Road Planning and Design Manual
Edition 2: Volume 3

Supplement to Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths

June 2015

Queensland Government

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Relationship with Austroads Guide to Road Design – Part 6A (2009)

The Department of Transport and Main Roads has, in principle, agreed to adopt the standards published in the *Austroads Guide to Road Design* (2009) *Part 6A: Pedestrian and Cyclist Paths.*

When reference is made to other parts of the *Austroads Guide to Road Design* or the *Austroads Guide to Traffic Management*, the reader should also refer to Transport and Main Roads related manuals:

- *Road Panning and Design Manual*
- *Traffic and Road Use Management Manual*.

Where a section does not appear in the body of this supplement, the *Austroads Guide to Road Design – Part 6A* criteria is accepted unamended.

This supplement:

- has precedence over the *Austroads Guide to Road Design – Part 6A* when applied in Queensland
- details additional requirements, including accepted with amendments (additions or differences), *new* or *not accepted*
- has the same structure (section numbering, headings and contents) as *Austroads Guide to Road Design – Part 6A*.

The following table summarises the relationship between the *Austroads Guide to Road Design – Part 6A* and this supplement using the following criteria:

Accepted:	Where a section does not appear in the body of this supplement, the *Austroads Guide to Road Design – Part 6A* is accepted.
Accepted with Amendments:	Part or all of the section has been accepted with additions and or differences.
New:	There is no equivalent section in the *Austroads Guide to Road Design – Part 6A.*
Not accepted:	The section of the *Austroads Guide to Road Design – Part 6A* is not accepted.

Austroads Guide to Road Design – Part 6A	RPDM Relationship
1 Introduction	
1.1 Purpose	Accepted
1.2 Scope of this Part	Accepted
1.3 Safe System Approach	Accepted
1.4 Road Design Criteria in Part 6A	New
2 Planning and need for a path	
2.1 Planning	Accepted
2.2 Need for a Path	Accepted with amendments
3 Types of path	
3.1 General	Accepted
3.2 Footpaths	Accepted
3.3 Bicycle Paths	Accepted
3.4 Shared Use Paths	Accepted
3.5 Separated Paths	Accepted
4 Path user requirements	
4.1 Pedestrians	Accepted
4.2 Cyclists	Accepted with amendments
5 Location of paths	
5.1 General	Accepted
5.2 Factors of Influence – Path Location	Accepted
5.3 Factors Influencing Roadside Alignment	Accepted
5.4 Paths in Medians	Accepted
6 Design criteria for pedestrian paths	
6.1 Alignment	Accepted
6.2 Clear Width and Height	Accepted
6.3 Changes in Level	Accepted
6.4 Surface Treatments	Accepted
6.5 Pedestrian Path Lighting	Accepted
7 Path design criteria for bicycles	
7.1 General	Accepted
7.2 Bicycle Operating Speeds	Accepted with amendments
7.3 Horizontal Curvature	Accepted with amendments
7.4 Gradient	Accepted with amendments
7.5 Width of Paths	Accepted with amendments
7.6 Crossfalls and Drainage	Accepted with amendments
7.7 Clearances, Batters and Need for Fences	Accepted with amendments
7.8 Sight Distance	Accepted
7.9 Bicycle Path Lighting	Accepted
7.10 Underground Services	Accepted

8 Intersections of paths with roads	
8.1 General	Accepted
8.2 Ancillary Treatments and Features	Accepted
9 Paths remote from roads	
9.1 General	Accepted
9.2 Path Function	Accepted
9.3 Intersections of Paths with Paths	Accepted
10 Path terminal treatments	
10.1 General	Accepted with amendments
10.2 Terminal Design Principles	Accepted with amendments
10.3 Terminal Device Opening Width	Accepted with amendments
10.4 Terminal Treatments	Accepted with amendments
10.5 Holding Rails	Accepted
11 Provision for cyclists at structures	
11.1 General	Accepted
11.2 Road Bridges	Accepted
11.3 Grade Separated Crossings	Accepted with Amendments
11.4 Bicycle Wheeling Ramps	Accepted
12 Construction and maintenance considerations for paths	
12.1 General	Accepted with Amendments
12.2 Bicycle Safety Audits	Accepted
References	
References	Accepted with amendments
Appendices	
Appendix A Application of envelopes and clearances to determine the widths of paths	Accepted
Appendix B Path construction and maintenance	Accepted
Appendix C Bicycle safety audit checklist	Accepted
Commentaries	
Commentary 1	Accepted with Amendments
Commentary 2	Accepted
Commentary 3	Accepted
Commentary 4	Accepted
Commentary 5	Accepted
Commentary 6	Accepted
Commentary 7	Accepted
Commentary 8	Accepted
Commentary 9	Accepted
Commentary 10	Accepted
Commentary 11	Accepted
Commentary 12	Accepted
Commentary 13	New
Commentary 14	New

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1 Introduction

1.4 Road Design Criteria in Part 6A

There is no equivalent Section 1.4 in *Austroads Guide to Road Design – Part 6A*.

