on only one side of the road.

Table 4(a) – Lane configurations without parking

Total lane width	Vehicle lane width	Cyclist facility	Comments
2.8 m to 3.6 m	2.8 m (min) to 3.6 m	BAZ (without edge line) See Figure 4	Not recommended on ascending (uphill) lane
3.7 m to 3.9 m	3.7 m to 3.9 m	Wide kerbside lane BAZ (with edge line) See Figure 4.1.1(c)	
4.0 m or greater	2.8 m vehicle lane width (min)	1.2 m bike lane achieved (min)	

Figure 4 – Dimensions for Bicycle Awareness Zones without edge lines and without parking

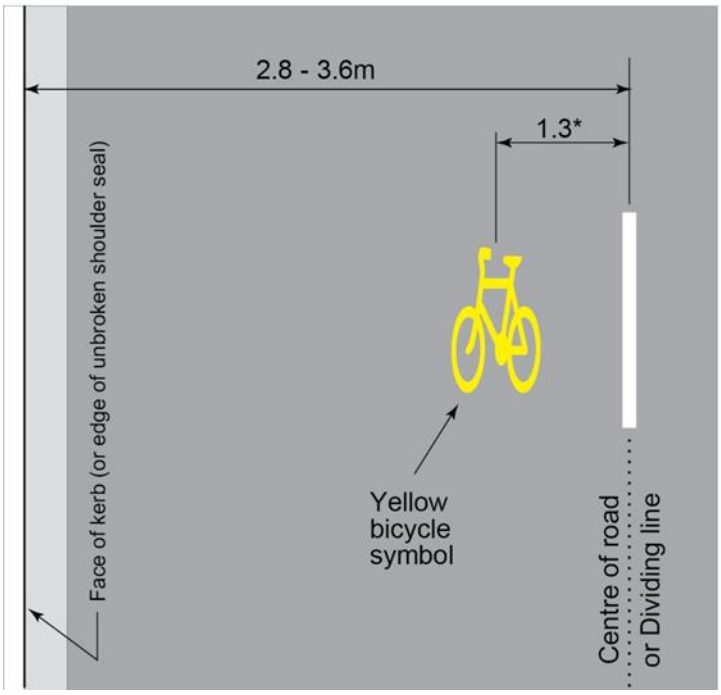


Table 4(b) – Lane configurations with parallel parking

Total lane width	Vehicle lane width	Shared cycling / parking facility	Comments
Less than 6 m		Parking not recommended	
6 m to 6.6 m	3.2 m to 3.6 m	BAZ (without edge line) (2.3 m (min) parking bays with 0.5 clearance required)[1]	Not recommended on ascending (uphill) lane
6.7 m to 6.9 m	3.7 m to 4.1 m	BAZ (with edge line) See Figure 4.1.1(c) (2.3 m (min) parking bays with 0.5 clearance required)[2]	
7 m or greater	4.2 m	1.2 m bike lane achieved (min)	

[1]Refer to Australian Standard AS 2890.5, Section 2.4(a) and Table 2.1

[2]Refer to Australian Standard AS 2890.5, Section 2.4(a) and Table 2.1

Where on-street parking cannot be provided in compliance with AS 2890.5, it should be removed. Provision of disabled parking bays is not recommended in a parallel parking configuration due to the risk posed by passing traffic.

