# Technical Requirements

## Active Transport Investment Program

October 2022

Queensland Government

# Contents

# 1. Introduction

The Active Transport Investment Program (ATIP) funds bike riding facilities that encourage more people of all ages and abilities to ride bikes more often. To increase bike riding participation, facilities need to be comfortable, low-stress, convenient, direct, safe and competitive with other modes of travel. In order to achieve this, these technical requirements outline the desirable treatment/s (and minimum standards, subject to justification) for bike riding infrastructure projects funded through the ATIP.

These technical requirements apply to the Department of Transport and Main Roads (TMR) and Queensland local governments when delivering projects funded through the ATIP.

These technical requirements are focused on projects delivered through the ATIP and are consistent with relevant Austroads' guidelines and the accompanying Queensland-specific documents, and other relevant stand-alone TMR standards, guidelines and associated specifications. The ATIP technical requirements generally pursue adoption of desirable treatments over minimum treatments to support ATIP grant funding and capital investment objectives to deliver infrastructure that:

- meets best practice design and construction standards
- completes missing links and/or removes barriers that present significant obstacles to bike riding
- improves access to trip attractors
- contributes to the development of the PCN
- anticipates and supports future demand and use

Best practise treatments also support the ATIP investment focus on delivery of the Principal Cycle Network that identifies the core bike riding routes across Queensland and the Queensland Cycle Strategy 2017-2017 vision of more cycling, more often.

The technical requirements also exclude certain treatments and design values that are unlikely to support ATIP objectives. They also incorporate several learnings and clarifications resulting from previous bike riding infrastructure projects.

*An eligibility requirement for all projects funded through the ATIP is that the design must conform to these technical requirements.*

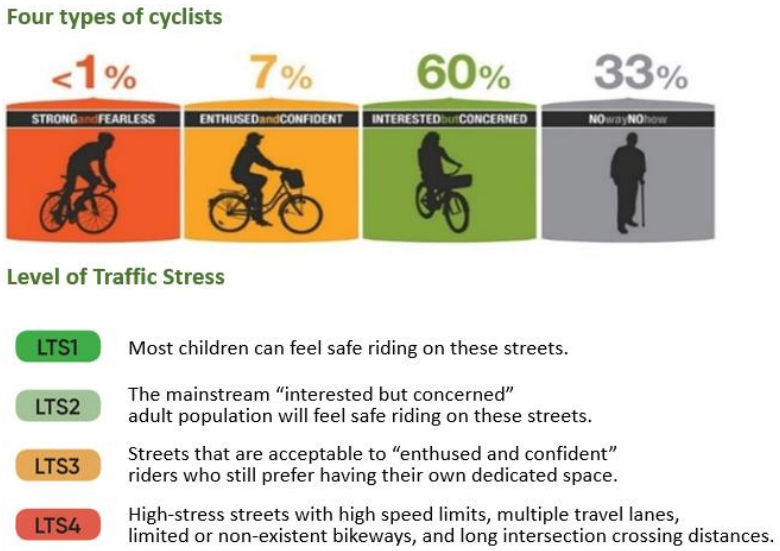
# 2. Eligibility and performance requirements

ATIP funding is focused on delivering infrastructure that will increase bike riding participation. To achieve this key program objective, facilities need to be comfortable, low-stress, convenient, direct, safe and competitive with other modes of travel.

TMR's Principal Cycle Network Plans (PCNPs) and associated Priority Route Maps (PRMs) identify core bicycle routes that connect people with key destinations and are direct, coherent and planned with safety in mind. Therefore, ATIP projects are required to follow an identified priority route. Identification of the specific alignment, along the priority route (including any proposals to deliver facilities on a parallel route) should be determined and documented in the project's Options Analysis and/or Business Case phase to ensure a direct, coherent and safe outcome is achieved.