New

Guidance on the use of values outside of the design domain (Normal and Extended) should be undertaken in accordance with this document and the Transport and Main Roads *Guidelines for Road Design on Brownfields Sites*.

2 Planning and need for a path

2.2.3 Paths for Cycling

Additions

The first step is the assessment as to whether an on-road lane or an off-road path, or both, are required. There may be a range of issues, constraints and practices that will have a bearing on the decision making process.

Once the decision that an off-road path is required, the procedure outlined in Figure 6A.1 can be used to:

- assess the capacity of existing paths
- assess the need for path upgrades, and
- to select appropriate widths for new paths.

The three inputs that must be considered when assessing path capacity are:

- the “design hour”
- the numbers of pedestrians and cyclists using the path during that time, and
- the “directional split”.

The Transport and Main Roads *Guidance on the widths of shared paths and separated bicycle paths Technical Note 133* provides additional operational and best practice guidance.

Figure 6A-1 Transport and Main Roads accepted process for determining the appropriate path type

Step 1

Determine the "design hour" for the path.

The design hour for the path is the hour during which it is most desirable to minimise delays for cyclists. The design hour may be the weekday AM peak hour for commuter paths, it may be sometime on a weekend for recreational paths or it may be the hour when most people are using the path. It is up to the designer or the path manager to determine the design hour. If possible future usage should always be factored into these calculations.

Step 2

Count the numbers of pedestrians and cyclists using the path in the design hour and their direction of travel.

Counting may be done manually or by automatic counting methods such as sensors. For more information on counting methodology for pedestrians and cyclists refer to the *Austroads (2013) Guide to Traffic Management – Part 3: Traffic Studies and Analysis*.

Step 3

Determine the directional split of the path users.

"Directional split" indicates the proportion of path users going in each direction. The split can be calculated by dividing the numbers of path users going in each direction by the total number of path users. Expressed as a percentage.

Step 4

Determine the appropriate path width for the number of pedestrians and cyclists using the path and the directional split.

To determine the appropriate path width:

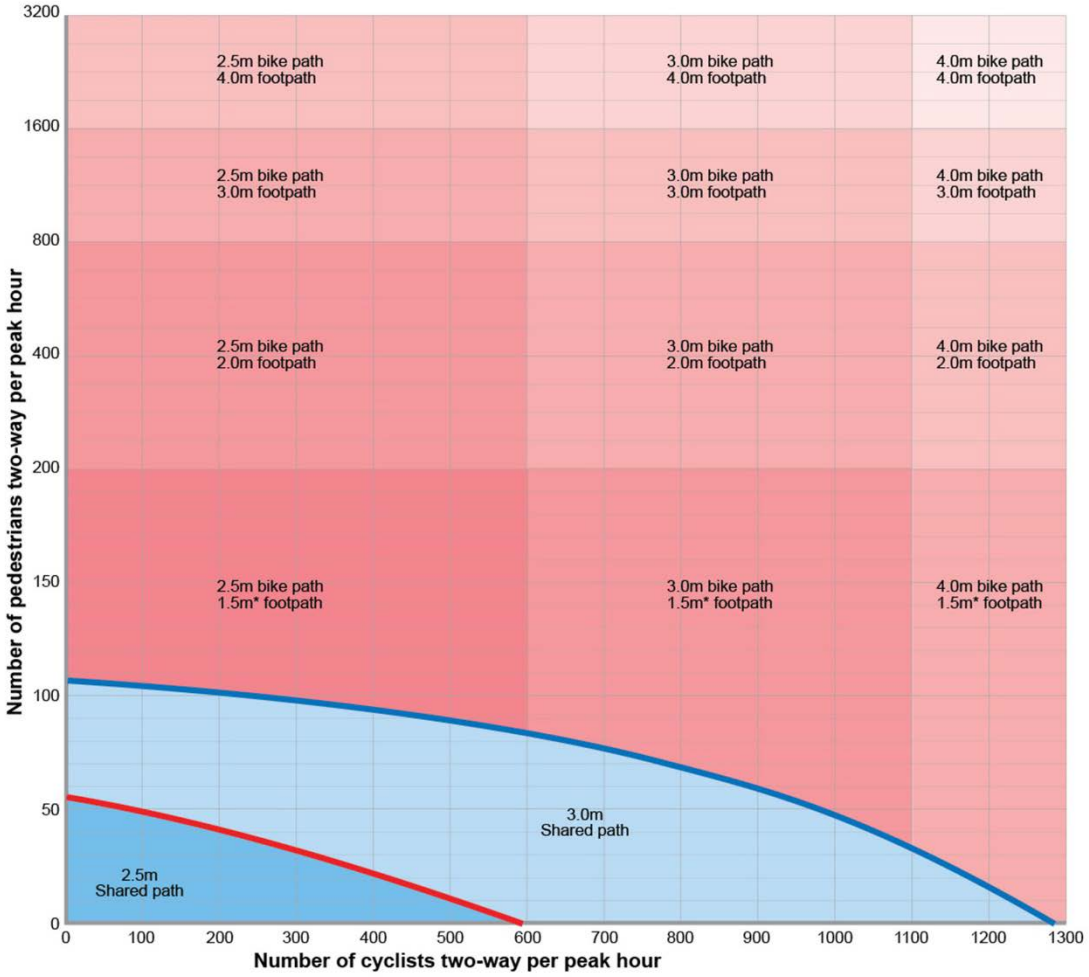
(a) select the appropriate graph to use – Figure 6A.2 for paths with a 75/25 directional split or Figure 6A.3 for paths with a 50/50 directional split

