bicycle NSW

Summary of Design Principles for Good Bicycle Infrastructure

Updated 7 May 2020

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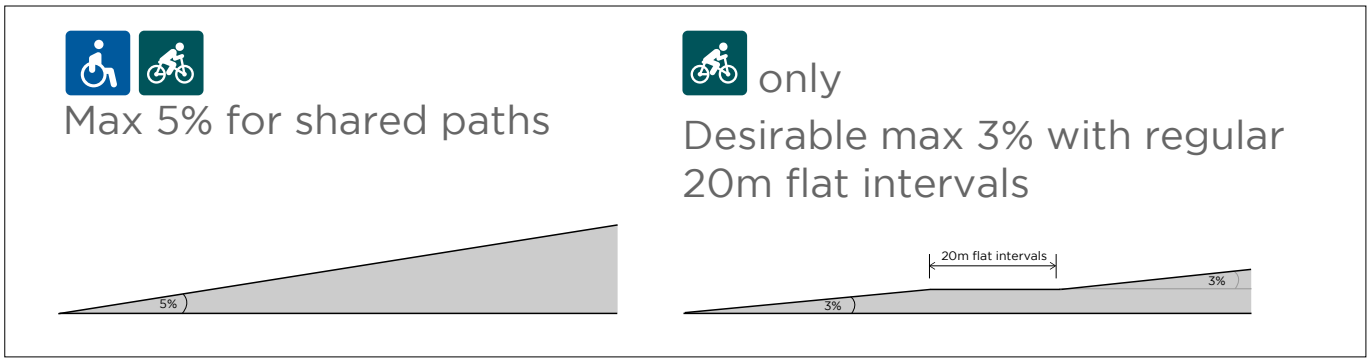
SUMMARY OF DESIGN PRINCIPLES FOR GOOD BICYCLE INFRASTRUCTURE

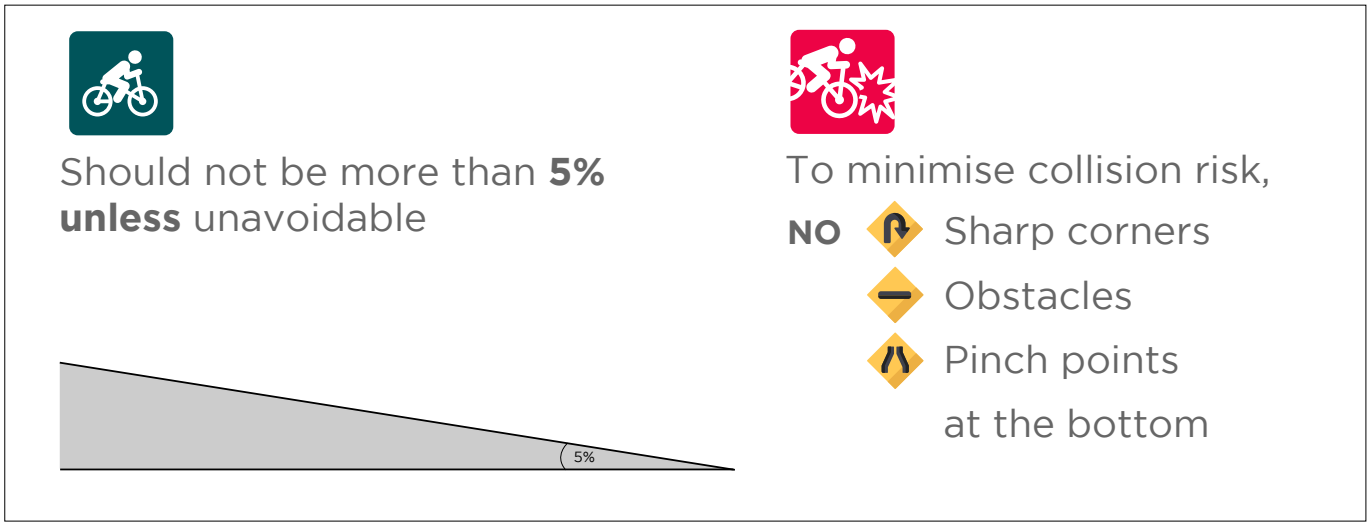
Austroads, Roads and Maritime Services and NSW Transport have a range of design principles for good bicycle infrastructure. Reviewing bike plans for anyone will be easier as we have developed a range of helpful graphics drawing on, and referencing, these principles

Principle	Rationale	Source
Gradient	**Uphill:** for shared paths no more than 5% if a wheelchair user may use the path AS 1428.1. For bike only 3% is the maximum desirable gradient and 5% is maximum and should have regular flat intervals of 20m length. **Downhill:** gradients shouldn't be more than 5% unless unavoidable and no sharp corners, obstacles or pinch points should be at the bottom due to collision/ crash risk	Austroads Guidelines 7.4

Uphill gradient

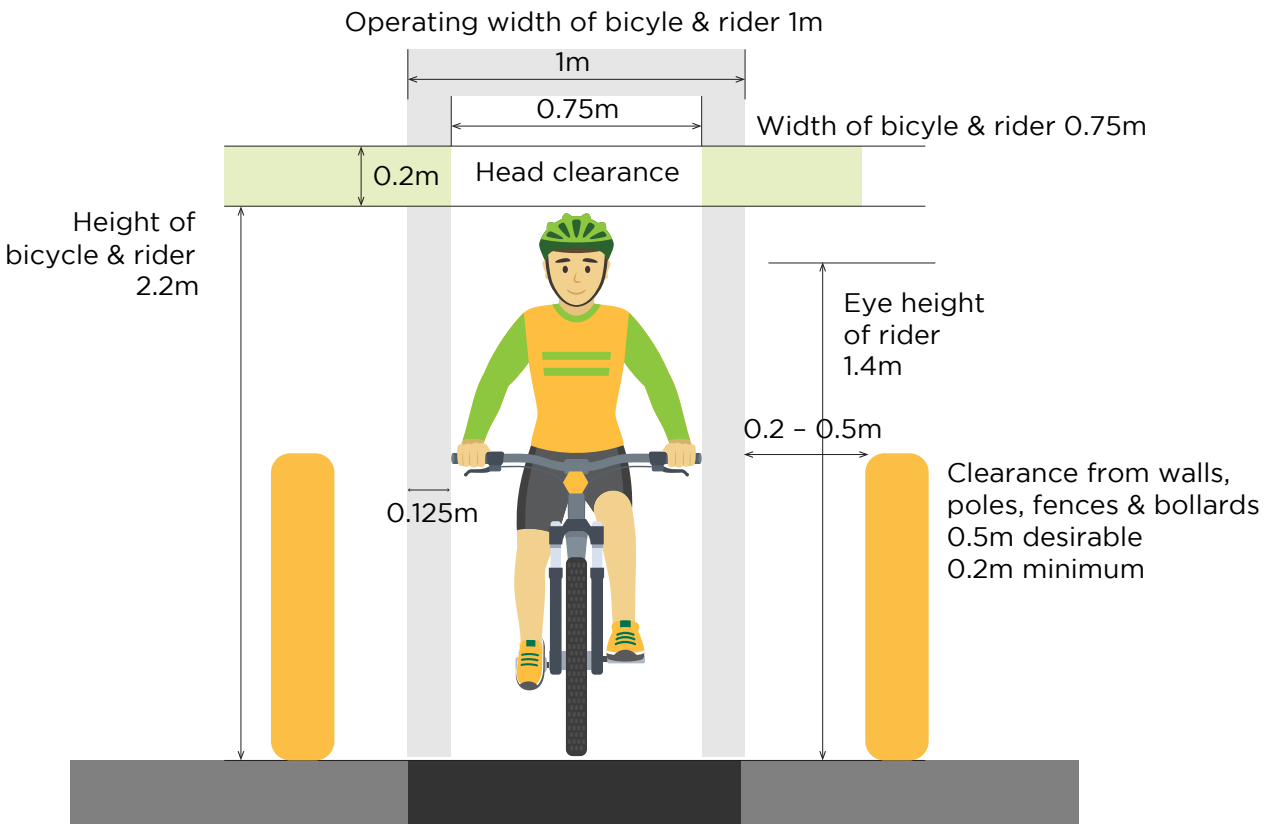


Downhill gradient



Principle	Rationale	Source
Rider envelope How much space is planned to accommodate riders?	These are the measurements that infrastructure is designed to accommodate Bike Path Widths Shared Path Widths	RTA Bicycle Guidelines Austroads 7.5.2 Austroads 7.5.3 Austroads 7.5 & 7.6

Rider envelope



Bike Path Widths

7.5.2 Bicycle Paths

Table 7.3 shows desirable widths and acceptable ranges of width for bicycle paths (i.e. exclusive use). The upper limit of the acceptable range in the table should not discourage designers from providing a greater width where it is needed (e.g. very high demand that may also result in overtaking in both directions).

Table 7.3: Bicycle path widths

	Path width (m)	
	Local access path	Major path
Desirable minimum width	2.5	3.0
Minimum width – typical maximum	2.5[1] – 3.0[2]	2.5[1] – 4.0[2]

1. A lesser width should only to be adopted where cyclist volumes and operational speeds will remain low.
2. A greater width may be required where the number of cyclists is very high.

Shared Path Widths

7.5.3 Shared Paths

Table 7.4 shows desirable widths and acceptable ranges of width for shared use paths. As for bicycle paths, the upper limit of the acceptable range in the table should not discourage designers from providing a greater width where it is needed (e.g. very high demand that may also result in overtaking in both directions).

Table 7.4: Shared path widths

	Path width (m)		
	Local access path	**Commuter path**	**Recreational path**
Desirable minimum width	2.5	3.0	3.5
Minimum width – typical maximum	2.5[1] – 3.0[2]	2.5[1] – 4.0[2]	3.0[1] – 4.0[2]

1. A lesser width should only to be adopted where cyclist volumes and operational speeds will remain low.
2. A greater width may be required where the numbers of cyclists and pedestrians are very high or there is a high probability of conflict between users (e.g. people walking dogs, roller bladders and skaters etc.).

