Guideline

Speed management on shared paths

August 2020

Queensland Government

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1 Purpose and scope

The purpose of this guideline is to provide operational and best practice guidance on speed management techniques for shared paths to minimise potential conflict between users. Design guidance is provided in the Transport and Main Roads *Road Planning and Design Manual* Volume 3, Part 6A.

Currently, there is no technical guidance available on the management of excessive speeds on shared paths in Queensland. This absence of guidance has resulted in speed limits being introduced and applied to facilities without consideration of appropriate design treatments or the high likelihood of non-compliance.

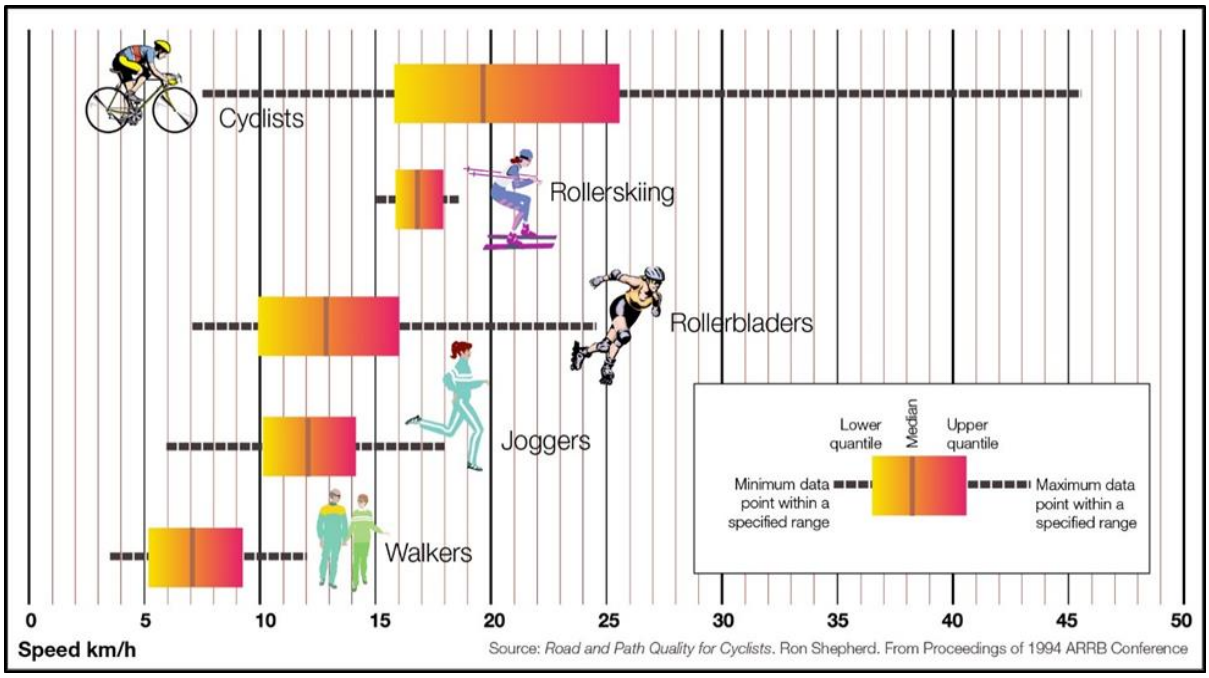
1.1 Introduction and background

Austroads *Guide to Road Design* Part 6A: *Pedestrian and Cycle Paths* describes shared paths as a type of off-road cycling facility which is accessible by people walking and people riding bikes. Shared paths are the most common type of facility due to the cost of constructing separated paths, limitations in the physical area available for a path and the versatility of a shared path, being accessible by all users.

Austroads also recommends that shared paths should be used in situations where there is demand for both a cycling and a pedestrian facility, but where the demand is not expected to warrant separated facilities; however, as increased usage adds pressure on shared paths, this will increase conflict between people riding bikes and people walking. Where separated facilities cannot be provided, and more people riding bikes and people walking are expected to use the same space, management needs to mitigate potential conflict.

Of particular concern to both path users and path managers (asset managers) is the speed of people riding bikes. The wide difference in operating speeds between the modes is shown in Figure 1.1.

Figure 1.1 – Operating speeds of the different types of shared path users (indicative)



Since bicycles are not required to have a speed-measuring device (and many do not have one), mandatory speed limits and their enforcement are not a viable option, even if they could be enforced; however, advisory speed signing and warning signage on paths where there are large numbers of slower users can be effective when used selectively at appropriate locations, and in accordance with the prevailing conditions.

A review of national and international literature has demonstrated speed limits for people riding bikes are not used or recommended as a safety device, with the exception of the rule which states the speed limit of the adjacent roadway shall apply to any road-related area.

1.2 Related documents

This guideline should be read in conjunction with the documents listed in Table 1.2, which provides further detail on design considerations. Documents referenced in this guideline which provide various insights related to the topic of speed management on shared paths are published in the *Active transport guidelines references* document.