(b) locate the number of pedestrians on the left side or "y" axis of the appropriate graph and draw a horizontal line across the graph from this point, and

(c) locate the number of cyclists along the bottom or "x" axis of the graph and draw a vertical line.

The zone within which these two lines intersect indicates the recommended path width.

Figure 6A-2 Path capacity and recommended widths, directional split 75/25

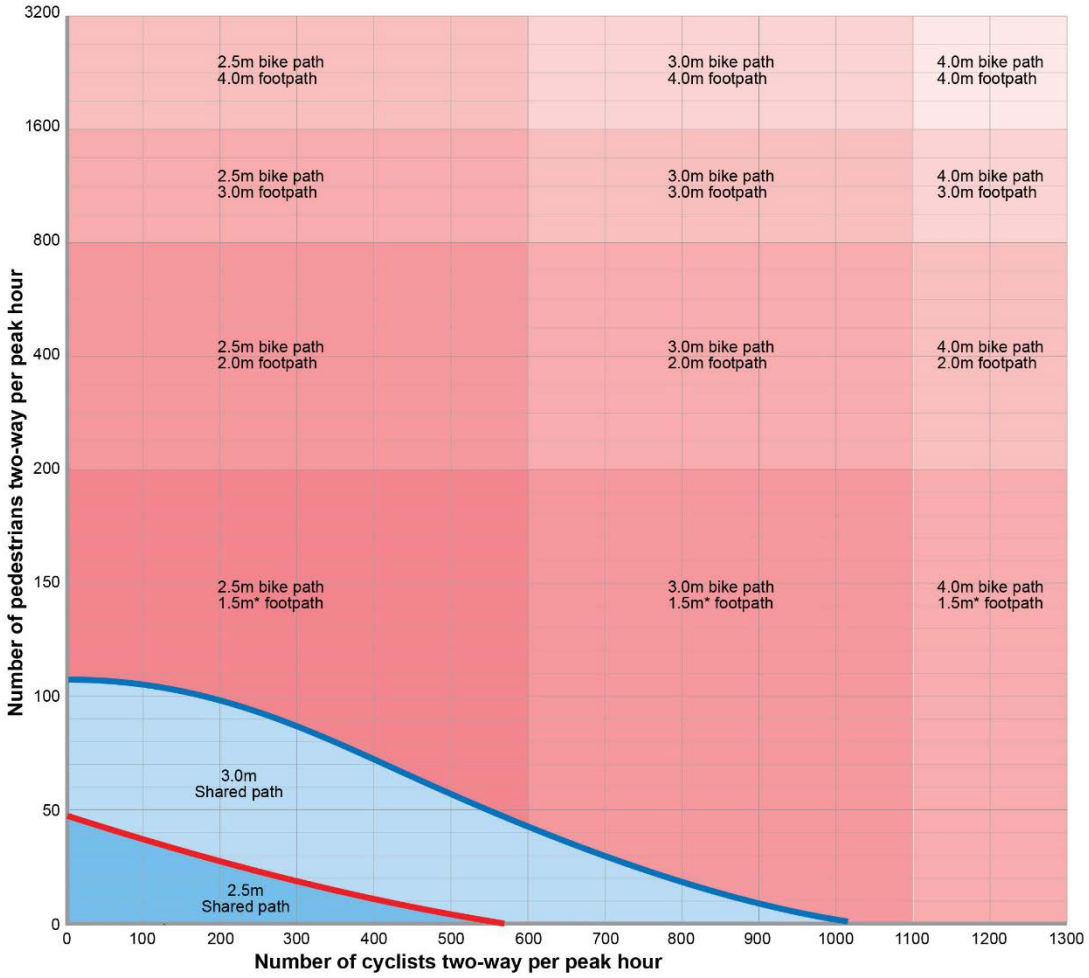


Notes: This figure is not to be used for pedestrian only paths

1.5 m footpath width is the low use minimum only and is not appropriate at higher pedestrian volumes

A 75/25 directional split is typical for most commuter paths which are subject to high peak direction volumes.