Separated Path Widths

Table 7.5: Separated two-way path widths

	Path width (m)		
	Bicycle path	**Footpath**	**Total**
Desirable minimum width	2.5	2.0	4.5
Minimum width – typical maximum	2.0 – 3.0	≥ 1.5	≥ 4.5

Table 7.6: Separated one-way path widths

	Path width (m)		
	Bicycle path	**Footpath**	**Total**
Desirable minimum width	1.5	1.5	3.0
Minimum width – typical maximum	1.2 – 2.0	≥ 1.2	≥ 3.4

Principle	Rationale	Source
Design principles for bike riding Coherent, direct, safe, attractive, comfortable.	Design principles for bike riding, Surfaces (smooth), continuous network, enables rider to maintain speed (av 20-30km/h, appropriate sight lines, connectivity (coherent network) and has information (directions, signage)	RTA Bicycle Guidelines Austroads 6a 4.2

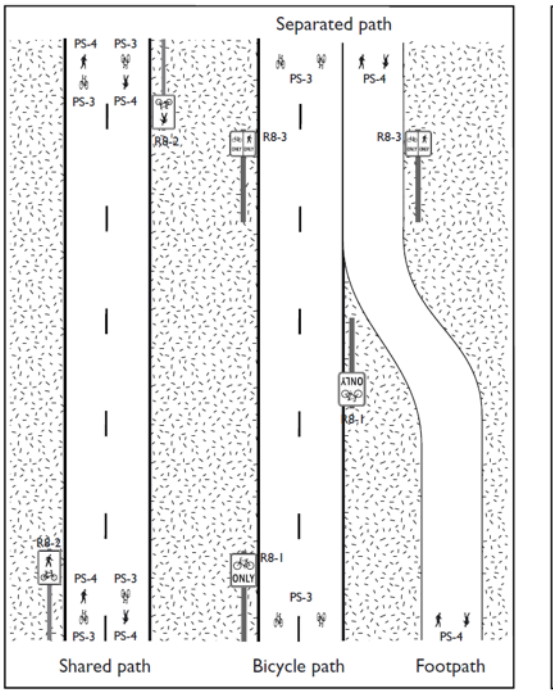
See table on following page

Design Principles for Bicycle Riding

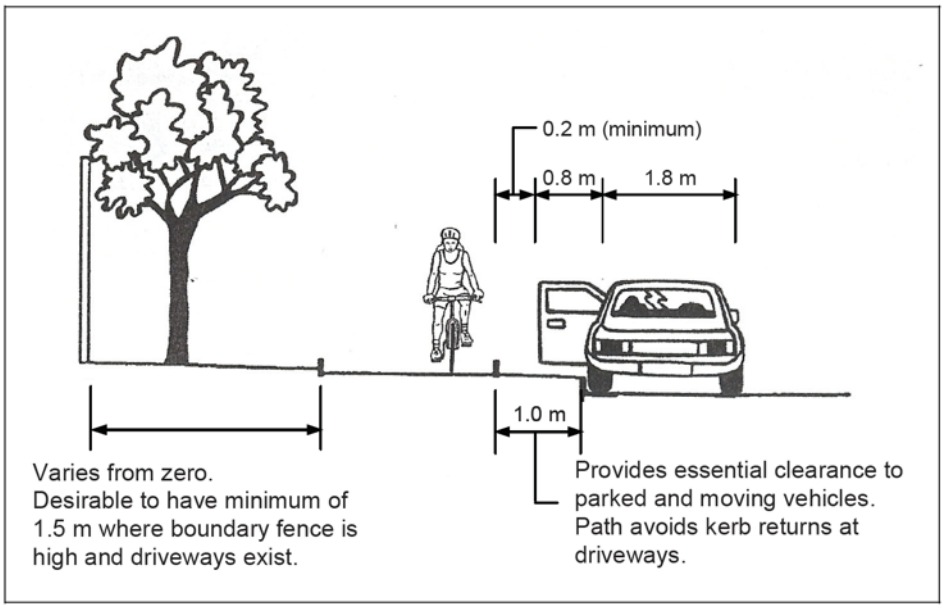
Principle	Criteria	Design considerations		
		Regional routes	Local routes	Mixed traffic streets
Coherence	Continuity of routes	No breaks in routes	Connect to regional route	Easy access to local routes
	Consistent quality of routes and facilities	Minimal quality changes	Minimal quality changes	N/A
	Easy to follow	Regional route signage	Local route signage	All street signs visible
	Freedom of choice of routes	Choice of at least two	Choice of at least two	Less than 250m to a route
Directness	Efficient operating speed	50km/h design speed	30km/h design speed	Consistent with street design
	Delay time	15 sec/km	20 sec/km	20 sec/km
	Detour factor	20%*	30%*	40%*
	*Detour factor is the relationship between the most direct distance between origin and destination and the distance taken by the actual route taken. A detour factor of 20% means that the route will be 20% longer than the distance as the crow flies.			
Safety	Minimum risk of accident on route	Monitor use of facility and investigate any links between accidents and design.	Monitor use of facility and investigate any links between accidents and design.	Monitor use of facility and investigate any links between accidents and design.
	Minimum risk of conflict with car traffic			
	Minimum risk of unsafe infrastructure			
Attractiveness	Support for the system	Public support and ownership	Public support and ownership	N/A
	Attractiveness of environment	Well lit & open appearance	Well lit & open appearance	N/A
	Perception of social safety	Minimum reports of vandalism & harassment	Minimum reports of vandalism & harassment	N/A
	System attractiveness	Coordination of all supporting system elements (maps, fittings, signage etc)	Coordination of all supporting system elements (maps, fittings, signage etc)	N/A
Comfort	Smoothness of ride (Refer to Austroads - Part 14 Section 8.5)	Smooth riding surface	Smooth riding surface	Smooth riding surface
	Comfortable gradient	Steep climbs minimised	Steep climbs minimised	N/A
	Minimise obstruction from vehicles	Minimise illegal parking	Minimise illegal parking	N/A
	Reduced need to stop - number of stops (average per km)	0.5	1.0	1.5
	Protection from adverse climate	Shade trees & wind	Shade trees & wind	N/A

Principle	Rationale	Source
Path Types	**Different types of path –** footpath, bike path, shared path, separated path Separated paths should be used where "… there is a significant volume of both cyclists and pedestrians such that shared use would lead to safety and operational problems".	RTA bicycle guidelines, Austroads Part 14 S. 6

Commonly used path terms



Space for bike path

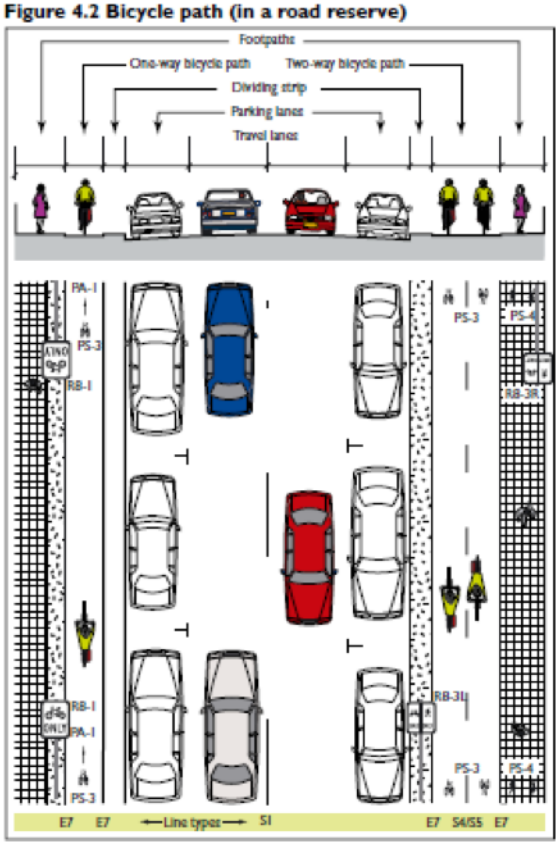


Source: Based on Austroads (1999).

Figure 5.1: Location of path in road reserve

Bicycle path

Figure 4.2 Bicycle path (in a road reserve)



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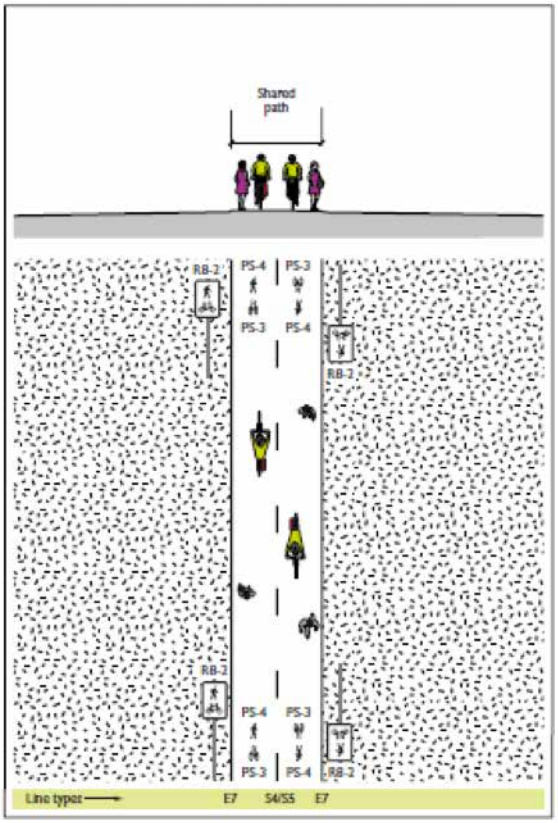
Shared path

Figure 4.5 Shared path (not in a road reserve)



Principle	Rationale	Source
Surface Tolerances and Paint Treatments	• The surface of a bicycle lane or path should be smooth and straight to avoid causing crashes. • Surfaces shouldn't deviate from a 3m straight edge by more than 5mm at any point. • Grooves and lips should be avoided and tolerances for these are below. (Table 4.1) • Paths should be wider if they are steeper or promote fast travel. • Sprayed, sealed surfaces should use a stone size of <14mm, and conform with frictional properties set in Australian Standard 1141.42	Austroads Part 14 S. 6 4.2.3 RMS QA Specification R110 Coloured Surface Coatings for Bus Lanes and Cycleways recommends a minimum Skid Resistance Value of 55 for normal applications and 65 for high skid risk applications Australian Standards Safe Environments AS1141.42 and AS 4663:2013 set the standard for measuring slip resistance

Surface Tolerances

Table 4.1: Existing surface tolerances

	Not to exceed (mm):	
	Width of groove[a]	Height of step[b]
Parallel to direction of travel	12	10
Perpendicular to direction of travel	-	20

a. A narrow slot in the surface that could catch a bicycle wheel, such as a gap between two concrete slabs.