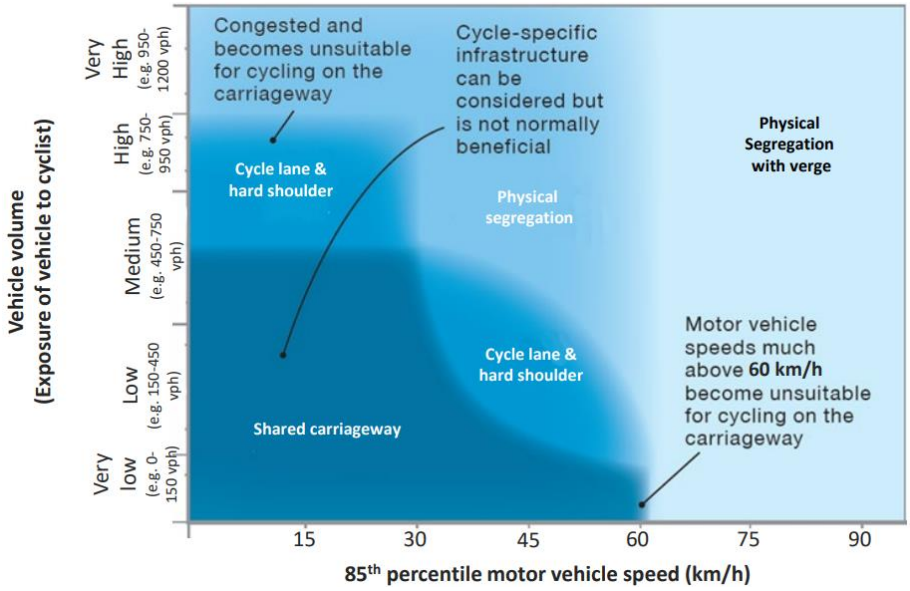
With respect to comfortable and low-stress travel by bicycle, the ATIP encourages and prioritises facilities and treatments which achieve at least LTS2, and preferably LTS1 – refer Figure 1.

***Figure 1 – Level of Traffic Stress categories***[1]




Furthermore, and consistent with the Safe Systems approach adopted in TMR's *Road Safety Policy*[2], the ATIP is focused on supporting facilities and treatments that do not expose active transport users to crash forces that could lead to fatal and/or serious injury outcomes. This means that separation of vulnerable road users (such as bike riders and pedestrians) from passenger/motor vehicles is preferred in most cases and is required for roads that carry higher traffic volumes – refer Figure 2.

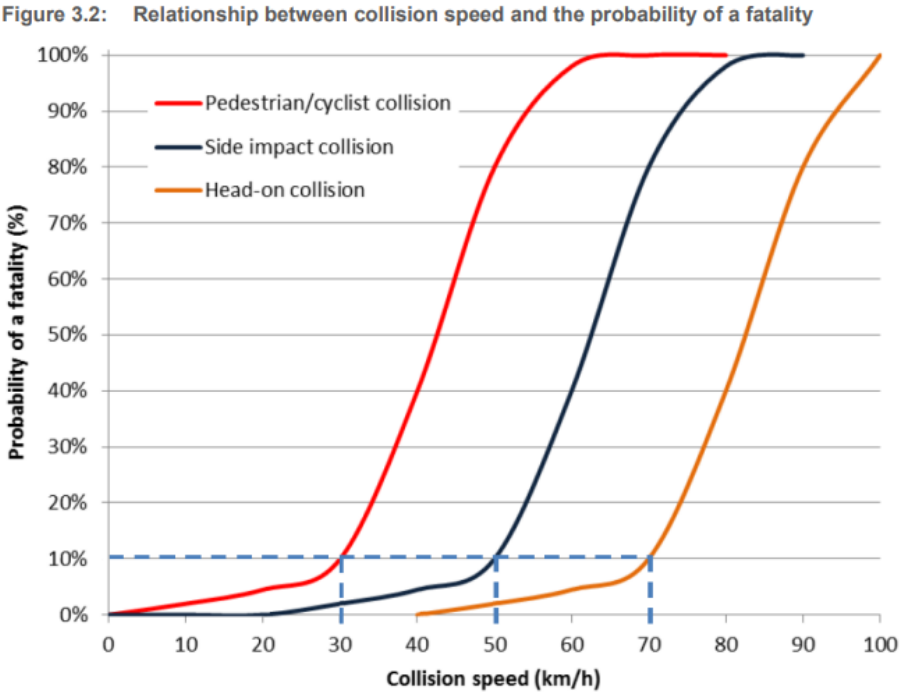
***Figure 2 – Separation of bike riders and motor vehicles along preferred bicycle routes***[3]




However, if separation isn't practicable (e.g. at road crossings and/or property accesses) then the target operating speed within the conflict area should not be greater than 30km/h – refer Figure 3.