Figure 6A-3 Path capacity and recommended widths, directional split 50/50



Notes: This figure is not to be used for pedestrian only paths

1.5 m footpath width is the low use minimum only and is not appropriate at higher pedestrian volumes

A 50/50 directional split is typical for most recreational paths which are subject to high use in both directions.

4 Path user requirements

4.2.2 Cyclist Operating Space and Clearances

Additions

Where a path is located immediately adjacent to a road, refer to Section 4.8 of Volume 3, Part 3 of this *Road Planning and Design Manual* for design guidance on the clearance to a cyclist envelope from an adjacent truck.

7 Path design criteria for bicycles

7.2 Bicycle Operating Speeds

Additions

Cyclists may be divided into the following broad groups shown in Table 6A-1.

Table 6A-1 Cyclist groups

Group	Description
Primary school children	Particularly younger children do not have developed road skills and awareness of dangerous situations and should preferably be provided with off road facilities.
Secondary school children	Are more adventurous and may prefer public roads to off-road paths, particularly if the latter requires a longer journey.
Recreational cyclists	Prefer most of their travelling on the quieter off-road paths and streets, and are usually not in any hurry to reach their destination. However, they will use the road system for longer journeys. For example, cycle tourers will travel extremely long distances within and between towns.
Commuter cyclists (e.g. work, shopping)	May have varying needs. Some will want to reach their destination in the shortest time, regardless of traffic conditions, and the others are prepared to take longer on less stressful routes. Secure bicycle parking facilities at the end of the journey are required, especially where stops for long periods occur.
Sports cyclists in training	Travel long distances for training and will be found on arterial roads and highways. Many of these cyclists will also commute to work.

For any specific locality, the needs of all the potential users should be considered. All will share common needs such as a smooth riding surface, a safe travelling corridor including connectivity of routes to potential destinations and somewhere to park the bicycle at the end of the trip.

Physical measures are sometimes needed to moderate speeds at the entry to paths and areas shared with pedestrians. The device must provide a clear unambiguous direction to the path user, the device must not add a hazard and the device must be supported by adequate regulatory signage and line marking. Table 6A-2 sets out acceptable and unacceptable speed limiting treatments for bicycle path and shared path terminations in Queensland.

Research undertaken by Transport and Main Roads found no defensible justification for imposing regulatory speed limits, and as a consequence would not use or recommend them as a safety device. Alternative treatment methods may be as or more effective as a safety device, avoiding the negative connotations associated with regulation. The Transport and Main Roads *Speed management on shared paths Technical Note 130* concludes that the cycling community is able to self-moderate speeds that are appropriate to the location without regulation.

Table 6A-2 Path speed-limiting devices

Device	Recommended	Comments	Queensland practice additional comments
Speed humps	Yes	Can destabilise riders and increase hazards if poorly sited or inadequately marked. Use with care. Fit warning signage and path markings similar to road speed humps	Watts or sinusoidal profile speed humps are acceptable
Path narrowing	Yes	Minimum one-way width 1.4 m. Warning signage and adequate linemarking required	
Path deflection	Yes	Maximum deflection angle 10 degrees for high-speed path and 20 degrees for low-speed path	
Path terminal deflection rails	No	Can destabilise riders and increase hazards if used as speed limiting device. Used only to prevent unauthorised vehicle entry	
Rumble strips	Yes	Use as a warning device to alert riders to slow for changed conditions ahead	Tactile (surface change) is acceptable
Warning signage	Yes	Used to warn of approaching hazard and to advise of need to reduce speed. Used in conjunction with other methods	
Holding rails	No	Only used at intersections as a temporary prop	Not suitable as a speed limiting device
Bollards	No	Not recommended as a speed control device. Only used to prevent unauthorised vehicle entry	
Alternative paving	Yes	Use different materials and colours	

The Transport and Main Roads *Speed management on shared paths Technical Note 130* provides additional guidance.

7.3 Horizontal Curvature

Additions

If possible, a generous alignment should be used to provide good operating characteristics. There will be constrained situations where smaller radii will be required. On the approach to intersections or on "hair-pin" bends in steep terrain, radii as small as 5 m may be appropriate. In general, radii of 15 m are considered "sharp".

7.4.1 Ease of uphill travel

Additions

On the steeper grades, experienced cyclists work the bicycle from side to side and inexperienced cyclists tend to wobble. The bicycle lane in the uphill direction should be widened by an additional 0.5 m to allow for this operating characteristic.

7.4.2 Safety of downhill travel on paths

Additions

Steep grades must not be combined with sharp horizontal curvature (i.e. curves < 20 m radius).

7.5.1 General

Additions

The Transport and Main Roads *Guidance on the widths of shared paths and separated bicycle paths Technical Note 133* provides operational and best practice guidance on the widths of paths in order to minimise potential conflict between users.