Table 1.2 – Related documents

Title
Austroads *Guide to Road Design Part 6A*
Austroads *Guide to Traffic Management Part 5*, Section 4.4
Transport and Main Roads *Road Planning and Design Manual Volume 3, Part 6A*
Transport and Main Roads *Manual of Uniform Traffic Control Devices, Part 9*

Figure 1.2(a) – Inappropriate speed limit signage application

Though the path on the right in this photo has been line marked as a bicycle path, the modified R8-2 regulatory sign declares it as a shared path with an 8 km/h speed limit. The adjacent path on the left is designed and signed for pedestrian-only use. Cairns, QLD.

Figure 1.2(b) – Effective use of pavement markings to manage speeds

The speeds people riding bikes can comfortably operate at are much higher than that of people walking. Poorly designed facilities can produce conflicts between the users due to insufficient operating space, poor surface or a lack of path definition and line marking. This well-designed path is smooth and well defined with centre lining. The path markings warn users to slow for a sharp bend in the path. Bicentennial Bikeway, Brisbane, QLD.

2 Bicycle operating requirements

Riders balances their bicycles in an upright position, mainly due to the forward-motion forces they exert on their machines. Without this forward motion, a bicycle loses stability and falls over. The speed of this forward motion at which people riding bikes choose to travel is influenced by a combination of human and other factors.

At slow speeds, riders stay upright by adjusting the steering and shifting their body weight continually in response to bicycle motion. At higher speeds, the forces set up by the rotating wheels make front wheel steering difficult, so a rider steers by leaning in the intended travel direction.

On well-designed paths and in good conditions, people riding bikes can travel comfortably at speeds of between 15–25 km/h with minimum risk or decrease in amenity to people walking.

An analysis by Transport and Main Roads of its permanent bicycle counters in the south-east Queensland region found that people riding bikes travel, on average, at a speed of 20 km/h. As is the case in on-road situations, the small percentage of riders travelling at excessive speeds (not appropriate to the prevailing conditions) presents the largest concern to the safe operation of shared paths.

Studies of bicycle operational stability during the last century have shown that a bicycle can become unstable at speeds below 11 km/h. The degree of stability depends on a number of factors: the skill of the rider; the design of the bicycle; and environmental factors such as path surface and slope.

Requiring people riding bikes to travel at speeds which may detrimentally affect their stability (and safety) on inadequately-designed paths, shared with other users insensitive to their operational needs, is not an equitable or safe path management strategy.

Any regulatory device which instructs people riding bikes to undertake a behaviour that will compromise their safety cannot expect compliance and damages the credibility of the device and should be replaced with a more suitable treatment.

2.1 Speed setting on shared paths

Setting a speed limit has proven high cost for little benefit, being problematic to enforce due to:

- technological limitations in measuring the speed of a person riding a bike from a standing position
- the required expectation of people riding bikes themselves to monitor their specific speeds, and
- not all bicycles are equipped with a speedometer (or similarly accurate speed measuring instrument).

Research into speed limit setting issues on shared paths was undertaken for Transport and Main Roads in 2011. The study surveyed user behaviour on popular paths in Brisbane and reviewed current research including accident data and current practice.

The key findings of this study were:

- The frequency of crashes between people walking and bike riders on footpaths and bikeways was extremely low, with an average of 4.7 crashes per year on off-road facilities across Queensland.

  In the 17-year period analysed, crashes between people walking and people riding bikes resulted in two fatalities and, in both circumstances the crashes occurred on a nearby road.
- Data from traffic counters on shared paths in Brisbane suggested that path speed is more consistent at busy periods, while people riding bikes travel at different speeds when the path is unoccupied. Data from counters show the average speed of each facility at peak times

approximates a reasonable design speed for each location, indicating the people riding bikes can self-moderate speeds appropriate to the location.

- There is no defensible justification for imposing regulatory speed limits on shared paths. A more constructive approach would be to provide clear instructions to people riding bikes of appropriate speed and behaviour in relation to other path users through effective path design and traffic control devices.
- Decisive feedback from people who ride bikes opposed the introduction of regulatory speed limits on shared paths while agreeing there were safety issues in some locations that needed to be addressed by proposing alternative treatment measures.
- Speed limits are not used or recommended as a safety measure for paths.
- Alternative treatment methods to speed limiting may be as, or more, effective as safety devices for path management, avoiding the negative connotations associated with regulation. If a speed limit is to be imposed, advisory speed signs should be used in place of regulatory speed limits and only sections of path below current design standards or with a localised safety hazard should be assessed for such signs.

Speed management guidelines for paths cannot be viewed in isolation. Implementing a path speed limit may increase the number of people riding bikes choosing to use an on-road alternative. A road that does not provide for people riding bikes could counteract the safety of people riding bikes with consequences and risk of non-compliance.

Figure 2.1 – Speed signs in current use

The two signs on the left are regulatory (enforceable) speed signs which apply to both the road and the road-related area (adjacent paths). The centre right sign is an (unenforceable) advisory speed sign. This type of sign is preferred for indicating advisory speeds (photo right). Where a regulatory speed limit is not signed, the default speed limits apply – 50 km/h in built-up areas and 100 km/h outside built-up areas.