4.1.1 Important note on parking restrictions to reduce car turnover and increase safety of people riding bikes

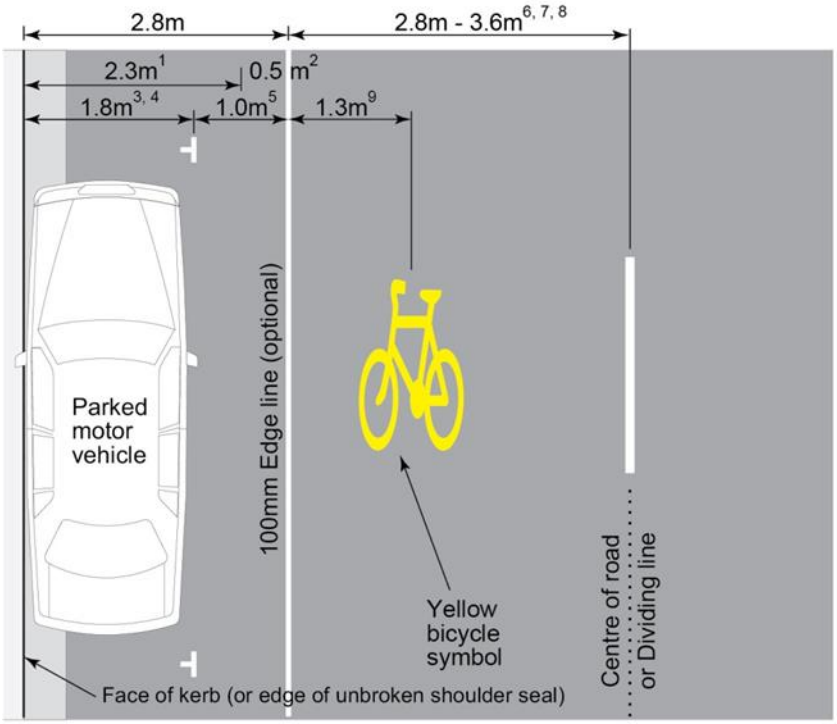
Although these width and line marking requirements encourage motorists to park as close to the kerb face as possible, there is still a risk for people riding bikes in the ‘door zone’ because some motorists may park well clear of the kerb. A vehicle parked on the kerbside only presents a car ‘dooring’ risk when an occupant enters or leaves that vehicle. As such, the nature of the parking provision must be assessed to determine the risk to safety of people riding bikes. If the number of events (that is, the number of times a door is opened) can be reduced, then the risk of conflict would also be reduced. By reducing vehicle turnover, the risk to people riding bikes of a ‘dooring’ crash will decrease proportionally.

Different types of parking zones will also have different rates of turnover; for example, loading zones and taxi zones, by their very nature, will attract vehicles that are constantly opening their doors and will have short parking times, resulting in a high rate of vehicles entering and exiting the parking spaces.

In constrained lane-width environments, where there is a need to place an advisory treatment for safety of people riding bikes, it is recommended that parking allocations and time restrictions be reviewed also, with a preference given to longer time period parking restrictions and residential or commuter parking.

It is acknowledged that this is a site-specific decision and will likely be affected by the destinations that the parking serves; for example, a retail precinct with service outlets, such as supermarkets, milk bars or newsagents, will probably generate far more parking turnover events than clothing stores.

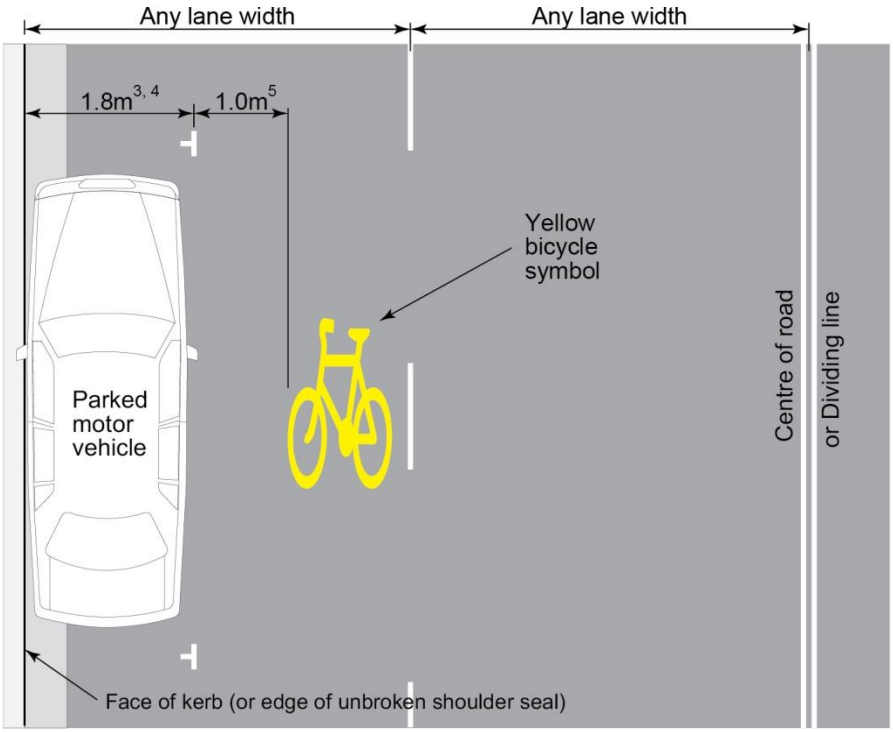
Figure 4.1.1(a) – Dimensions for Bicycle Awareness Zones on a two-lane, general traffic road with parallel parking