7.5.3 Shared paths

Differences

All of the text, including Table 7.4, in this section of *Austroads Guide to Road Design Part 6A* is replaced with the following.

Park maintenance vehicles can effectively operate on 2.5 m wide paths. For this reason, 2.5 m should be the minimum standard for shared paths.

The design width of a path also depends on the number of pedestrians per hour, the number of cyclists per hour and the design directional split. Table 6A-3 provides values for 90/10 directional split. Transport and Main Roads *Guidance on the widths of shared paths and separated bicycle paths Technical Note 133* recommends that the maximum number of 12 delayed overtakings per hour and should be reviewed for additional directional splits.

Table 6A-4 provides a summary of the widths of shared paths and some broad guidelines for their use, based on user volumes, locations, intended use and estimated speed of cyclists. In proposing these widths, intermediate widths (for example 2.4 m or 3.7 m) are unlikely to be considered.

Table 6A-3 Shared path capacity for different widths

Pedestrians per hour	Cyclists per hour		
	2.5 m path	**3.0 m path**	**4.0 m path**
0	730	1.380	2,420
20	440	1,160	2.200
50	210	960	1,990
100	–	770	1,740
200	–	460	1,440

Note: Based on two way peak-hour volumes 90/10 directional split, design maximum of 12 delayed overtakings per hour.

Table 6A-4 Summary of path widths and guidelines for their use

Path Width	Type of path	Guidelines for appropriate use
2.5 m	Recreational and regional commuter paths.	Overtakings and meetings between path users are likely and bicycle speeds are between 15 km/h and 25 km/h. This width may be appropriate for commuter and recreational paths within outer suburban areas and regional cities and towns.
3.0 m	Recreational and urban commuter paths where overtakings and meetings are frequent and bicycle speeds exceed 25 km/h. Larger clearances are required between path users	In most circumstances, the minimum standard for new shared paths should be 3.0 m wide.
3.5 m		A 3.5 m path provides increased clearance between path users and may be used by cyclists to reduce the number of delayed overtakings.
4.0 m		A 4.0 m path provides increased clearance between path users and may be used by cyclists to reduce the number of delayed overtakings.

7.5.4 Separated Paths

Additions

When separating cyclists from pedestrians, the key is to use visual clues that make it intuitive to users which path they should use, be they bicycle riders or pedestrians. This is best achieved through an appropriate path surface (materials, colours, textures) and a clearly defined separation zone supported by signing, line marking and pavement symbols.

As both commuter cyclists and pedestrians will usually prefer the most direct route, chicanes and detours will often be bypassed by path users. Where separated paths are located close to scenic attractions such as foreshores and viewpoints it is preferable to locate the footpath close to these attractions to minimise the instances of pedestrians wishing to cross the bicycle path.

Table 6A-5 provides advice on the most common means of separating cyclists from pedestrians.

The Transport and Main Roads *Guidance on the widths of shared paths and separated bicycle paths Technical Note 133* provides operational and best practice guidance on the widths of separated paths.

Table 6A-5 Methods for separation of cyclists from pedestrians

Visual Separation (Level surface separation)		
Type	**Advantages**	**Disadvantages**
White dividing line	• Inexpensive • Minimal width take-up • Easier to maintain than physically segregated routes.	• Not detectable by tactile means • Often ignored • Might be visually intrusive.
Low profile raised line or concrete edge or border	• Detectable by tactile means • Inexpensive • Minimal width take-up • Easier to maintain than physically segregated routes.	• Can be difficult to construct properly, which might present a trip/cycle hazard • Often ignored • Can impede surface drainage unless gaps are provided • Might be visually intrusive.
Contrasting pavement surfaces e.g.: concrete footpath beside asphalt bicycle path	• Might be detectable by tactile means • Minimal width take-up • Easier to maintain than physically segregated routes.	• Likely to be ignored.
Surface texture e.g.: a grassed at-grade median strip	• Detectable by tactile means • Inexpensive • Can be easier to maintain than physically segregated routes.	• Takes up more width than a white line.
Vertical Separation (Separation by level difference)		
Footpath and bicycle path separated by level difference and standard height or low kerb	• Detectable by tactile means • Effective.	• Can be a hazard for cyclists if width is limited • Can be very expensive compared with level surface separation • Likely to be more expensive than barrier separation • Might make maintenance more difficult • Some additional width required • Can be difficult for wheelchair users if width is inadequate • Can present a barrier for some disabled people.
Physical Separation (Separation by barrier)		
Wall or railings	• Detectible by tactile means • Effective.	• Can be a hazard for cyclists, especially where width is limited • Can trap users on the wrong side • Can seriously hamper maintenance • Significantly reduces effective width so route will need to be wider overall • More expensive than level surface separation • Might be visually intrusive.
Row of bollards	• Detectible by tactile means.	• Can present a significant hazard for cyclists and visually impaired people • Likely to be ineffective • Can seriously hamper maintenance • Significantly reduces effective width so route will need to be wider overall • More expensive than level surface separation • Might be visually intrusive.

