Technical Requirements

Active Transport Investment Program

Queensland Government

Contents

Introduction

The Active Transport Investment Program (ATIP) funds cycling facilities that encourage more people of all ages and abilities to cycle more often. To increase cycling 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 and minimum standards for cycling infrastructure projects funded through the ATIP.

These technical requirements only relate to projects delivered through the ATIP and are in line with Austroads guidance. However, to support the program intent, the ATIP technical requirements generally seek a higher standard of provision because the ATIP funds principal cycle networks and future cycling demand is expected to be high.

The technical requirements also exclude certain treatments and design values that are unlikely to support the program intent. They also incorporate a number of learnings and clarifications resulting from previous cycling infrastructure projects.

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

Eligibility

Unless otherwise noted by these technical requirements, the ATIP accepts treatments and design values set out for bicycle facilities in the reference documents listed in *Table 1*.

Designs incorporating treatments described in *Appendix A - Separation Devices on Bicycle Lanes* and *Traffic and Road Use Management Manual Volume 1 Part 8 – Advisory Bicycle Lanes and Cycle Streets* are specifically being targeted by the ATIP. Additional assistance in the design and evaluation of these innovative treatments will be made available through the ATIP.

Alternative standards, guidelines and innovative treatments not covered by the reference documents will be assessed on a case by case basis.

The following treatments are not eligible for funding by the ATIP:

- Bicycle Awareness Zone treatments (with the exception of circumstances identified under the Bicycle Lanes section);
- Part-time bicycle lanes; and
- Construction of shared paths less than 2.5m wide (as a stand-alone treatment).

Table 1 - Reference documents

Austroads Guides to Road Design, Traffic Management and Road Safety	Available at www.austroads.com.au
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.
TMR Guidelines for road design on brownfield sites	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 (MUTCD), Part 9 Bicycle Facilities	Available at www.tmr.qld.gov.au.
TMR Traffic Control signs (TC signs)	Available at www.tmr.qld.gov.au.
TMR Traffic engineering Technical Notes	Available at www.tmr.qld.gov.au.
Australian Standard 3996 Access Covers and Grates	Available at www.saiglobal.com.
Australian Standard 1428 Design for Access and Mobility	Available at www.saiglobal.com.

Performance requirements

Facilities delivered through the ATIP must be fit for purpose, direct, safe, attractive, and coherent. Facilities should also be transport-oriented allowing people using bicycles to comfortably access meaningful destinations. For further detail on these requirements, refer to *TMR Technical Note 128 Selection and Design of Cycle Tracks*.

Directness, comfort 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 and attractiveness. Making a direct facility safer is often easier than making a safe facility more direct.

On-road facility requirements

Bicycle lanes

In some environments the attractiveness and perceived safety provided by a visually separated (e.g. line marking only) bicycle lane may not be enough to encourage new riders. Physical separation from motorised traffic assists in limiting perceived safety issues in road environments with higher traffic speeds and volumes. Physical separation can be achieved by:

- "hardening" a bicycle lane with a physical device, refer *Appendix A*;
- establishing a Cycle Track, refer *TMR Technical Note 128 Selection and Design of Cycle Tracks;* or
- establishing a path (incorporating priority crossings to maintain safety and directness).

ATIP funding is specifically targeted at delivering a high proportion of projects that incorporate physical separation from motorised traffic. As such, projects which seek to achieve physical separation in the appropriate context will be more likely to secure ATIP funding.

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 the *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)

Road speed limit	Minimum width for ATIP projects	Desirable width for ATIP projects
40km/h or less	Consider Advisory Bicycle Lanes or Cycle Street (Refer TRUM Volume 1 Part 8)	Consider Advisory Bicycle Lanes or Cycle Street (Refer TRUM Volume 1 Part 8)
50km/h	1.2m	2.0m (Physical separation possible consider Appendix A)
60km/h	1.5m	2.0m (Physical separation possible consider Appendix A)
70km/h	1.8m	2.0m (Physical separation possible consider Appendix A)
80km/h or higher	2.0m (Physical separation recommended refer Appendix A)	2.0m (Physical separation recommended refer Appendix A)

Bicycle Awareness Zone (BAZ) treatments do not provide separation for cyclists. The ATIP will only consider funding BAZ treatments in exceptional circumstances where a road or bridge section is highly constrained and where traffic speeds and volumes are low. Refer *TRUM Volume 1 Part 10 Section 6.5-1* for more information.