[1] Refer (source) *Figure 2.2* in TMR's Selection and design of cycle tracks guideline (Oct 2019)
[2] https://www.tmr.qld.gov.au/Safety/Road-safety/Road-Safety-Policy
[3] Refer (source) *Figure C9 1* in Austroads' *Guide to Traffic Management Part 4: Network Management Strategies* (Apr 2020)

***Figure 3 – Relationship between collision speed and the probability of a fatality***[4]




Achieving comfortable, low-stress and safe travel by bicycle is typically achieved on ATIP projects through adoption of the following facilities:

- Stand-alone bikeway/cycleway – physically separated by wide verge, grade separation and/or stand-alone infrastructure;
- Separated path (cycle track)/s – physically separated by verge and/or kerb (bicycle path alongside footpath);
- On-road bike lane/s – separated/delineated by separation devices and provision of conflict protection through turning movement speed management/restrictions at intersections/accesses;
- Cycle street/shared zone/s – low volume local access roads with speed management devices;
- Raised priority crossing/s; and/or
- Shared path/s – preferably at least 3.0m wide (2.5m minimum), with demarcation of bike riders and pedestrians where appropriate.

Whilst not an exhaustive list, applicable reference documents related to the above bicycle facilities are summarised in Table 1. Alternative standards, guidelines and innovative treatments not covered by the reference documents will be assessed by ATIP on a case by case basis (in consultation with TMR's Engineering and Technology branch).

For the avoidance of doubt, the following treatments are not typically endorsed by the ATIP:

- Bicycle Awareness Zone/s;
- Part-time bicycle lanes;
- On-road bike lanes without separation devices (unless the exclusion of separation devices is supported by relevant guideline/s and justifiable on engineering grounds); and
- Shared path/s less than 3.0m wide (without justification).

[4] Refer (source) *Figure 3.2* in Austroads' *Integrating Safe System with Movement and Place for Vulnerable Road Users* (Feb 2020)

***Table 1 - Reference documents***[Note 1]

| | |
|---|---|
| TMR Road Planning and Design Manual (RPDM) | Available at www.tmr.qld.gov.au. |
| Traffic and Road Use Management Manual (TRUM) | Available at www.tmr.qld.gov.au. |
| Queensland Guide to Traffic Management (QGTM) | Available at www.tmr.qld.gov.au. |
| TMR Design criteria for bridges and other structures | Available at www.tmr.qld.gov.au. |
| Queensland Manual of Uniform Traffic Control Devices (QMUTCD), Part 9 Bicycle Facilities | Available at www.tmr.qld.gov.au. |
| TMR Traffic Control signs (TC signs) and MUTCD Q-series signs | Available at www.tmr.qld.gov.au. |
| TMR Cyclist and Pedestrian Guidelines | Available at www.tmr.qld.gov.au. |
| TMR Technical Notes | Available at www.tmr.qld.gov.au. |
| Austroads Guides to Road Design, Traffic Management and Road Safety | Available at www.austroads.com.au |
| Australian Standard 3996 Access Covers and Grates | Available at www.saiglobal.com. |
| Australian Standard 1428 Design for Access and Mobility (AS 1428.1) | Available at www.saiglobal.com. |
| Australian Standard 1158 Lighting for roads and public spaces (AS 1158.1.1-3, AS 1158.3.1 and AS 1158.4) | Available at www.saiglobal.com. |

Note 1: Directness, convenience and coherence generally lead towards solutions within road corridors. This requires careful consideration of crossing and intersection treatments and physical separation from motorised traffic to maintain safety, attractiveness and comfort. Making a direct facility safer is often easier than making a safe facility more direct.

# 2.1 Specific facility requirements

## 2.1.1 On-road bicycle lanes and cycle tracks

In many environments the attractiveness and perceived safety provided by a visually separated (e.g. line marking only) bicycle lane is not enough to encourage new riders, nor is it consistent with the Safe System approach. Physical separation from motorised traffic assists in limiting perceived and actual safety issues in road environments with higher traffic speeds and volumes. Physical separation can be achieved by:

- "hardening" a bike lane with a physical device, refer *Queensland Guide to Traffic Management (QGTM) Part 10 – Bicycle lane separation devices guideline* (Nov 2021);
- establishing a Cycle Track, refer TMR's *Selection and design of cycle tracks* (Oct 2019) guideline*;* or
- establishing a bike path (incorporating priority crossing/s to maintain safety and directness).