Notes for Figure 4.1.1(a)

1. AS 2890.5 requires 2.3 m width for parking space for cars and light commercial vehicles.
2. AS 2890.5 requires 0.5 m clearance from the nearest moving traffic lane, in a traffic speed environment <60 km/h. Additional 1 m clearance required for every additional 10 km/h to a maximum of 3 m.
3. As per AS 2890.5, in Australia, 85 per cent of cars have width dimension less than 1860 mm.
4. It is required to ensure road space is most effectively used by marking parking bays that are no wider than absolutely necessary in order to encourage parking discipline as close to the kerb as possible.
5. The bicycle rider collision with car doors research report states that cycling within a distance of 1 m from a kerbside parking space, places people riding bikes at risk should a car door open.
6. In instances of general traffic lane widths of <3.6 m, there is insufficient space for a car to safely pass a bicycle. In these instances, the bicycle should occupy the middle of the lane to improve visibility to motorists and to clearly communicate to motorists that it is unsafe to attempt to pass people riding bikes while remaining in the lane.
7. In instances of general traffic lane widths between 3.7–3.9 m, there is sufficient space for a car to safely pass a bicycle.
8. In instances of general traffic lane widths >4 m, there is sufficient space for a bicycle lane.
9. Symbol should be paced between wheel paths, notionally 1.3 m subject to local conditions.

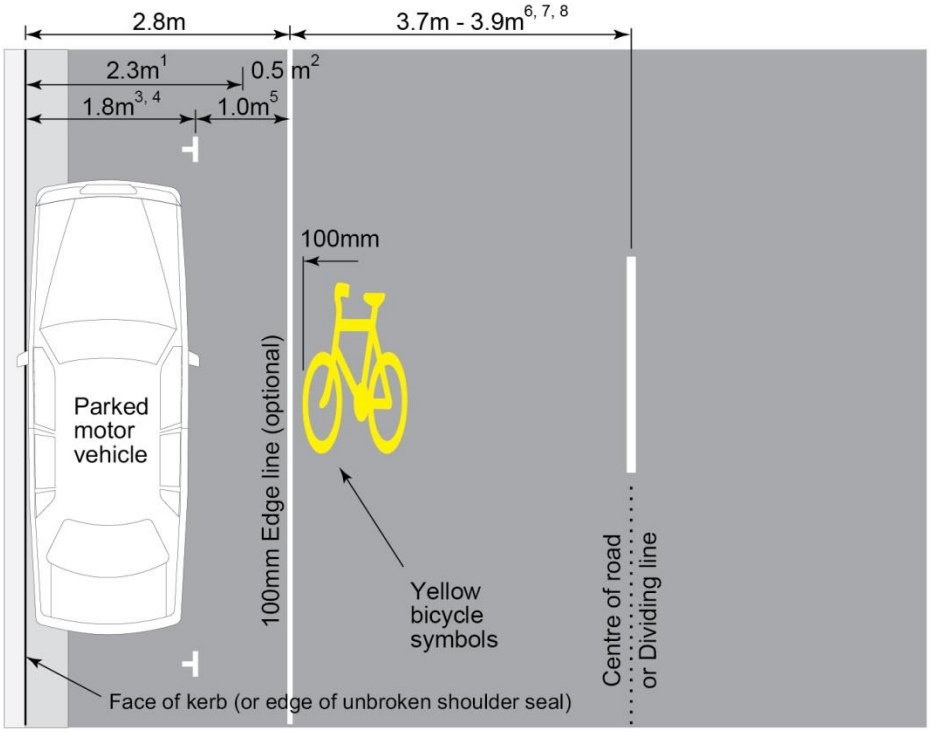
Figure 4.1.1(b) – Dimensions for Bicycle Awareness Zones on a multi-lane, general traffic road with parallel parking