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 cyclists from moving traffic. This also enables clearway operation to provide motor vehicle capacity when needed and parking off-peak while safely providing a safe full time facility for cyclists, for more detail refer *Austroads Guide to Road Design Part 3 figure 4.32*. Projects proposing this arrangement will be more likely to secure ATIP funding.

The ATIP will only accept projects proposing on-street kerbside car parking adjacent to a bicycle lane when the minimum dimensions set out *Table 3* are achieved. Typically, this can only be achieved with pavement marking of the parking bays as well as marking of the bicycle lane and the door zone. In some cases, this may require the narrowing of existing parking bays and adjacent traffic lanes.

Table 3 – Bicycle lanes and on-street parking dimensions

Parking bay width	Door zone buffer	Bicycle lane width
2.1m minimum	0.6m minimum	Refer Table 2 (above)

Where minimum widths cannot be achieved, on-street parking should be removed, indented or reconfigured to position cyclists kerbside. Projects considering parking rationalisation should consider demand, turnover and utilisation within the entire walkable catchment of the project site. *Table 4 - Relationship between length of time parked and distance walked* provides a general indication of walkable catchment related to parking duration. Construction costs related to indenting parking must be fit for purpose to attract ATIP funding. Improvements to paths and crossings may be a justifiable ancillary project inclusion to promote walking from parking in nearby underutilised parking in side streets.

Table 4 - Relationship between length of time parked and distance walked[1]

Parking duration	Distance Walked (m)	Minutes Walked (at 1.2m/s)
less than ¼ hr	66	1
¼ hr to ½ hr	100	2
½ hr to 1 hr	121	2
1 hr to 2 hrs	150	3
3 hrs and over	183	4

Road drainage

Drain grates adjacent to bicycle facilities 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 bicycle lanes are retrofitted on streets with encroaching grates, use of desirable width bicycle lanes along the street will ensure that minimum bicycle lane widths are provided between the edge of grate and the bicycle lane marking. Grates should also be at the same crossfall as the adjacent pavement and not have additional fall to the inlet. Existing stormwater gullies could also be reconstructed to reduce grate interaction with the bicycle lane.

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. This allows cyclists to follow the kerb line without interacting with potentially slippery steel grates.

[1] Derived from A Comprehensive Parking Survey of the St. Louis, Missouri Central Business District. St. Louis, Mo.: Missouri State Highway Department, 1950.

Off-road requirements

Paths

In order to achieve the program intent, key path design criteria are set out in *Table 5*.

Table 5 - Key path design criteria for Grant projects

Path design criteria	Minimum value	Desirable value	Rationale
Width (m)	2.5	3.0	3.0m wide paths have 50% greater capacity than 2.5m wide paths and generate fewer path user complaints.
Design speed on midblock level grade (km/h)	25	30	Appropriate for commuter use. Design speed should vary dependant on gradient and intersection priority.

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 to TMR and accepted through the design approval process to retain grants funding.

Provision of paths both sides of urban arterial and collector roads[2] may provide a case for reduced path widths, particularly when co-located with bicycle lanes.

Intersections of paths with paths should include 2.5 metre corner radii or a chamfer of equivalent size.[3]

Where an existing path is to be widened, longitudinal joints in paths should only 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 [4]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.

Where a significant number of pedestrians and cyclists are expected, a segregated path may be required to maintain an appropriate level of service[5]. TMR *Technical Note 128 Selection and Design of Cycle Tracks* provides additional guidance on segregated paths and path treatments at intersections with side streets.

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 should not be used on shared paths to avoid any confusion regarding facility designation.

Shared path signage is not necessary as Queensland road rule 250 permits cyclists to ride on footpaths.

Paths intersecting with driveways should be constructed to provide a smooth joint between the two facilities using measures to control joint displacement such 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 should not include a vertical lip at the invert.

Field inlets and/or cross drainage 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.

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[2] Refer to Table C1 2, Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling (2017)
[3] Refer section 6.4, Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling (2017)
[4] Figure C 4, Austroads Guide to Road Design Part 6A: Paths for Walking and Cycling (2017)
[5] Refer TMR Technical Note 133 Guidance on the widths of shared paths and separated bicycle paths

Transitions between on-road and off-road facilities

Where the cycle route connects from a roadway corridor into a parkland or off-road corridor, transition kerb ramps should be considered. These ramps should also be considered for locations where the bicycle lane may be restricted by a narrow bridge or intersection. The additional off-road option allows bicycle riders to choose which facility they use based on their confidence and the traffic level at the time. For further detail refer TMR *Technical Note 108 Mid-block bicycle lane termination treatments.*

Objects adjacent to paths

A 1.0 metre clearance should be provided from the edge of cycle-able surface of any bikeway or shared pathway to any potentially hazardous object adjacent to a path.