ATIP funding is prioritised towards projects that incorporate physical separation from motorised traffic.

Bicycle lanes established under ATIP shall conform to the widths specified in Table 2. Minimum width bicycle lanes should only be considered at localised constrictions such as drainage grates or where significant constraints restrict relocation of the kerb line.

Bicycle lane set out shall be based on the alignment of the adjacent traffic lane, not the kerb alignment.

Urban traffic lanes may need to be marked less than 3.5m wide in order to establish a bicycle lane. There is limited evidence to support wide traffic lanes in urban areas. Refer to TMR's RPDM Edition 2 Volume 3 *Supplements to Austroads Guide to Road Designs Parts 1, 3 and 4A* (formally *RPDM* and *Guidelines for road design on brownfield sites*) for further detail.

***Table 2 – ATIP Bicycle lane widths (Based on AGRD Part 3, Table 4.18, Feb 2021)***

| **Posted speed limit** | **Width**[Note 2] **for ATIP projects** |
|---|---|
| 40km/h (preferably 30km/h) or less | Consider Advisory Bicycle Lanes or Cycle Street (Refer TRUM Volume 1 Part 8) |
| 50km/h | 2.0m (Physical separation[Note 3] possible consider TRUM Volume 1 Part 10 section 7-1) |
| 60km/h | 2.0m with physical separation, refer *QGTM Part 10 – Bicycle lane separation devices guideline* |
| 70km/h | 2.0m with physical separation, refer *QGTM Part 10 – Bicycle lane separation devices guideline* |
| 80km/h or higher | 2.0m with physical separation, refer *QGTM Part 10 – Bicycle lane separation devices guideline*; or bike path (separated bikeway) |

Note 2: At localised constrictions/constraints, or where justified in constrained areas, narrower facility width/s are to be determined in accordance with TMR's Selection and design of cycle tracks guideline.
Note 3: Along very low volume and constrained streets without on-street parking physical separation may not be required.

#### 2.1.1.1 Bicycle lanes and on-street parking

Limitation of on-street parking on arterial roads improves safety, reduces motor vehicle congestion and permits separation of bicycles from moving traffic.

Locating parking adjacent to a separated bicycle lane (bicycles positioned kerbside) is an efficient method to protect people riding bikes from moving traffic. This also enables clearway operation to provide motor vehicle capacity when needed and parking off-peak while providing a safe fulltime facility for people riding bikes, for more detail refer TMR's *Selection and design of cycle tracks* (Oct 2019) guideline.

The ATIP will only accept projects proposing on-street kerbside car parking adjacent to a bicycle lane in exceptional circumstances.

### 2.1.2 Intersections

ATIP requirements for providing for bike riders at intersections are directness, safety and comfort. These requirements are often addressed by providing priority for bicycle riders and pedestrians at intersections. Designing to ensure appropriate vehicle speeds so that people are not exposed to crash forces that would lead to fatal and serious injury outcomes is consistent with the Safe System approach and an ATIP requirement. The following TMR guidelines should be referred to for further information:

- *Selection and design of cycle tracks* (Oct 2019)*, Section 4.2* provides comprehensive guidance on a variety of intersection treatments.
- *Raised priority crossings for pedestrians and cycle paths* (Jan 2019) provides guidance for shared path crossings at side roads, roundabouts, and slip lanes.
- *Supplement to Austroads Guide to Road Design Part 4B: Roundabouts* (Jul 2021), *Section 5* provides further guidance for treatment/s at roundabouts (as does the *Providing for People Walking and Riding at Roundabouts*, Aug 2020).
- Where slip lanes must be retained (removal preferred), wombat (raised zebra) crossings are expected to be installed, refer *Section 2.6.3* in *Raised priority crossings for pedestrians and cycle paths* (Jan 2019). The ATIP will only accept treatment/s other than a wombat crossing in exceptional circumstances with suitable engineering justification.

### 2.1.3 Drainage and Utilities

Drainage is an essential design component to ensure road and path longevity and safety. Guidance relating to bicycle aspects of drainage design is covered in Austroads' *Guide to Road Design* (AGRD) Parts *5* and *5A*, and TMR's *Supplement to AGRD Part 6A* (Nov 2021).