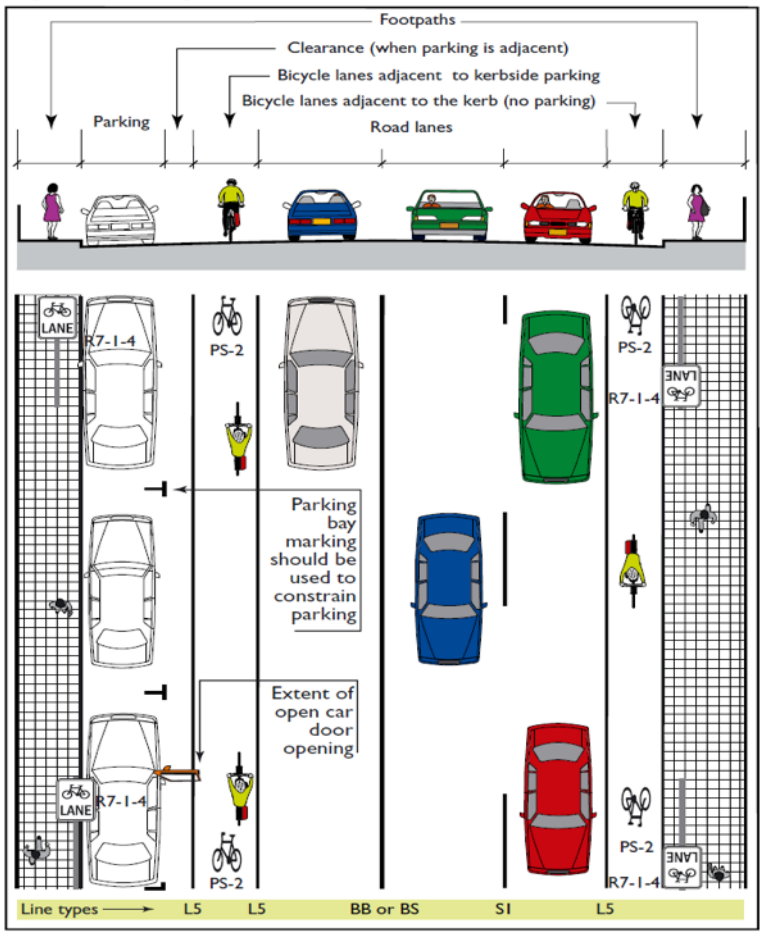
b. A ridge in the pavement, such as that which might exist between the pavement and a concrete gutter or manhole cover; or that might exist between two pavement blankets when the top level does not extend to the edge of the roadway.

Note: It is suggested that a height of 20 mm, as suggested by the Californian Department of Transportation (2006), may be excessive for many modern bicycles that have narrow high-pressure tyres. This value should be considered as a maximum intervention level for an existing facility rather than a design or construction tolerance. It is suggested that individual jurisdictions should consider a lower intervention level (e.g. 10 mm for perpendicular to direction of travel) depending on local circumstances and the importance of the path within the bicycle path network. Designs and specifications should require smooth flat surfaces.

Source: Californian Department of Transportation (2006).

Principle	Rationale	Source
Bicycle Lane	Separated operating space for bicycles on the road. Extra space should be allocated if parking is allowed so riders don't get doored. If marked as a 'bicycle lane' with signage, riders have to stay in it unless impractical	RTA bicycle guidelines

Figure 4.1 Bicycle lane



Principle	Rationale	Source
What should be provided Allowable traffic volumes/road speed for bike sharing with cars	Separation of bicycles and motor vehicles according to traffic speed and volume below	RTA bicycle guidelines

Figure 3.2: Separation of bicycles and motor vehicles according to traffic speed and volume.

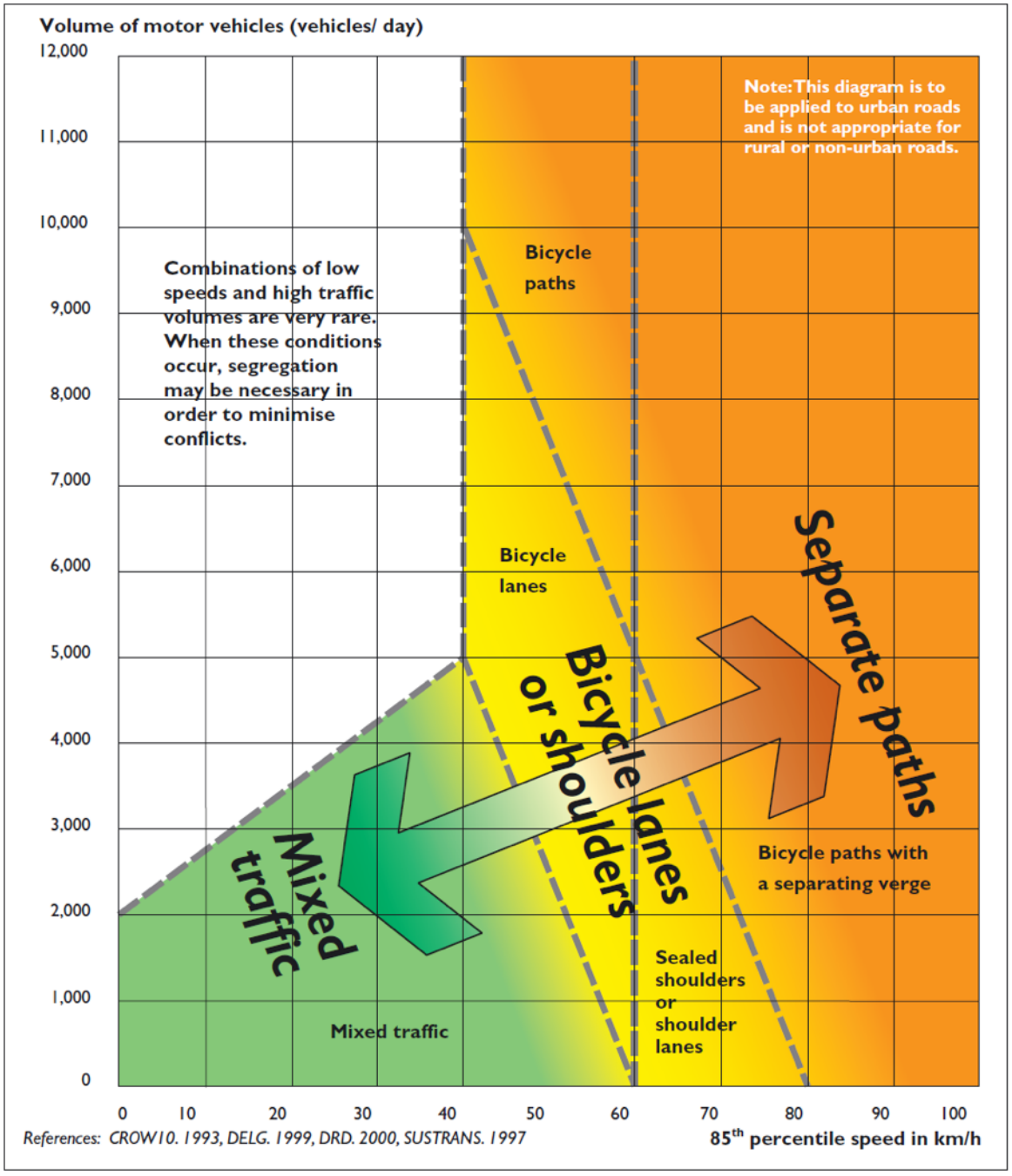
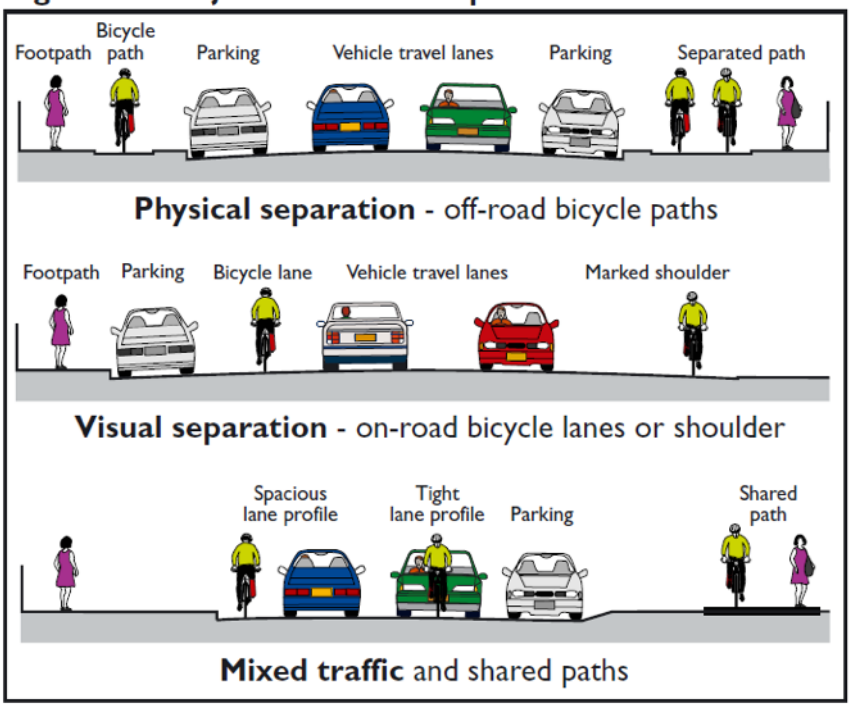
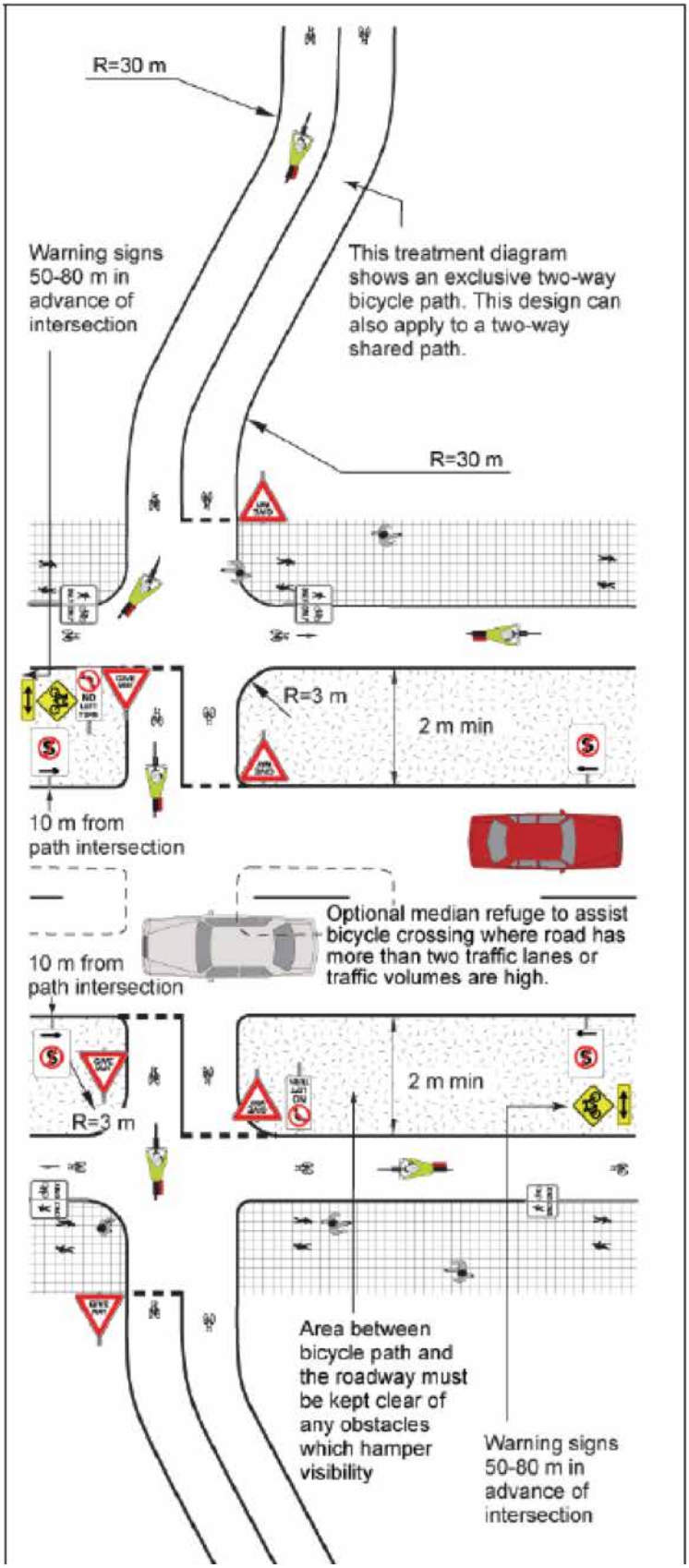