Notes for Figure 4.1.1(b)

1. AS 2890.5 requires 2.3 m width for parking space for cars and light commercial vehicles.
2. AS 2890.5 requires 0.5 m clearance from the nearest moving traffic lane, in a traffic speed environment < 60 km/h. Additional 1 m clearance required for every additional 10 km/h to a maximum of 3 m.
3. As per AS 2890.5, in Australia, 85 per cent of cars have width dimension less than 1860 mm.
4. It is required to: ensure road space is most effectively used by marking parking bays that are no wider than absolutely necessary in order to encourage parking discipline as close to the kerb as possible.
5. The bicycle rider collision with car doors research report states that cycling within a distance of 1 m from a kerbside parking space, places people riding bikes at risk should a car door open.
6. This scenario assumes that the parking spaces are only unoccupied during the peak hours of a single direction of flow of traffic (for example, 7am–9am inbound or 4pm–6pm outbound). The majority of time the people riding bikes will be required to travel clear of the door zone for their own safety. During peak times, people riding bikes are expected to comply with the road rule (S129) requiring road users to keep as the far-left side of the road as practicable.

Figure 4.1.1(c) – Dimensions for Bicycle Awareness Zones in a wide kerbside-lane lane with parallel parking



Notes for Figure 4.1.1(C)

1. AS 2890.5 requires 2.3 m width for parking space for cars and light commercial vehicles.
2. AS 2890.5 requires 0.5 m clearance from the nearest moving traffic lane, in a traffic speed environment < 60 km/h. Additional 1 m clearance required for every additional 10 km/h to a maximum of 3 m.
3. As per AS 2890.5, in Australia, 85 per cent of cars have width dimension less than 1860 mm.
4. As per the research report (CDMR 2012), it is recommended to ensure road space is most effectively used by marking parking bays that are no wider than absolutely necessary in order to encourage parking discipline as close to the kerb as possible.
5. Cycling within a distance of 1 m from a kerbside parking space, places people riding bikes at risk, should a car door open.
6. In instances of general traffic lane widths of <3.6 m, there is insufficient space for a car to safely pass a bicycle. In these instances, the bicycle should occupy the middle of the lane to improve visibility and to clearly communicate to motorists that it is unsafe to attempt to pass people riding bikes, while remaining in the lane.
7. In instances of general traffic lane widths between 3.7–3.9 m, there is sufficient space for a car to safely pass a bicycle.
8. In instances of general traffic lane widths > 4 m, there is sufficient space for a bicycle lane.

5 Bicycle lane design worksheet

Project Name / Number				
Existing environment				
Section description Street				
from				
to				
Posted speed limit				
Vehicles per day (VPD)				
Traffic mix (% HGV / LGV / cars)				
Describe how proposed connection contributes to an identified cycle route.				
Potential cyclists				
Expected cyclist volume (hourly)				
Likely cyclist type (commuter, occasional, recreational)				
Existing road layout				
Side 1				
Parking turnover (high, med, low)				
Parking restrictions				
Existing lane widths Parking				
Bike				
Traffic				
Traffic				
Side 2				
Existing lane widths Traffic				
Traffic				
Bike				
Parking				
Parking restrictions				
Parking turnover (high, med, low)				
Increasing road space options	Consider and comment on options to increase road space, Refer Section 6.			
Option				
Remarking traffic and/or parking lanes				
Sealing shoulders				
Indenting car parking				
Rationalising car parking				
Road widening at the median				
Road widening (in direction of travel)				
Removing a motor vehicle lane				
Transitioning to path				
Using existing service roads				
Combinations of above options				