Field inlets, cross drainage and/or seepage management may need to be considered to prevent paths being submerged during rainfall and reduce collection of debris on the path, slip resistance issues and ongoing maintenance.

Where transverse drainage may impact path user safety, flow depth and velocity checks should be undertaken at transverse drainage locations, this is a requirement for ATIP projects.

Where facilities are proposed adjacent to or within a drainage channel, special considerations for both the minor and major storm event are required – these will be considered by ATIP on a case-by-case basis.

Steel in the travelled way can be a slip resistance safety issue for people riding bikes. The ATIP requires that covers located in the travelled way provide equivalent slip resistance to surrounding surfaces in all weather conditions and recommends the same for covers within 1.0m of the travelled way. Concrete infill covers are a good way to ensure durable slip resistance.

Drain grates and utility covers should comply with *Australian Standard 3996 Access Covers and Grates*. Works to update non-compliant gully grates should be considered as part of ATIP projects.

Where possible, new gullies in urban areas should be recessed into the kerb to allow the grate to line up with the lip of channel.

Where bicycle lanes are retrofitted on streets with encroaching grates, adoption of minimum bike lane width as per Table 2 immediately adjacent the grate/s may be acceptable (bike/heel safe grate requirements remain, as applicable). Existing stormwater gullies could also be reconstructed to reduce grate interaction with the bicycle lane.

## 2.1.4 Off-road requirements

### 2.1.4.1 Path widths

In order to achieve the program intent, key path design criteria are set out in Table 3.

***Table 3 - Key shared path design criteria for ATIP projects***

| Path design criteria | Desirable value | Minimum value | Rationale |
|---|---|---|---|
| Width (m) | 3.0*Note 4* | 2.5*Note 5* | 3.0m wide paths have 50% greater capacity than 2.5m wide paths and generate fewer path user complaints and interaction issues. |
| Design speed on midblock level grade (km/h) | 30 | 25*Note 6* | Appropriate for commuter use. Design speed variance should consider gradient/s and intersection priority. |

Note 4: Minimum value for stand-alone treatments along major roads.

Note 5: Justification required for adoption of 2.5m rather than desirable 3.0m.

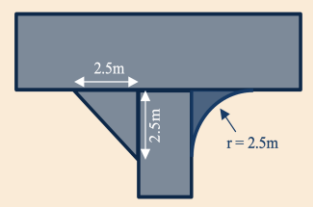
Note 6: Where justified in constrained areas, a lower minimum design speed may be considered.

A reduction in these design criteria values may be considered at localised constraints such as significant poles or structures. This must be explicitly documented as to why a better facility standard cannot be achieved, submitted and accepted through the ATIP design review process to retain ATIP funding.

Provision of paths both sides of urban arterial and collector roads may provide a case for reduced path widths when co-located with cycle tracks or bicycle lanes with separation devices.

Intersections of paths with paths are to include 2.5 metre corner radii or a chamfer of equivalent size – refer Figure 4.

***Figure 4 – Corner radii for path intersections***[5]




Where a significant number of people walking and bike riding are expected, a segregated path may be required to maintain an appropriate level of service[6]. TMR's *Selection and design of cycle tracks* (Oct 2019) guideline provides additional guidance on segregated paths and path treatments at intersections with side streets.

### 2.1.4.2 Path sight lines

Path corridors must be designed to provide appropriate unobstructed sight lines. Intersection visibility splays[7] and visibility requirements for two-way paths[8] must be considered in addition to other general visibility checks.

### 2.1.4.3 Path joints

Where an existing path is to be widened, longitudinal joints in paths are only to be considered where a physical divider, such as a kerb, can be used to cover this joint.

Transverse joints shall be designed to be smooth, this is usually achieved through sawcut joints[9] or using a proprietary jointing system.

Where possible, pathways should be positioned so they are clear of the roots of established trees. In constrained locations where paths will be within the root zone of trees, pathway joint systems between slabs should be used to minimise any displacement of slabs that could form a hazard.

### 2.1.4.4 Path pavement marking and signs

Where a warning colour is used at an intersection with another path, crossings or driveway, green surfacing shall only be used on a path designated “Bicycle Only”. Green surfacing is not to be used on shared paths. Coloured surface treatments should be used sparingly. Other treatments such as exposed aggregate surfacing may offer enough visual and tactile differentiation at a lower whole of life cost.