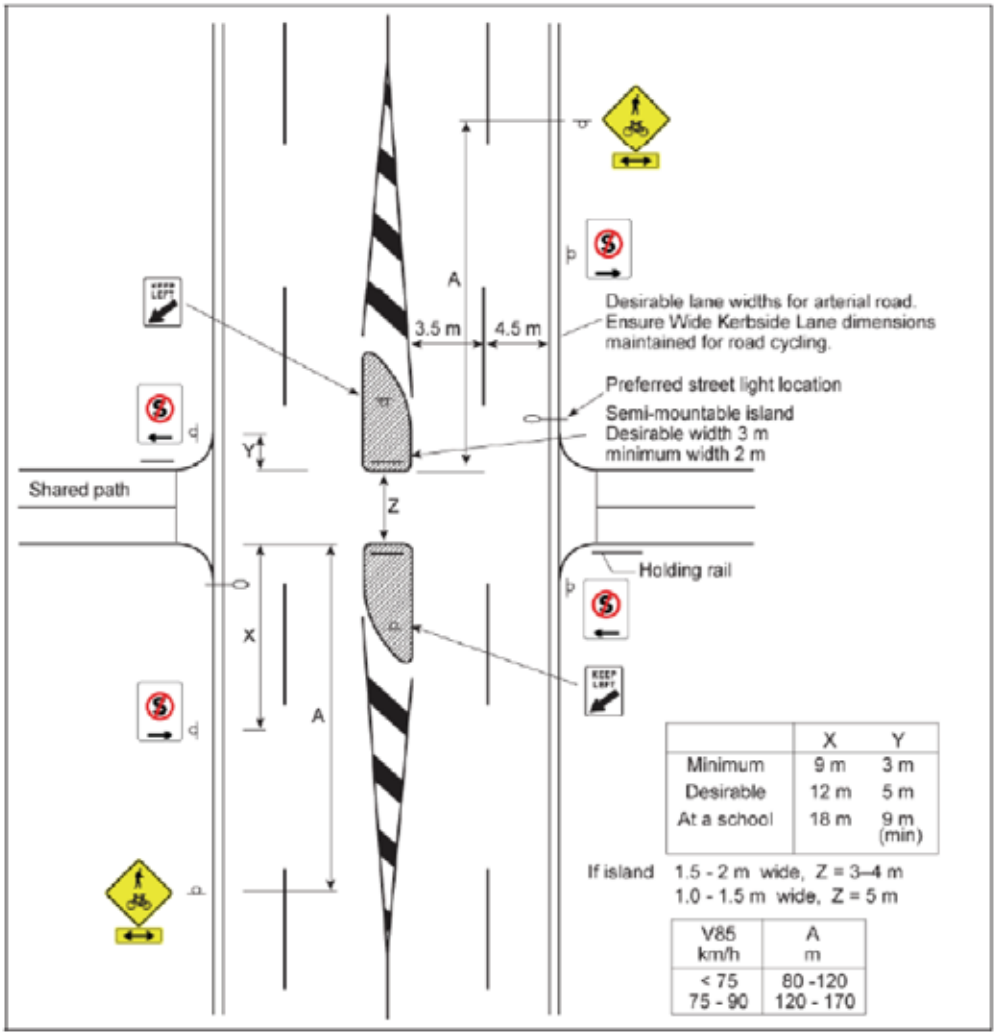
Figure 3.3: Major methods of separation.



Principle	Rationale	Source
Road crossings (lanterns/marking/ signals)	For Crossings at intersections between bicycle paths, shared paths and the road. 9.2.2 Low volume streets (<3000 vehicles per day) may have no special treatment, or just some signs 9.2.3 to cross busy local streets refuges for bike riders are recommended din the middle of the road 9.2.5 it is preferable on low volume streets to give cyclists on a bike path the right of way Under the NSW Road Rules 2014 people are only allowed to cycle across marked pedestrian crossings if there is a bicycle lantern or marked bicycle crossing For Higher volume roads For higher volume roads, or more complex intersections with cycleways and shared paths, refuges within unsignalised intersections 9.2.4 Or separated path crossings 9.4.2	Austroads Guide to Road Design Part4.: Intersections and Crossings

Crossings


R=30 m
Warning signs 50-80 m in advance of intersection
This treatment diagram shows an exclusive two-way bicycle path. This design can also apply to a two-way shared path.
R=30 m
R=3 m
2 m min
10 m from path intersection
Optional median refuge to assist bicycle crossing where road has more than two traffic lanes or traffic volumes are high.
10 m from path intersection
2 m min
R=3 m
Area between bicycle path and the roadway must be kept clear of any obstacles which hamper visibility
Warning signs 50-80 m in advance of intersection



	X	Y
Minimum	9 m	3 m
Desirable	12 m	5 m
At a school	18 m	9 m (min)

V85 km/h	A m
< 75	80 -120
75 - 90	120 - 170

Note: Where required tactile ground surface indicators should be provided on paths and ramps in accordance with AS 1428.4 and jurisdictional guidelines.
Source: Based on AS 1742.10.