Visual Separation (Level surface separation)		
Type	**Advantages**	**Disadvantages**
Plantings or hedges	• Detectible by tactile means • Effective • Can be aesthetically pleasing.	• Can trap users on the wrong side • Can seriously hamper maintenance • Significantly reduces effective width so route will need to be wider overall • Unchecked growth can reduce route • Comfort and capacity • More expensive than level surface • Separation • The vegetation requires maintenance.

7.6.2 Drainage

Additions

Transport and Main Roads *Maintenance minimisation guidance for walking and cycling facilities Technical Note 132* provides detailed discussion on drainage management. A number of illustrations are provided in Transport and Main Roads *Speed management on shared paths Technical Note 130* to assist in design.

7.7.1 Clearances

Additions

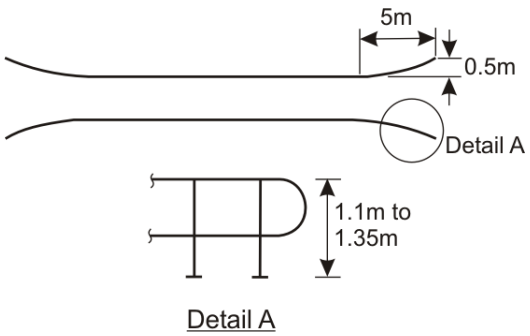
On high-speed roads, the physical separation of off-road bikeways can be achieved with an appropriate safety barrier, allowing sufficient distance for the expected deflection of the barrier, or by an adequate separation distance. Desirably, the separation distance should be 10 m or more, but not less than the clear zone required for the road. Transport and Main Roads Road *Planning and Design Manual Edition 2: Volume 3, Part 6: Roadside Design* should be reviewed for additional specific design guidance for clearances.

7.7.2 Batters and Fences

Additions

Where bicycle safety railings are terminated, they should be flared away from the line of the rail to produce an offset of about 0.5 m over a length of 5 m (Figure 6A.4). The end of the rails at all terminals should be joined smoothly to form a semi-circular face; this face forms the terminal presented to oncoming cyclists.

Figure 6A-4 Bicycle Safety Railing



Fencing with horizontal rails must not be used within the clear zone or in any location where there is the possibility of impaling an impacting vehicle.

Where a safety barrier is erected adjacent to a bicycle path (i.e. the path behind the barrier), measures to protect pedestrians and cyclists from any sharp edges of barrier posts may need to be considered. This is to minimise the risk of catching pedals and clothing on the sharp posts resulting in cyclists/pedestrians falling against and/or over the guardrail. In providing this protection, it is essential that the operation of the guardrail, in particular that of the end treatment, is not affected.

10 Path terminal treatments

10.1 General

Differences

Transport and Main Roads does not accept that a physical barrier or set of barriers be used for off-road, shared paths and bicycle paths to address the two objectives outlined in *Austroads Guide to Road Design Part 6A*:

- restricting access to the path by unauthorised vehicles
- warning path users of the path's termination at a road, and

It is essential that these objectives are treated separately and in both cases the safety and amenity of path users is given the highest priority in the overall design of the termination.

In Queensland, path terminal treatments, in the form of physical barriers, shall not be used to either advise cyclists that there is a road ahead or slow cyclists down. Physical barriers shall not be installed as a measure to slow cyclists down as they limit the comfort and capacity of paths for all path users and cyclists have been seriously injured as a result of crashes into bollards.

The preferred method of advising cyclist of the road ahead is through the provision of clear sightlines and the use of traditional warning devices, such as signs and pavement markings. In most instances the use of a 'GIVE WAY' (R1-2) or 'ROAD AHEAD' (W6-8) sign at the terminal will communicate all the required information to the cyclist. Transport and Main Roads *Shared path and bicycle path terminal treatments Technical Note 131* provides additional guidance on path terminal treatments.

10.2.1 Access

Additions

Access restriction devices to prevent unauthorised vehicle entry should only be installed if:

- there is a documented recurrent issue with unauthorised vehicle access
- the issue cannot be resolved by other methods (CCTV, police enforcement, path user reports), or
- vehicle access may damage path infrastructure (for example, a light weight bridge structure not designed to support vehicular load).

An escalating three-step approach to access management is to be applied:

1. Install regulatory signs identifying the infrastructure as a path which prohibits motor vehicle entry. In the case of a regular park vehicle use fit "authorised vehicles only" and load limit signage at the entry.
2. Re-design path entry appearance to discourage vehicle access.

3. Physical barriers to be used as a last resort, where the risk of damage to infrastructure from occasional unauthorised entry exceeds the risk of a permanent hazard to path users. If possible provide separate authorised vehicular access for maintenance/emergency vehicles.

When path entry gates are used, these should be fitted with hazard marking and permanent well-marked two-way paved bypass paths located to the side of the gate.