Proposed bicycle facility	Determine the treatment using the three-step process in Section 3.1 of this guideline.			
Treatment Side 1: (circle chosen treatment)	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track
Treatment Side 2: (circle chosen treatment)	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track	No treatment BAZ (without edge line) BAZ (with edge line) Cycle street Advisory Bicycle Lane Bicycle lane Cycle track
Width Side 1 Proposed lane widths Parking				
Bike				
Traffic				
Traffic				
Width Side 2 Proposed lane widths Traffic				
Traffic				
Bike				
Parking				
If BAZ is the chosen treatment, describe how an Austroads compliant facility could be provided in the future.				
Comments:				
Signed off by:				

6 Ways to gain on-road space to make provision for on-road cycling (derived from VicRoads 2001)

Space finding techniques	Definition / opportunities to implement	Benefits / advantages	Other considerations
Re-marking traffic and/or parking lanes	When traffic and parking lanes are wider than necessary (for example, wider than the minimums given in the *Transport and Main Roads* RPDM and/or *Austroads Guide to Road Design* Part 3), lane markings can be removed and repainted to allow for an exclusive bicycle lane or wide kerbside lane.	• Relatively low-cost treatment. • Can be undertaken during maintenance (for example, of line marking or as part of road resurfacing). • Causes minimal disruption to other road users.	• May limit lane widths for other road users. • Widths should not be reduced below minimums given in the relevant guidelines. Also refer Transport Planning and Coordination Regulation 2005 Part 2, Section 5. • May reduce the capacity of the road and so possibly increase congestion. • May increase 'friction' between through motorised traffic, people riding bikes and parked vehicles.
Sealing shoulders	Some roads in outer suburban and regional areas have long lengths of continuous unsealed shoulders that could be sealed to provide bicycle lanes for people riding bikes (providing shoulder materials are pavement quality).	• Increased road safety for all road users. • Less road maintenance – reduction in edge breaks and ravelling of surface. • Access to funding from road safety and maintenance programs.	• Shoulder should only be sealed if shoulder materials / pavement suitable to serve as a pavement and suitable for sealing. In such cases, the shoulder should not be sealed unless the shoulder material is removed and replaced with pavement materials complying with a certified design. • Need to ensure shoulders remain free of debris. • Adopt a maximum 10 mm chip size on shoulder seals within a 20 km radius of towns (refer Austroads *Guide to Road Design* Part 3, Table 4.5)

Space finding techniques	Definition / opportunities to implement	Benefits / advantages	Other considerations
Indenting car parking	Indenting parking frees up space that can be used to make provision for people riding bikes on-road. Car parking can be indented on both sides of the road or on one side only.	• Maintains some car parking on one or both sides of the road. • Efficient use of available space.	• Need to control parking between indented areas. • Possibly reduced car parking capacity. • Reducing footpath width may affect Public Utility Plant (PUP), road lighting poles and/or stormwater (for example, pits / gullies). • May be a costly option due to relocation of PUP, road lighting poles and/or stormwater (for example, pits / gullies) subsurface drainage and pavement widening. • Unsuitable in areas of high activity of people walking (unless footpaths are wide).
Rationalising car parking	On many roads, parallel parking is permitted on both sides of the street – even where there is off-street parking available or there is insufficient demand for the volume of on-street parking provided. In these situations, it may be possible to prohibit parking on one side of the road, or perhaps on both sides, to create sufficient space to make provision for people riding bikes on-road.	• Relatively low-cost treatment. • Rationalised volume of available parking corresponds to forecast demand or may be used as a travel demand management measure.	• Reduced car parking capacity, which may affect residents and businesses. • May require changed line marking and signage. This may add to cost. • Need to enforce changes.
Road widening at the median	In some cases, it may be possible to widen the road by reducing the width of the median strip. Median strips may offer a cost-effective space for widening of a road as they often contain minimal amounts of stormwater drainage and services. It is important to ensure that medians are wide enough to accommodate turning lanes, traffic signals, PUP, lighting poles, safety barriers, pedestrians, and so on, as required.	May minimise disruption to drainage and services.	• May be a high-cost treatment, requiring extensive traffic management. • May reduce landscaping opportunities. • Removal of a table drain may require installation of underground stormwater systems. • Relocation of PUP, road lighting poles and/or stormwater (for example, pits / gullies) may be required which may increase costs. • Safety barrier may need to be installed or existing safety barriers may need to be relocated.