Figure 9.2: Example of a cyclist and pedestrian refuge at a mid-block location

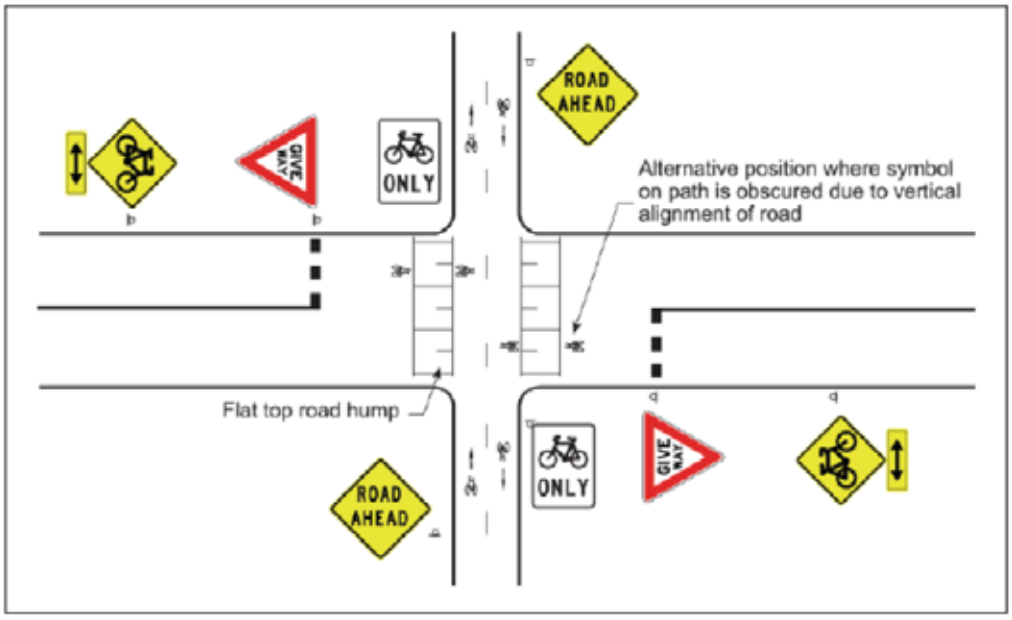


Figure 9.4: Cyclist priority treatment for use at low-volume street crossings

Bicycle Crossing Lanterns

Figure 1. Example of separate pedestrian and bicycle lanterns

Figure 2. Example of a combined pedestrian and bicycle lantern

Marked bicycle crossing adjacent to pedestrians

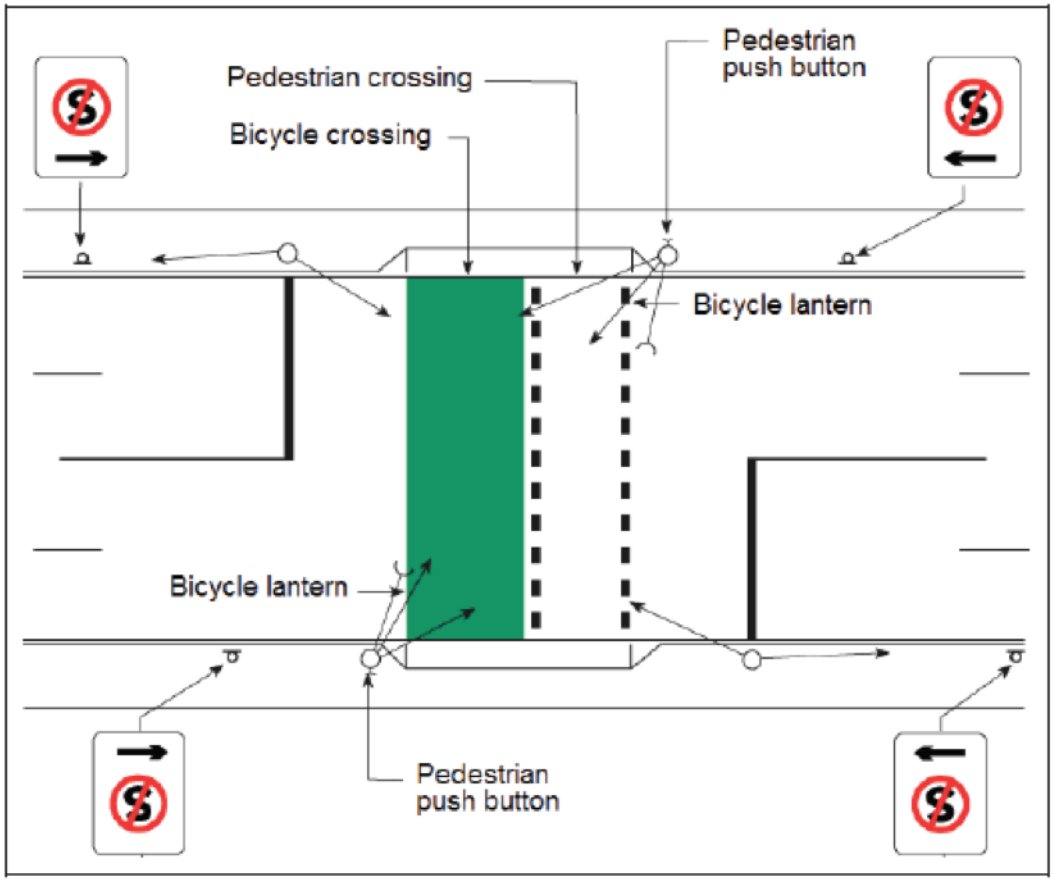
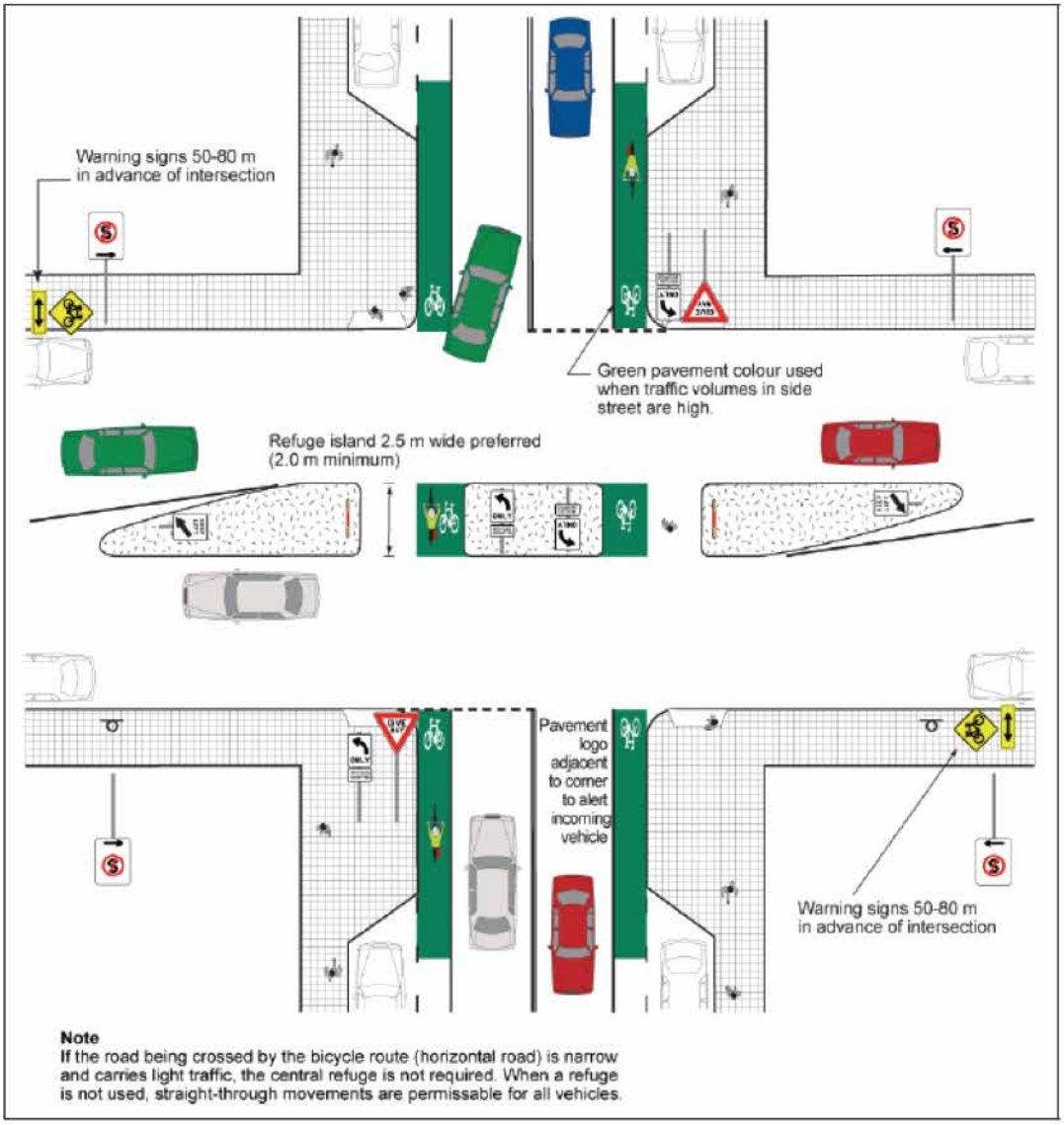


Figure 9.5: Signalised crossing with separate pedestrian and cyclist areas

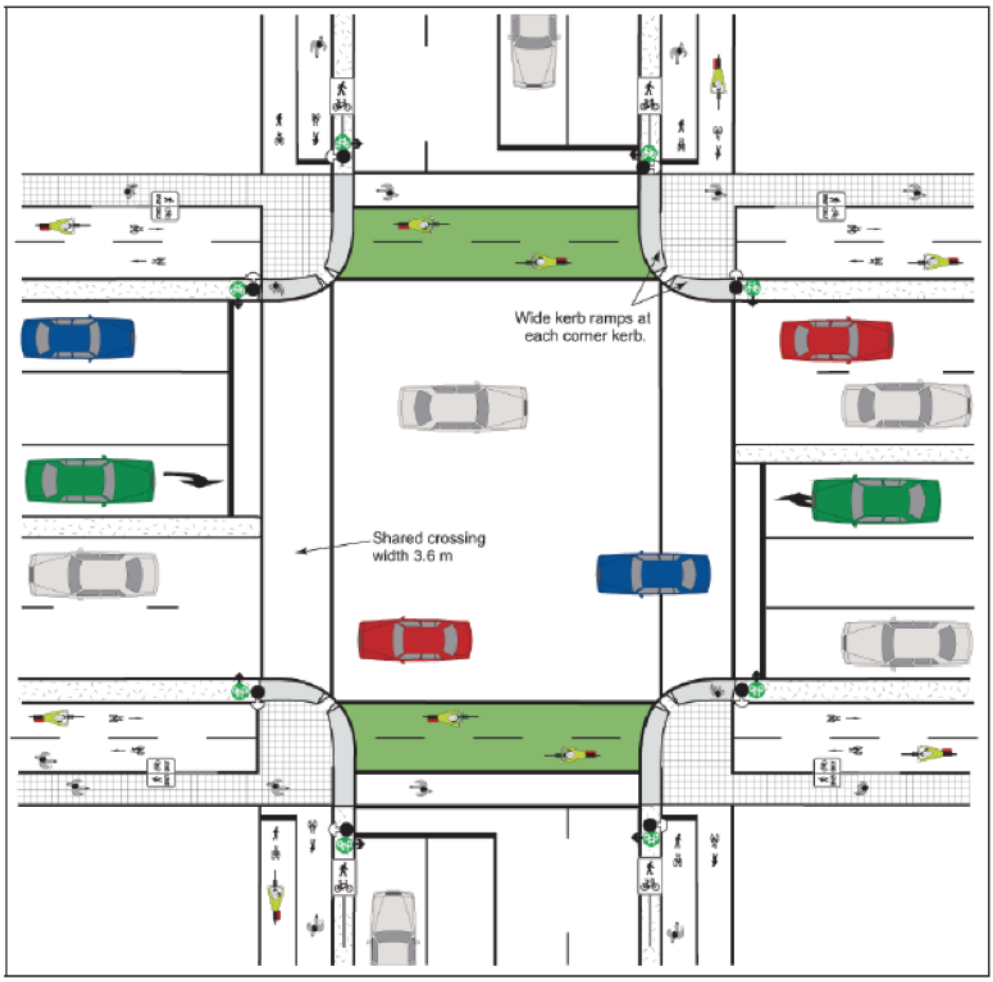
Refuge within unsignalised intersection



Source: Based on RTA (2005).