10.2.2 Geometry

Differences

In the second last dot point in this section of *Austroads Guide to Road Design Part 6A*, the restrictor bars in terminal treatments have a minimum height of 1.2 m above the riding surface.

In the last dot point, isolated vertical poles (e.g. bollards) are to be at least 1.8 m high above the riding surface to heighten visibility. Low bollards (1.0 m minimum height) need to have a large impact surface to limit point (impaling) injury. Transport and Main Roads *Shared path and bicycle path terminal treatments Technical Note 131* provides additional guidance for bollards.

10.3 Terminal Device Opening Width.

Additions

Separate entry and exit openings are preferred on all Principal Cycle Network (PCNP) routes and separated bicycle paths to improve capacity and reduce conflict between path users. Separate openings for each direction reduces the chances of collision, unanticipated stopping, blockage and conflict at the terminal device.

Terminal restrictor bars (banana bars) may be duplicated in order to form two single direction paths to minimise cyclist and pedestrian conflict through the constrained section. Transport and Main Roads *Shared path and bicycle path terminal treatments Technical Note 131* provides some examples.

10.4.1 Separate Entry and Exit Treatment

Additions

Transport and Main Roads *Shared path and bicycle path terminal treatments Technical Note 131* should be referred to for Transport and Main Roads preferred designs.

10.4.2 Bollards and U-rails

Additions

Physical barriers (such as bollards or terminal restrictor bars) should be avoided where crash likelihood, severity or cognitive demand is increased. Locations to avoid include:

- at the bottom of a gradient ≥ 5%
- on a horizontal curve ≤ R50 m
- at a location with restricted sight lines or visibility, or
- close to an intersection with other closely spaced conflict points or pedestrian activity.

Transport and Main Roads *Shared path and bicycle path terminal treatments Technical Note 131* should be referred to for Transport and Main Roads preferred designs.

10.4.3 Staggered Fence Treatment

Differences

Transport and Main Roads does not endorse the use of Staggered Fence Treatment. This treatment should only be considered as a last resort in exceptional circumstances, where all other options have been exhausted.

11 Provision for cyclists at structures

11.3.1 General

Additions

People throwing objects from overpass bridges can be an issue and some form of caging may be required to ensure security for, and the safety of, the traffic below. The aesthetics of the caging must be an important consideration in its design. For design requirements and the risk assessment methodology, refer to Transport and Main Roads *Reduction of Risk from Objects Thrown from Overpass Structures onto Roads*, and its accompanying *Technical Guidelines for the treatment of overhead structures*.

11.3.3 Pedestrian/cyclist subways

There is no equivalent Section 11.3.3 in the *Austroads Guide to Road Design – Part 6A*.

New

General

Pedestrian subways are not the preferred method of providing grade separated pedestrian crossings because of the potential danger posed by the “hidden” nature of the crossing. However, it is sometimes the case that a subway is the only reasonable alternative.

Subways should be lit and care taken with the design to ensure that “hiding” places do not occur. There should be a clear line of sight from one end to the other and this should preferably be available from the adjacent street. Access should be by means of ramps or a combination of ramps and stairs provided that wheel chair access is fully available. The access should be designed to cater for the needs of sight-impaired people and the necessary features to guide them are to be incorporated.

Landscaping and services should be located so as not to obscure sight lines. High quality, vandal proof lighting will be required in subways to enhance personal security. Murals can often be provided to discourage graffiti.

Designs should also be in accordance with Australian Standards (2010) AS1428.

Cross sections

The desired interior cross section for subways, other than when using existing culverts, is 6.0 m wide by 2.7 m high (clear of light fittings, signs and other equipment).

Grades

Longitudinal grades in the subway should be not less than 0.3% in one direction to allow for longitudinal drainage.

12 Construction and maintenance considerations for paths

12.1 General

Additions

Surface defects

There is a range of surface defects that can occur across the variety of pavement materials. Typical defects include cracking, potholes, differential settlement, breaking up of surfaces, and slippery surfaces.

Vehicle damage due to loading or impact by vehicles such as maintenance and emergency vehicles are a cause of pavement damage. This can result in safety issues for cyclists and pedestrians due to cracking, sub-base failure and pavement failure.

Maintenance can be minimised if the following issues are considered in the planning phase:

- wherever practicable locate bicycle and pedestrian paths where they will not be subjected to inundation, by adjusting the alignment or using structures
- consider future developments and construction works which may affect the facility, such as road widening in areas of high traffic growth; these activities may accelerate deterioration of the surface material
- avoid alignments on areas with poor soil characteristics such as expansive clay areas subject to instability and settlement
- if the facility is on-road and being retrofitted to an existing road, consult the original road design and maintenance history to identify the design, quality and condition of the section of road being used and the future plans for the road
- when widening an existing facility, which is in good condition, the pavement should be matched to the existing and any sub-soil or edge drains disrupted should be replaced.