Shared path signage is not necessary as Queensland Road Rule 250 permits people to ride on footpaths.

### 2.1.4.5 Path and driveway conflict/s

Paths intersecting with driveways are to be constructed to provide a smooth joint between the two facilities using measures to control joint displacement such as dowels or other proprietary devices.

Where existing driveways do not meet the cross-fall requirements of proposed shared paths, they should be reconstructed to join smoothly to the pathway grade and cross-fall.

Where driveways are being installed or reconstructed, the kerb crossing is not to include a vertical lip at the invert.

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[5] Refer *Section 6.4*, TMR RPDM Edition 2 Volume 3 *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling* (Nov 2021)
[6] Refer *Section 5.1*, TMR RPDM Edition 2 Volume 3 *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling* (Nov 2021)
[7] Refer *Figure 6A-2*, TMR RPDM Edition 2 Volume 3 *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling* (Nov 2021)
[8] Refer *Section 5.7*, TMR RPDM Edition 2 Volume 3 *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling* (Nov 2021)
[9] Refer *Figure C 4*, Austroads *Guide to Road Design Part 6A: Paths for Walking and Cycling* (Feb 2021)

Sight lines between drivers entering or exiting driveways, and path users should also be provided. On commercial driveways, further treatments such as road humps are usually required to reinforce low vehicle speeds and path priority.

Driveways should be delineated to maintain the appearance of the path being continuous through the driveway.[10]

### 2.1.4.6 Objects adjacent to paths

A 1.0 metre clearance should be provided from the edge of the rideable surface of any bike facility or shared path to any potentially hazardous object adjacent to the path/facility.

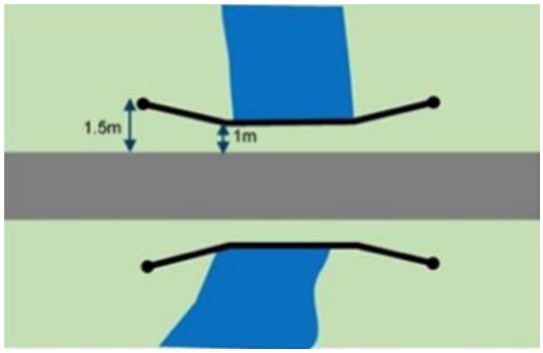
Fencing, balustrades and vegetation should be placed to ensure unobstructed sight lines are available.

Selection of vegetation adjacent to paths should consider the effects of leaf, seed and other plant debris on path slip resistance and maintenance. Planting of vegetation adjacent to paths must ensure clearances and sight lines are easily maintained as the planting matures.

Designing to minimise the extent of fencing is recommended. Landscaping or low shrubbery (up to 0.5m high) is a desirable alternative to fencing in many situations.

Fencing is intended to protect path users from hazards however it does not necessarily need to follow the edge of path. For example, fencing the headwall and wings of a culvert protects path users from the hazard while maximising clearance to the path. Fencing constructed directly adjacent to the path shall incorporate flared terminals, refer TMR *Fencing and edging treatments for cycling infrastructure* guideline for details and Figure 5.

***Figure 5 – Fence alignment at drainage/creek crossing***




Fencing incorporating vertical bars is not considered smooth as rubrails are only partially effective at preventing adult or children riding bikes from engaging with the vertical elements of the fence. Fence types with openings of 20mm or less are considered to have smooth features. Smaller apertures are more desirable and may be required if anti-climb features are required. The smoothest side of fence products should face towards the path such as in Figure 6.

***Figure 6 – Closely spaced mesh fencing***

[10] Refer TMR *Treatment options to improve safety of pedestrians, bicycle riders and other path users at driveways* guideline (Feb 2021)

Fencing with continuous smooth profiles eliminates the need to consider an offset top rail on bicycle paths as pedals will not be caught on the tightly spaced horizontal wire. This should also have the benefit of reducing the cost of the fencing. This modified weldmesh can also be formed with the edges rolled at the top and bottom to further increase strength and remove the need for top or bottom rails. *Figure 6A-1* in TMR's RPDM Edition 2 Volume 3 *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling* (Nov 2021) notes the projecting deflection rail is not required when snag-free infill panels are provided. This is the preferred full barrier fencing style on ATIP projects.