Figure 9.3: Refuge within an intersection for pedestrians and cyclists in bicycle lanes

Separated path crossing



Notes:

Only the additional bicycle signal lamps are shown, not the complete traffic signal layout.

In-path or other remote detection is recommended for bicycle paths.

The width of the marked crossing for separated paths should match the width of the paths on the approach.

At intersections where the volume of cyclists and pedestrians is high it is advisable to provide contrasting surfaces to delineate the use and priority of movement.

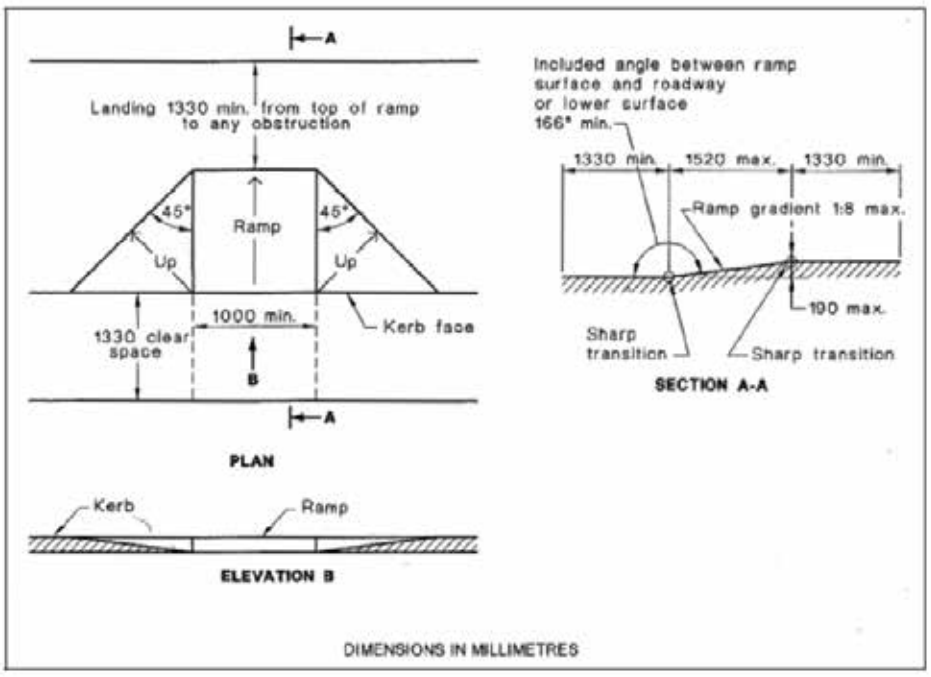
Source: Adapted from RTA (2005).

Figure 9.6: Shared path and one-way bicycle path at a signalised intersection

Principle	Rationale	Source
Lighting	Bicycle Paths or shared paths that carry substantial numbers of cyclists between dawn and dusk should be lit in accordance with lighting level P2 or higher. People riding bikes require more light in order to detect hazards, rough surfaces, other riders and pedestrians because bike lights are generally designed to enable the rider to be seen, not to sufficiently illuminate surfaces to detect and avoid hazards.	Austroads Guide Part 6a: Walking & Cycling s. 7.9 The design standard is AS/ NZS 1158.3.1:2005, Pedestrian area (Category P) lighting- Performance and design requirements

Principle	Rationale	Source
Kerbs and lips	Transitions between different paths and the roadway that will be used by bike riders should be smooth. Kerb and lips can cause crashes, especially where a person riding a bike cannot cross the kerb or lip at a 90 degree angle.	

Kerbs and lips



Notes:

The ramp and sloping sides should be slip resistant and of a colour that contrasts with the adjoining surfaces.

Tactile ground surface indicators should be provided in accordance with AS 1428.4 and jurisdictional guidelines.

The kerb ramp should be aligned in the direction of travel.

For guidance on installation of tactile ground surface indicators, refer to AS 1428.4.

Source: Based on AS 1428.1.

Figure 8.6: An example of a kerb ramp design

Example of good transition with no lip.

Principle	Rationale	Source
Path curvature	Paths alignments should be straight or have large radius that allows the clear sight lines that are essential for safety. The gradient of paths will influence the speed of travel, and the need for longer sight lines	Austroads Guide to road design S7.3 Tables setting out the radii of curves are provided in the standard

Tables for horizontal curve radii

Table 7.1: Minimum radii of horizontal curves without superelevation

Design speed (km/h)	Minimum radius (metres)
20	10
30	25
40	50
50	94

Note: Based on zero superelevation and friction factors of 0.31, 0.28, 0.25 and 0.21 for speeds of 20, 30, 40 and 50 km/h respectively.

Table 7.2: Minimum radius of horizontal curves that have superelevation

	Superelevation (%)				
	2	3	4	5	6
Speed (km/h)	Minimum radius (m)				
20	10	9	9	9	9
30	24	23	22	21	21
40	47	45	43	42	41
50	86	82	79	76	73

Source: Californian Department of Transportation (2006).

Principle	Rationale	Source
Markings and signs the signs used to communicate with bike riders need to conform with Australian standards and be clearly visible to riders	Should be in conformity with standards, not obscured by foliage, and clearly understood. See examples below	NSW Bicycle Guidelines and Australian Standard AS1 742.9 Manual of Uniform Traffic Control Devices Part 9 Bicycle Facilities, and Part 2 Traffic Control Devices for General Use

Markings and signs

Markings and signs

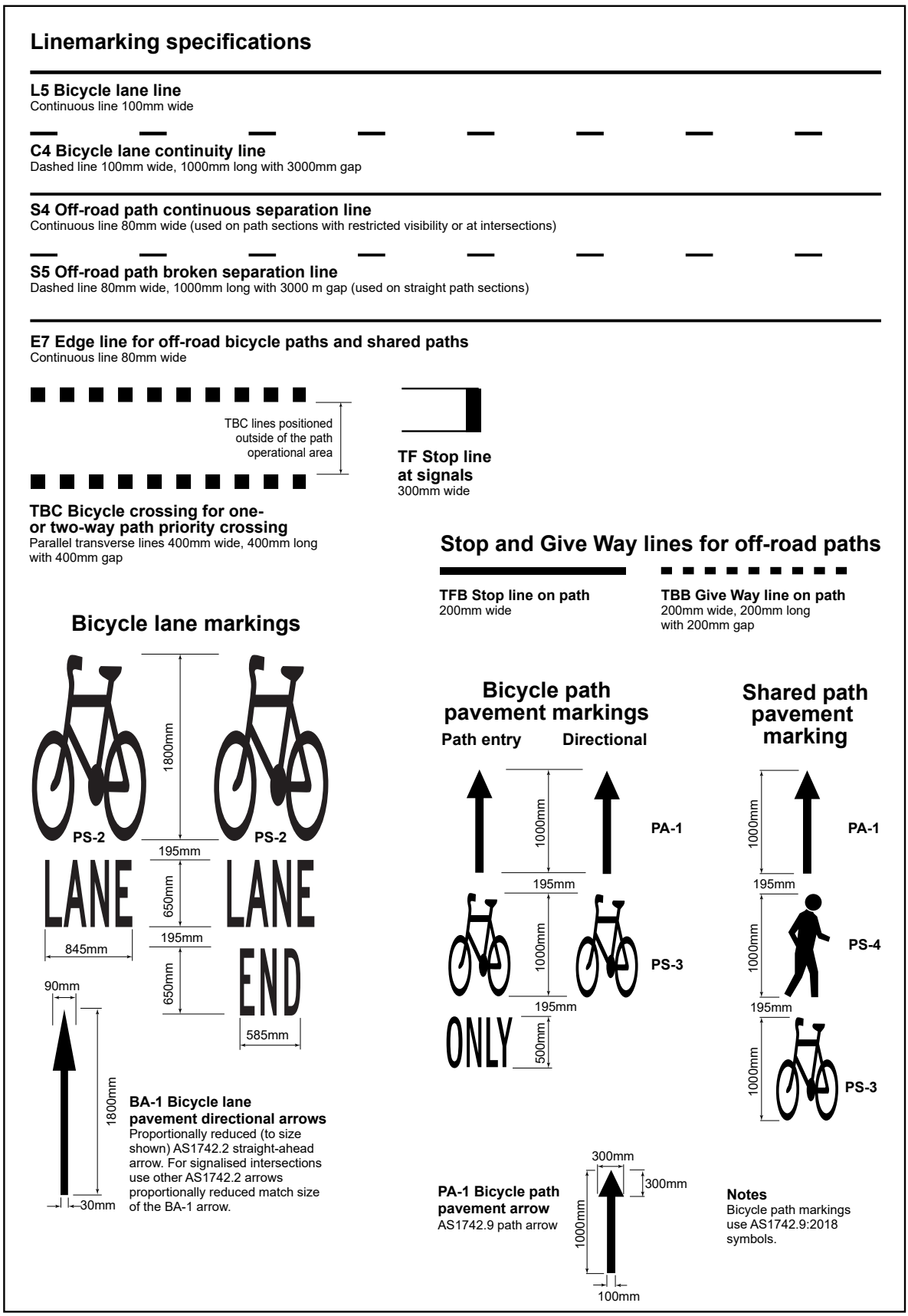
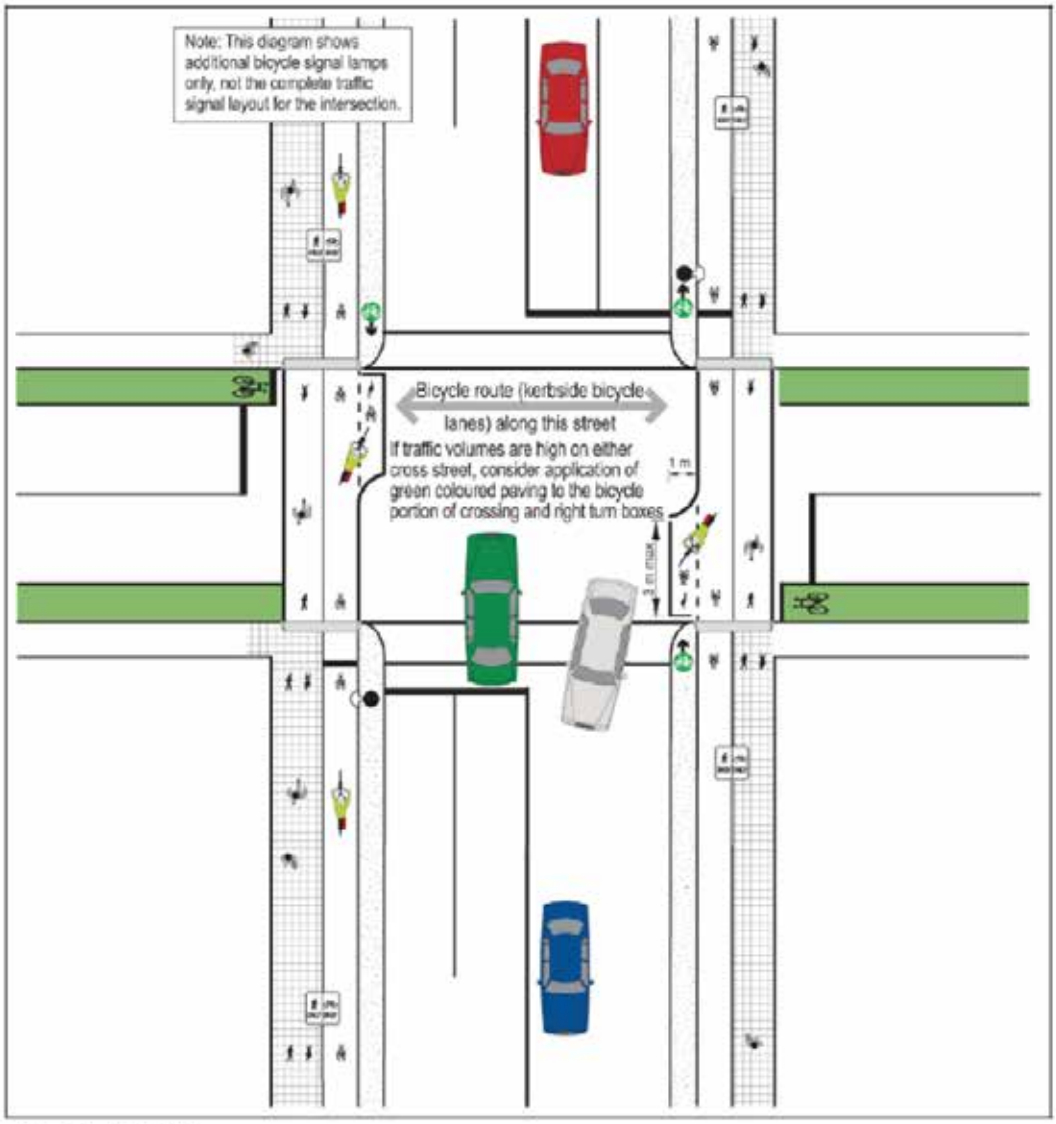