Fencing, balustrades and vegetation shall 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 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 incorporating vertical bars is not considered smooth as rubrails are only partially effective at preventing adult cyclists or children from engaging with the vertical elements of the fence. Fence types with openings of 25mm 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 1.

Figure 1 - Closely spaced mesh fencing

Fencing with continuous smooth profiles can eliminate the offset top rail requirement on bicycle path 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. *Austroads Guide to Road Design Part 6A section 5.5.3* 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 w-beam guardrail. If w-beam is located within 1.0 metre of the path edge it should be treated to minimise path user collision severity. Fencing needs to be designed to ensure it does not interfere with guardrail effectiveness in the event of a motor vehicle collision. 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.

Path Terminal Treatments

Path terminal treatments should not be used as slow points or force cyclists to dismount to safely navigate through the treatment.

Terminal barrier treatments that limit motor vehicle access should only be considered if there is infrastructure along the pathway, such as light weight bridges, that could be damaged by unauthorised access by a motor vehicle.

Protection of structures from unauthorised motor vehicle access should be managed by load limit signage.

TMR *Technical Note 131 Shared path and bicycle path termination treatments* provides further guidance on safe vehicle restriction treatments for bicycle paths and shared paths.

Appendix A – Separation Devices on Bicycle Lanes

In 2015 TMR commissioned a study into the feasibility of retrofitting separation onto existing on-road bicycle lanes. The study: examined available separation devices, undertook crash analysis and observational studies of the operation of existing on-road separation treatments. This fact sheet provides a summary of the key findings of this research.

Best Performing Separation Device Configuration:

- Vertical delineation devices on a separation kerb, optimally within a pavement marked buffer:
  - Separation kerb provides a safe mounting for the vertical delineators and a tactile deterrent to vehicle encroachment;
  - Vertical delineation devices improve conspicuity, reduce the likelihood of bicycle wheel strikes hazards and complement the vehicle encroachment deterrent provided by the separation kerb; and
  - Pavement marked buffer around the separation kerb improves delineation and increases the offset to vehicles and bicycles.

Vertical device within a pavement marked buffer

Desirable characteristics:

- Provide breaks in separation kerb to reduce cyclist 'trap' hazard and allow drainage;
- Generally seek to avoid short sections of separation kerb;
- Conspicuous (through use of contrasting colours and inclusion of retro reflective elements); and
- Slip resistant, semi-mountable (fully mountable at driveways).

Mountable separation kerb for driveway access

Separation kerb with vertical device

Historic Practice:

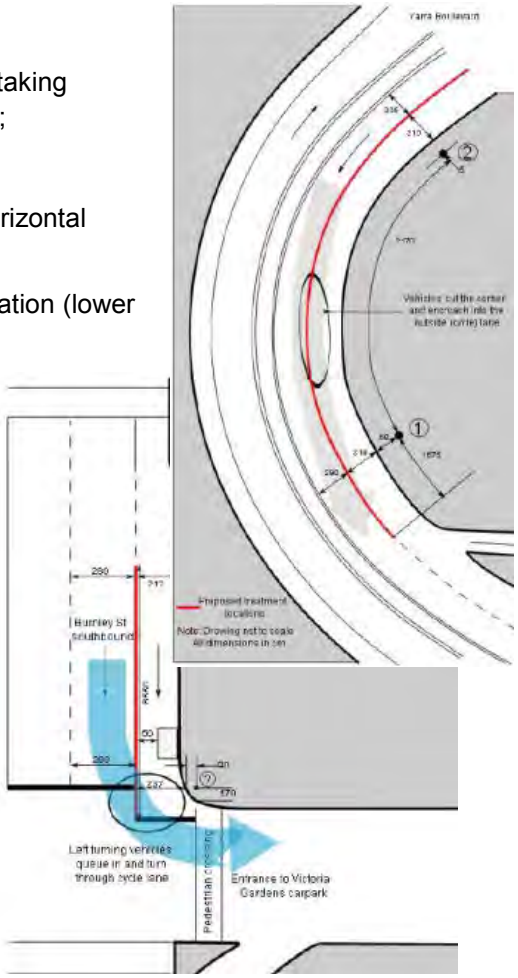
Use of concrete barrier kerbs or 'wheel stops' are common on historical separation treatments.