There is often a need for fencing of pathways across bridges, particularly where pathways pass close to the back of guardrail. If guardrail is located within 1.0 metre of the path edge it is to be treated to minimise path user collision severity. If adopted, fencing needs to be designed to ensure it does not interfere with guardrail effectiveness in the event of a motor vehicle collision, and/or guardrail type selected/modified to minimise risk of impact with fencing. The path should diverge away from the guardrail as soon as practicable to minimise the amount of path with clearance constraints and the need for fencing.

### 2.1.4.7 Access management

Access management devices such as bollards and fencing deflection rails shall not be used as slow points or force riders to dismount to safely navigate through the treatment.

Access management treatments at path terminals should not be considered unless there is infrastructure along the pathway, such as light weight bridges, that could be damaged by unauthorised access by a motor vehicle and no alternative solution is available. Where access management devices are required, they shall be placed in the safest location possible (for example, in a visible location clear of curves and steep grades) and be implemented to maintain path capacity and minimise conflict between path users. Clear opening width shall be not less than 1.6m and approach delineation shall be marked from 5-10m on approach to any potentially hazardous feature.

Protection of structures from authorised motor vehicle access can potentially be managed by load limit signage, subject to local authority management.

TMR's *QGTM Part 6: Intersections, Interchanges and Crossings Management Appendix C* (Jul 2021) provides further guidance on safe vehicle restriction treatments for bicycle paths and shared paths.

### 2.1.4.8 Shared path longitudinal grade

TMR's RPDM Edition 2 Volume 3 *Supplement to Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling* (Nov 2021) and Austroads *Guide to Road Design* (AGRD) *Part 6A: Paths for Walking and Cycling* (Feb 2021) (*AGRD Part 6A*) provide guidance on bike path and shared path longitudinal grade.

With specific reference to shared path/s, *Section 5.4*, *Section 5.4.1* and *Table 5.8* in *AGRD Part 6A* refer to *AS 1428.1* (June 2021). Therefore, *AS 1428.1* is a relevant reference document for ATIP projects, including shared path/s. This design approach is consistent with:

(a) the requirements of the *Disability Discrimination Act* (DD Act)[11];

(b) guidance from the Australian Human Rights Commission (AHRC) that advises "premises" should be read to include "streetscapes", which includes "public footpath" – refer *Section 3* and *Section 8.7* in the AHRC *Advisory Note on streetscape, public outdoor areas, fixtures, fittings and furniture, 8 February 2013*[12]; and

(c) TMR's vision to create a single integrated transport network accessible to everyone – refer TMR's *Accessibility and Inclusion Strategy*[13].

It is acknowledged that a significant portion of the projects delivered through the ATIP are within brownfield sites and therefore delivering shared path/s accessible to all can in some locations be a considerable challenge. In these instances, it is required that thorough consideration of plausible design solutions be

[11] https://www.legislation.gov.au/Details/C2018C00125
[12] https://humanrights.gov.au/our-work/disability-rights/publications/advisory-note-streetscape-public-outdoor-areas-fixtures
[13] https://www.tmr.qld.gov.au/About-us/Our-organisation/Accessibility-and-inclusion

investigated and appropriately documented[14]. It is also recommended these considerations be undertaken in consultation with:

(i) TMR's internal Accessibility team (for TMR projects) and/or relevant local representative group/s; or

(ii) Council's internal accessibility team and/or relevant local representative group/s (for Council projects).

### 2.1.5 Transitions between on-road and off-road facilities

Transition ramps should be considered for bicycle route connections between roadway corridor and parkland and/or off-road corridors. The additional off-road option allows people riding bikes to choose which facility they use based on their confidence and the traffic level at the time. Existing single dwelling residential driveways constructed without a vertical lip may function as a transition ramp in either direction, however other driveways without a vertical lip may function as a transition ramp from off-road to on-road only. For detail on bicycle specific transition ramps refer Austroads *Guide to Road Design Part 3: Geometric Design Figure 4.45* (Feb 2021).

[14] Refer TMR's RPDM Edition 2 Volume 3 *Supplements to Austroads Guide to Road Designs Part 1* (formally *RPDM* and *Guidelines for road design on brownfield sites*) and the DD Act for further detail.