Space finding techniques	Definition / opportunities to implement	Benefits / advantages	Other considerations
Road widening at the left-hand side (in direction of travel)	On roads that do not have a median strip or that have a median strip that cannot be reduced further, it may be possible to widen the road by reducing the width of the footpath / nature strip or cutting back protruding traffic islands.	Increased road safety for all road users.	• May be a high-cost treatment. • May be appropriate where the footpath is wider than necessary or where there is little pedestrian activity / demand. • Important not to reduce useable footpath space for pedestrians if there is reasonable pedestrian activity / demand. • Relocation of PUP, road lighting poles and/or stormwater (for example, pits / gullies) may be required which may increase costs. • Footpath may need to be reinstated. • May reduce landscaping opportunities.
Removing a motor vehicle lane	It may be that a road is either too wide and/or contains too many traffic lanes for the volume of traffic that it carries or will carry in the future. It may be possible to introduce a tidal flow lane arrangement or a centre turning lane to manage peak hour traffic volumes. The resulting space may be sufficient so that adequate provision for people riding bikes on-road can be made.	Typically, a low-cost treatment requiring only changes to line marking. Tidal flow can have high construction and operation costs.	• Poorer level of service and consequent reduction in motor vehicle capacity (that is, greater congestion). • Need to consider forecast traffic demand and implications of removing lane. • Potential Travel Demand Management measure. • Two-way right-turn lane treatments may reduce congestion and improve safety.

Space finding techniques	Definition / opportunities to implement	Benefits / advantages	Other considerations
Transitioning to path	Where a sufficient verge corridor width is available, and the adjacent road environment is highly constrained.	• Path construction is typically less costly than road pavement widening. • Limits exposure of people riding bikes to vehicular encroachment on tight corners. • Caters for a wide range of competencies of people riding bikes.	• Deficient property access, vegetation and location of footpath furniture must be modified to ensure safe operations. • Relocation of PUP, road lighting poles and/or stormwater (for example, field inlets) may be required which may increase costs. • Path surfaces must be even, refer Austroads *Guide to Road Design* Part 6a, Section 5.10, may require reconstruction of existing footpath facilities. • Consider bus stops and volume of pedestrian movements; for appropriate path layout and width, refer to Austroads *Guide to Road Design* Part 6A, Section 5.1.3. • Lack of priority at intersections will reduce proportion of people riding bikes using the facility. Consider priority crossings at low order side roads. • Transition back to on-road where road width permits, treat as an added lane to protect reintegration of people riding bikes on-road.
Using existing service roads	Many arterial roads have parallel service roads. Service roads provide an ideal opportunity for the provision of on-road cycling. Route continuity and providing for people riding bikes at intersections are important factors to consider. For this reason, checks involving detailed design of intersections are required to ensure that acceptable provision is made for people riding bikes (for example, marked stand-up lanes).	• May be a low-cost treatment. • People riding bikes are exposed to lower motor vehicle volumes and speeds than they would be on arterial roads. • Typically, less complex intersections than on arterials. • Access to local destinations and services for people riding bikes.	• May require changes to existing intersections. Should changes to intersections be required, the cost of this option may be substantially increased unless coordinated with other planned works. • May involve changes to line marking and signage. • Local area traffic management and new path construction may be required to improve connectivity, directness and safety. • People riding bikes will be less likely to use the arterial if the service road is as fast as convenient and less stressful.

Space finding techniques	Definition / opportunities to implement	Benefits / advantages	Other considerations
Combinations of the above	Some measures may be combined to make space (for example, indent parking and the remark of lane lines). Refer to discussion of each treatment.	Refer to discussion of each treatment.	Refer to discussion of each treatment.

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