Maintenance issues in the detailed design stage include:

- use a recognised pavement thickness design system or catalogue of bicycle way pavements based on the expected in-service loads
- ensure that joints are located appropriately for the terrain and conditions
- design for possible root infiltration.

Surface transitions

Where a path transitions from one surface to another the discontinuity is prone to vertical displacement and this combined with a change in surface friction can create a hazard for cyclists and pedestrians. These transitions occur when a path meets a roadway, bridge, boardwalk or another path. The roots of some trees growing too close to a path can lift the pavement creating discontinuities at the joints and cracking. It is possible to substantially reduce the risk of vertical displacement by providing some form of physical interlocking such as tie bars.

Pavement edge drop-off is an issue that is caused by erosion. Erosion is an issue that affects pedestrians and bicycle facilities located next to steep terrain or where the landscape has been excavated to accommodate new infrastructure. In such terrain, well designed batters and drainage is required to minimise erosion and deposition on the path.

Vegetation and debris management

Vegetation including trees, shrubs, herbaceous plants and grass can be a major maintenance problem causing safety and path deterioration issues. Fallen leaves and debris can cause cyclists to crash. Vegetation can also cause blocked drains, water ponding, reduction in sight distances, and overhanging limbs intruding on pedestrian and cyclists envelopes.

Cycle path debris can include litter, windblown leaves and branches, sediment deposited by water crossing the facility, rocks falling from cuttings and pavement damage. Most debris is a hazard to cyclists and it needs to be minimised by appropriate design and removed by regular maintenance, particularly after adverse weather events.

Further operational and best practice guidance is contained in Transport and Main Roads *Maintenance minimisation guidelines for walking and cycling facilities Technical Note 132*.

References

Transport and Main Roads publication references refer to the latest published document on the departmental website www.tmr.qld.gov.au.

Additions

Australian Standard (2009) *AS1428.4 Design for access and mobility – tactile ground surface indicators*, Standards Australia, Sydney NSW

Australian Standards (2010) *AS1428 Design for access and mobility series*, Standards Australia, Sydney NSW

Transport and Main Roads *Guidelines for Road Design on Brownfields Sites*, Brisbane, QLD

Transport and Main Roads *Guidance on the widths of shared paths and separated bicycle paths Technical Note 133*, Brisbane, QLD

Transport and Main Roads *Maintenance minimisation guidelines for walking and cycling facilities Technical Note 132*, Brisbane, QLD

Transport and Main Roads *Policy – Reduction of Risk from Objects Thrown From Overpass Structures onto Roads*, Brisbane, QLD

Transport and Main Roads *Shared path and bicycle path terminal treatments Technical Note 131*, Brisbane, QLD

Transport and Main Roads *Speed management on shared paths Technical Note 130*, Brisbane, QLD

Commentary 1

Additions

As bicycles are defined as vehicles in road regulations, they have a right to use the road system unless specifically excluded (e.g. on some motorways and controlled access highways). Bicycles are also allowed to travel on footpaths in Queensland unless specially prohibited by a local law.

Commentary 13

There is no equivalent Commentary 13 in *Austroads Guide to Road Design – Part 6A*.

New

Shared zones

Shared zones are generally constructed in areas where the competing demands of pedestrians, moving vehicles and parking require a form of control which allows complete pedestrian mobility whilst at the same time enhancing pedestrian safety. In such zones a speed limit of 10 km/h is usually considered appropriate.

The most important element in a shared zone is to alter the environment to make it obviously different from other streets. This can be achieved by the use of different coloured and textured paving, by the use of full width paving between property lines and by judicious and aesthetic placement of planters and other landscaping.

Shared zones are often provided on roads in commercial or shopping areas. They are appropriate where all of the following conditions exist:

- the road is not a through route
- pedestrian movement predominates
- reasonable vehicle movement is required, and
- it is desired to clearly establish the priority of pedestrian movement.

Commentary 14

There is no equivalent Commentary 14 in *Austroads Guide to Road Design – Part 6A*.

New

Tactile Indicators

Tactile ground surface indicators have been designed to give directional guidance and warning of hazards to vision impaired pedestrians. They are detected through contact by foot or cane.

They have been made in synthetic rubber, ceramic and clay tiles and stamped concrete. Obviously some will be more suited to indoor and/or lightly trafficked areas rather than outdoor footpaths. Guidance strips and tactile tiles, commercially produced, are commonly used on footpaths and shopping complexes.

All must conform to the Australian Standard (2009) AS1428.4, which provides for tactile ground surface indicators. AS1428.4 sets out details of their use and provides examples of typical applications.

Note that there is a conflict between the needs of those in wheelchairs and the visually impaired. Care is needed to ensure that this conflict does not create undue difficulties for either group.

Refer also to the appropriate Transport and Main Roads' Standard Drawings for details of applications.