These are appropriate only if the risk of vehicle encroachment into the bicycle lane is greater than the risk of cyclists and motor vehicle crashes with the device. Risk assessment and exercising engineering judgement and will be required on a site by site basis.

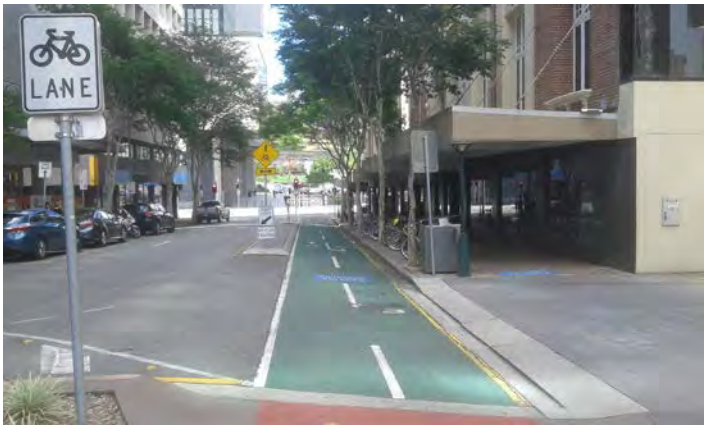
If used, they must incorporate colour contrast, retro reflection, a pavement marked buffer and vertical delineation devices. They must also have a semi mountable profile facing on the bicycle lane side with ramped ends at the drainage cuts combined with increased width at the entry and distinct delineation on the ends.

Site Considerations:

- Bicycle lane width of 1.8m minimum (2m desirable) to allow for passing/overtaking (AGRDPt3) and additional width required on uphill sections and turns/curves;
- Existing facilities are used, or could be used, by less experienced cyclists;
- Where vehicle encroachment on cycling space is most common including horizontal curves, weaving situations, and intersection auxiliary lanes (images right);
- Where traffic volumes and proportion of heavy vehicles/buses warrant separation (lower vehicle thresholders where there are higher proportions of trucks/buses):
    - ≥ 8,000 vehicles per day at 50kph,
    - ≥ 5,000 vehicles per day at 60kph,
    - ≥ 2,500 vehicles per day at 70kph, and
    - Any volume of vehicles per day at ≥ 80kph.
- Careful design consideration needed where there is high vehicle demand across/through the location from:
    - Kerbside bus stops (bus frequency) and car parking (consider turnover rates and if it is reconfigurable);
    - Driveways at high vehicle trip generators.
- Design to account for operational risks including:
    - Regular bicycle pelotons or bicycle platoons formed at intersections, and
    - Strong pedestrian desire line along or across the bicycle lane.



Examples:



Tank St, Brisbane (right) provides a direct connection in the cycle network between the Kurilpa Bridge and Roma Street Parklands filling a key inner-city 'missing link'.

It is two-way, 2.2m wide cycle track, delineated by a 1.2m wide raised concrete median island and green bicycle lane surface treatment.

It has high bicycle traffic of 1000 bicycles on a weekday and 500 on the weekend.

Maryborough Street, Bundaberg (left) is a two-way, 2.8m wide cycle track delineated by a raised concrete kerb and parking.

At times, a high number of students stand and walk within the cycle track in order to access car parking, school buses, or cross the street.

It is heavily used by school aged cyclists during the week.

Document control sheet

Contact for enquiries and proposed changes

If you have any questions regarding this document or if you have a suggestion for improvements, please contact: TMR.Cycle.Grants@tmr.qld.gov.au

Version history

Version no.	Date	Changed by	Nature of amendment
0.1	29.10.14	Tamara Smith	Initial version
0.2	15.01.15	Kendrick Benson	Technical review.
0.3	13.05.15	Mark McDonald	Technical review.
0.4	27.05.15	Tamara Smith	New template.
0.5	08.07.15	Mark McDonald	Incorporated review comments
0.6	16/9/16	Mark McDonald	Incorporated innovative treatment provision, corner radii clarification and minor edits to path side object section.
0.7	26/9/16	Mark McDonald	Incorporated separation preference and intent.
1.0	21/6/17	Mark McDonald	Unified requirements for Grants and Works programs
1.1	21/8/18	Mark McDonald	Annual review. Updated references & fencing recommendations

Document sign off

The following officers have **approved** this document.

X

Jon Douglas
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X

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