Figure 12.1 from the NSW Delineation Guidelines Part 12: Pavement Markings for Bicycle Facilities updated to reflect recent changes to the NSW Road Rules and Australian Standard AS1742 Part 9: Bicycle Facilities

Markings and signs

Principle	Rationale	Source
Hook Turns	People riding bicycles in NSW may need to complete a hook turn to turn right and safely cross traffic. Bicycle riders are allowed to turn right from the far left lane using a hook turn.	S 9.4.3 of the Austroads Guide to Road Design

Hook Turns

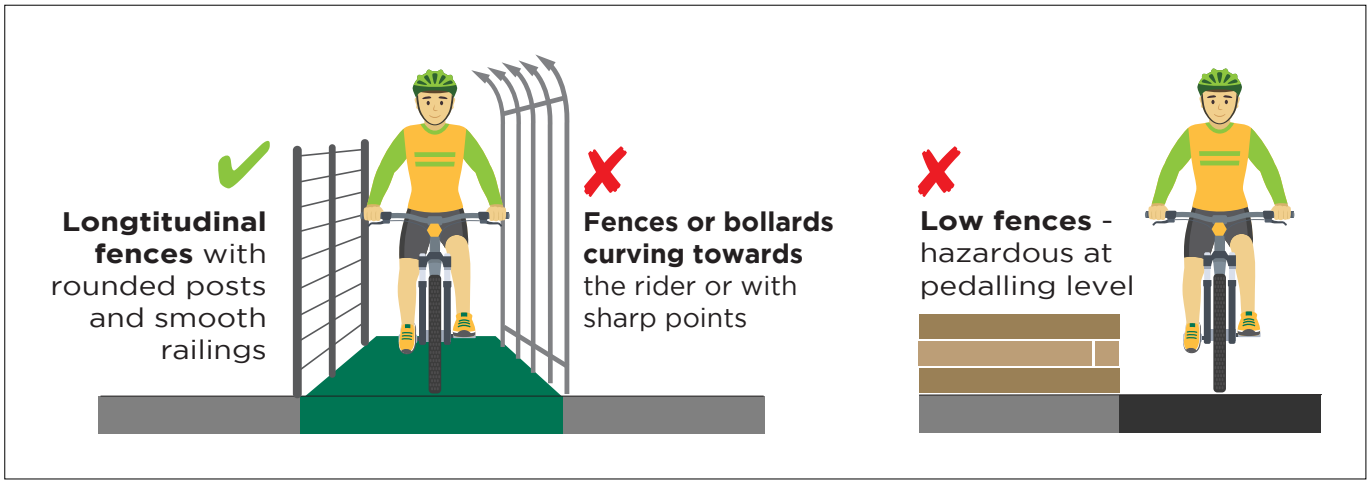


Source: Adapted from RTA (2005).

Figure 9.7: Right turn from an off-road bicycle path to an on-road bicycle lane

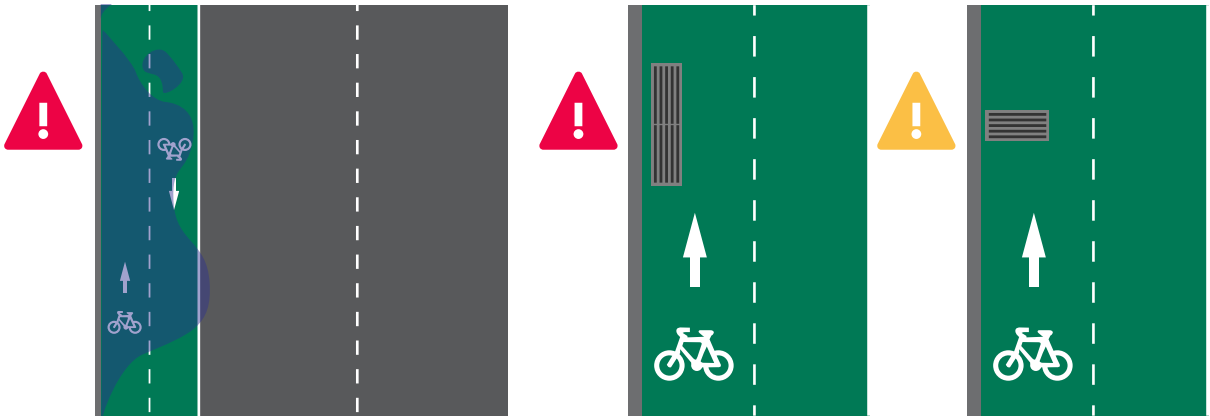
Principle	Rationale	Source
Fences and Railings – should be used to provide a physical barrier to hazards	High speed traffic and sharp drop-offs are common hazards to bike riders and railings and fences can provide safe parries. They should be made of longitudinal members that present a smooth running rail, avoid any features that would snag pedals, and avoid protrusions at either end that a rider may hit Low treated pine log, chain mesh and wire fences should be avoided.	RTA Bicycle Guidelines Austroads 7.5.2 Austroads 7.5.3 Austroads 7.5 & 7.6 NSW Bicycle Guidelines 8.5 Austroads Guide to Traffic Engineering Part 14

Fences and Railings



Principle	Rationale	Source
Drainage – bicycle lanes should be well-drained with safe grilles and structures	Pooled water can cause crashes, poorly designed grilles can trap wheels, and where bike lanes are simply marled on the left of a roadway, water can pool making them unuseable if drainage design fails	NSW Bicycle Guidelines 8.4 and Austroads Guide to Traffic Engineering Part 14

Drainage



Pooled water can cause crashes and make routes unuseable

Vertical grates can trap wheels

Horizontal grates can cause slips

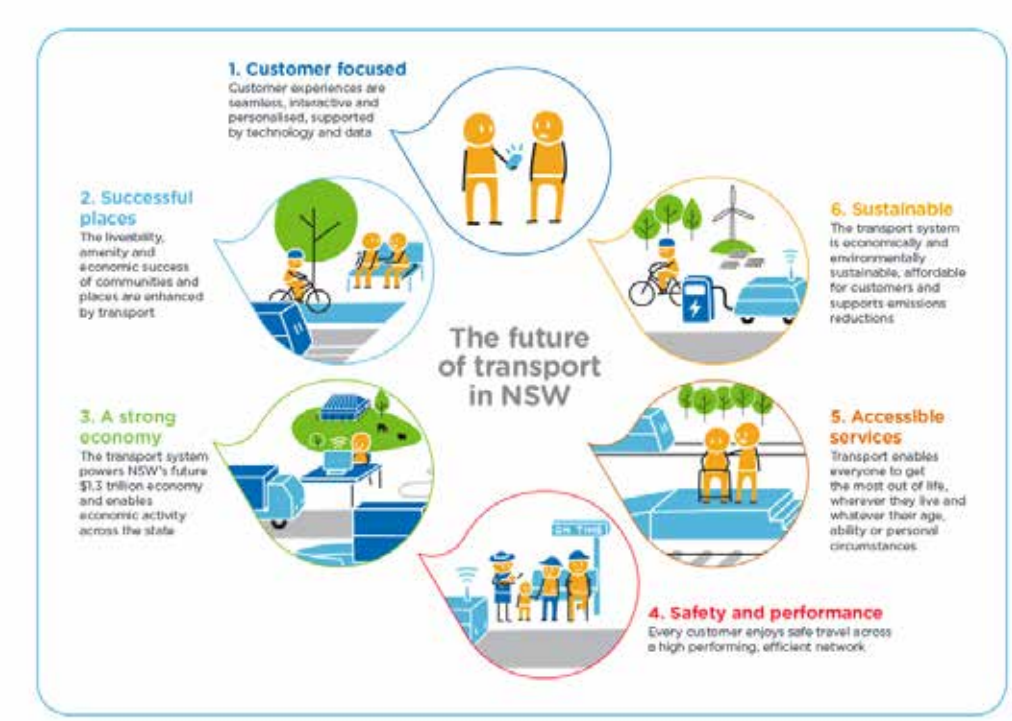
Principle	Rationale	Source
Sight lines –bicycle paths need clear lines of sight	Should take into account that bicycles can travel at up to 50km/h and need clear sight lines. Plantings can improve rider amenity but should be planned to avoid obstructing travel and sight lines, and to reduce the likelihood of root egress damaging the surface of paths, branches or foliage obstructing travel	NSW Bicycle Guidelines 8.3, Austroads Guidelines 2016 s. 3

Principle	Rationale	Source
Bollards Must be clearly marked in a bright colour, with reflective tape and provide safe clearances for riders and pedestrians. Bollards should not be used as a speed control device only as a measure to prevent unauthorised vehicle entry.	Sometimes the only way to prevent unauthorised parking or vehicle use of bike lanes is through using bollards. They should protect, not endanger, bike riders.	NSW Bicycle Guidelines 6.4

Principle	Rationale	Source
Speed control On bike infrastructure should be limited to path narrowing, path deflection, warning signage and alternative paving.	Speed humps, rumble strips, path terminal deflection rails, holding rails and bollards should not be used to control speed as they cause crashes.	NSW Bicycle Guidelines 6.3

LEGISLATION REGULATION AND GUIDELINES THAT SHOULD BE APPLIED

Principle	Rationale	Source
Infrastructure ignoring bikes?	Of the 6 outcomes of this plan, bike riding and safe cycling infrastructure contributes to 4 "2. Successful Places", "4. Safety and performance" "5. Accessible services", and "6. Sustainable"	NSW Government, Future Transport 2056



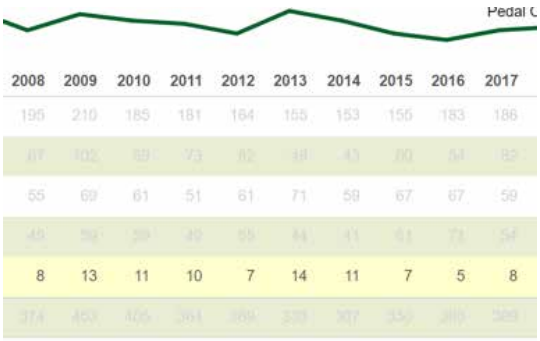
The vision of the plan includes:

Encouraging active travel (walking and cycling) and using public transport

"...One in eight NSW residents ride a bicycle in a typical week.[1] Increasing the number of people using active transport for short trips to their local and city centres will require us to look at safe, well connected infrastructure such as bike paths and walking routes. More people traveling by active transport will improve network outcomes overall in addition to delivering positive health, wellbeing and environmental outcomes.

We know that we need to look at initiatives that support people using active transport for short trips including the provision of safe and accessible footpaths, designed for all ages and abilities with frequent seating and shade. Other factors that encourage active transport include safe pedestrian crossings, lower traffic speeds, safe, separated cycling paths and before and after trip facilities such as secure bicycle storage.

Transport for NSW is already delivering initiatives to increase active transport. As part of Sydney's Cycling Future program, secure bike storage is being rolled out across the network providing undercover storage at selected railway stations..."

Principle	Rationale	Source
Not safe enough?	State Priority Target to reduce road fatalities by 30 per cent by 2021 (from 2008–10 levels). This has not happened for bike riders. According to the Centre for Road Safety Statistics fatality rates are increasing, and sadly in the first 4 months of 2020 we reached the annual death toll of 2008:  	NSW Government, Road Safety Plan 2020(Towards Zero) (2018) [Online 1/4/2020]

Serious injury trends have also increased:

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Driver	2,221	2,204	2,473	2,645	2,884	2,850	2,867	2,829	2,746	2,654
Passenger	834	690	731	791	786	800	785	754	748	698
Motorcyclist	971	940	1,006	1,117	1,187	1,234	1,045	1,169	1,182	1,024
Pedestrian	622	596	656	607	650	711	607	636	627	556
Pedal Cyclist	266	255	247	276	320	322	299	298	317	298
Grand Total	4,914	4,685	5,113	5,436	5,827	5,917	5,603	5,686	5,620	5,230

Priorities:

- Saving lives on country roads – improving road safety infrastructure, including targeting high-risk roads and behaviours, as the fatality rate on country roads is four times the rate on metropolitan roads.
- Safe urban places – addressing crashes in busy local areas, including pedestrian trauma which accounts for around 17 per cent of all deaths in NSW and 9 per cent of serious injuries.
- Using the roads safely – preventing risky road behaviour, such as drink and drug driving.
- Building a safer community culture – working in partnership with local and state road authorities, education providers, business and industry, vehicle manufacturers, community organisations and road safety advocates to build a safety culture.

Principle	Rationale	Source
Inclusion Fail?	The NSW Government is directed to create more liveable communities for people with disability. Areas identified for further development include: • increasing the availability and accessibility of public and private transport options for people with disability, including people living in regional and rural areas, and ongoing implementation of existing transport access plans • increasing the accessibility of public spaces including bus stops, outdoor paths of travel and footpaths, ramps, stairs, curb ramps, rest areas and accessible pedestrian signals	Disability Inclusion Plan, NSW Government(2015) [Online 1/4/2020]
Ageist?	"Active transport including walking and cycling are encouraged as transport options for active older people. The focus of transport options includes maintaining active ageing as long as possible and not having mobility curtailed as a result of transport services and supporting infrastructure that do not reflect needs during this stage."	Older Persons Transport and Mobility Plan 2018-2022 NSW Government (2018) [Online 1/4/2020]

Principle	Rationale	Source
Infrastructure failing bike riders?	Austroads Guide to Road Design – Part 6A Walking & Cycling (2017) [Online 1/4/2020] Australian Standards: — AS2890.3 Parking Facilities: Part 3 – Bicycle Parking Facilities	https://austroads.com.au/publications/road-design/agrd06a https://www.standards.org.au/standards-catalogue/sa-snz/building/ce-001/as--2890-dot-3-colon-2015
	Australian Standards: — AS1742 Manual of Uniform Traffic Control Devices	https://www.standards.org.au/standards-catalogue/sa-snz/transportandlogistic/ms-012/as--1742-dot-9-colon-2018
	Australian Standards: — AS1743 Road Signs – Specifications	https://www.standards.org.au/standards-catalogue/sa-snz/transportandlogistic/ms-012/as--1743-colon-2018
	RMS 2013 supplements to the Australian Standards including Manual of uniform traffic control devices, Part 9: Bicycle facilities AS1742 Part 9: Bicycle facilities	https://www.standards.org.au/standards-catalogue/sa-snz/transportandlogistic/ms-012/as--1742-dot-9-colon-2018

Principle	Rationale	Source
Construction management seems unsafe?		
Risk	Part 2. S2.3 Risk – requiring "…identification and analysis of all risks likely to arise during works on roads…evaluating them in terms of likelihood of occurrence and adverse consequences using historical data, experience or other means. The traffic management plan and the traffic guidance scheme should then be checked in detail to ensure that adequate means of controlling or reducing those risks are in place…" "…To ensure that risks are managed appropriately, a Traffic Management Plan (TMP): • outlines how the works are to be integrated into the operation of the road network • identifies and considers all foreseeable risks • stipulates mitigation measures • assesses the impact on all categories of road users, adjacent property and business owners and other impacted stakeholders."	Austroads Guide to Temporary Traffic Management (2019) [Online 1/4/2020]
Traffic Management Plan	S2.6.2 Principles for consideration in the preparation and review of a Traffic Management Plan (TMP) "There are four guiding principles to be considered as part of the preparation and review of TMPs: • safety • accessibility • amenity • asset. Safety is of the highest priority…."	Austroads Guide to Temporary Traffic Management (2019) [Online 1/4/2020]

Principle	Rationale	Source
Safety	TMPs control the risks...any feature placed within the road environment has the potential to be a risk ...particularly so for vulnerable road users such as cyclists, pedestrians and the mobility impaired. Legibility of the site is important and road users must be able to easily understand the traffic management measures in use. Particular attention to detail when locating signs, barriers and other traffic control devices is essential."	Austroads Guide to Temporary Traffic Management (2019) [Online 1/4/2020]
Accessibility	TMPs ensure access to the road and essential goods and services is maintained for all road users. Consider accommodating the needs of public transport users and the mobility and visually impaired and other vulnerable road users, including the provision of parking	Austroads Guide to Temporary Traffic Management (2019) [Online 1/4/2020]
Amenity	TMPs minimise delays to traffic (including pedestrians, cyclists and other vulnerable road users), maximise network efficiency, and, where practical, maintain the most direct and convenient route between destinations. The first preference is to redirect traffic around the works, and any detour should be as short as possible and as close to the level of difficulty of the original route. Designers should consider adjoining or nearby developments when selecting detours as well as the impact of increased traffic on existing paths. Where it is not practical to send traffic safely around the works, sending traffic through the works is the next preference. Where possible, traffic lanes, footpaths, cycle paths, cycle lanes and shared paths should remain open for use. Footpath and cycle routes will be maintained on the same side of the street and additional road crossings will be minimised.	Austroads Guide to Temporary Traffic Management (2019) [Online 1/4/2020]
Duty of Care	S2.8.3 Duty of Care "Include a commitment by the party responsible for implementation of the TMP to exercise duty of care to works and all road users in the implementation of the TMP.	Austroads Guide to Road Design (2019) [Online 1/4/2020] Austroads Guide to Road Safety Austroads Guide to Road Safety (2019) [Online 1/4/2020]

BIBLIOGRAPHY

Mapping Comparison: Guide to Temporary Traffic Management and Australian Standard 1742.3 (2009) [outdated] to AS1742.3 (2019) https://austroads.com.au/publications/temporary-traffic-management/ap-c109-20/AP-C109-20_Mapping_AGTTM_and_AS1742-3.pdf

All Australian standards can be found by searching [Online] Accessed 26/3/2020 https://www.standards.org.au/