There are always spatial issues when different transport modes mix; for example, the Queensland Road Rules recognise this by specifying a ‘minimum overtaking distance’ when passing a bicycle rider.

Likewise, people walking may feel a need for separation between themselves and people riding bikes on shared paths and footpaths. These issues should be addressed through carefully-considered facility design and targeted behavioural interventions.

3 Designing paths to account for speed

There are many treatment measures to address the safety concerns of users on shared paths, but practitioners should take a holistic approach to path design, using all the following categories and carefully studying path user behaviour and consulting with actual path users before implementing remedial measures, as safety issues rarely involve a single design category.

If non-compliance with treatment by people riding bikes is likely, an alternative treatment should be used. It is also essential to determine if the treatment is 'solving' the problem or just 'relocating' it.

Common design and management issues affecting the operation of a path are:

- path design speed
- path widths and user volumes
- path gradient, surface, alignment and sightlines
- physical devices, and
- advisory devices.

3.1 Path design speed

Section 5.2 of Austroads' *Guide to Road Design Part 6A* recommends that shared paths be built to a design speed of at least 30 km/h wherever possible and desirable, given the purpose of the path and, in other cases, for the anticipated operating speeds. It may be necessary to adopt higher or lower design speeds in specific circumstances.

Design speed should not be confused with operating speed or preferred operating speed which are related more to the driver rather than the path's design.

All path and road users have a legal obligation to travel at safe speeds, according to the prevailing conditions and to travel with all due care and attention to avoid a collision with other road / path users. A travel speed appropriate to the prevailing conditions may well be below a posted speed limit.

Where shared paths or short sections of these paths have not been adequately designed for the desired operating speed, interim, specific site measures may need to be implemented before a path upgrade.

Figure 3.1(a) – Design parameters for off-road paths

Design element	Coverage in *Austroads Guide to Road Design - Part 6A Pedestrian and Cyclist Paths 2017*	Example values for 30km/hr design speed
Bicycle path width	5.1 Width of bicycle paths 5.1.3 Table 5.2	2.5m local access, 3.0m major path
Shared path width	5.1 Width of shared paths 5.1.4 Table 5.3	2.5m local access, 3.0m major path
Separated path width	5.1 Width of spearated paths 5.1.5 Table 5.4 and 5.5	Two-way 2.5m bikepath, 2.0m footpath One-way 1.5m bikepath, 1.5m footpath
Operating speed	5.2 Bicycle operating speed	30km/hr
Horozontal curvature	5.3 Hozozontal curvature Tables 5.6 and 5.7	25m minimum path radius without superelevation
Gradient	5.4 Gradient Figure 5.6	5% maximum
Clearances	5.5 Clearances Figure 5.7, 5.8, 5.9, and 5.10	0.5 - 1.0m to walls and fences
Crossfall and drainage	5.6 Crossfalls and drainage Figure 5.14	2% for minimum radius of 25m
Sight and stopping distance	5.7 Sight distance Figure 5.15	35-40m 8m sight clearance on min 25m radius curves

Also refer to the Transport and Main Roads *Road Planning and Design Manual* Volume 3, Part 6A.

Figure 3.1(b) – Use of segregation and pavement markings to minimise conflict

During morning and evening peak periods this path is heavily used by people riding bikes and people walking. To minimise conflicts and improve user amenity, the path has been widened into separate bicycle and pedestrian paths. Bicentennial Bikeway, Brisbane QLD.

3.2 Path widths and path user volumes

In urban situations where paths carry high volumes of both types of users (people riding bikes and people walking), the width of the facility is critical in its safe operation and user amenity.

The departmental *Road Planning and Design Manual* Volume 3, Part 6A provides design guidance, and Austroads' *Guide to Traffic Management*, Part 5, Section 4.4 provide operational guidance, to practitioners on suitable path widths relative to path use.

In instances where path volumes are excessive, the physical separation of people riding bikes and people walking onto separate but parallel paths may be the most desirable option.

3.3 Path gradient, surface, alignment and sightlines

Bicycles are very manoeuvrable, but this manoeuvrability has limits when the forward movement of the bicycle becomes insufficient to maintain an upright position comfortably.

As bicycles are vehicles of momentum, riders may coast quickly down hills, using the momentum built up from prior physical effort to travel further with minimal effort.

Figure 3.3 – Path safety issues due to broader design issues exacerbated by speed

Left: This path is built on a downhill slope with a significant crossing movement of people walking across the path to the ferry wharf. The crossing point is marked with warning signage and highlighted pavement colour. The sign assembly is top to bottom – W6-1, W8-23 and TC1592-2.

Right: This merge point for separated pedestrian, and cyclist merges into a shared path section which is signed (in the opposite direction) with warning signage and different pavement material. Kangaroo Point, QLD.

These factors relating to the operating characteristics of the vehicle are not widely recognised by path designers. This can result in excessively steep grades, insufficient warning of path curves or sudden path narrowing obscured by poor sightlines. Adequate warning signage of upcoming potential hazards and the maintenance of good sightlines are factors that can, in themselves, moderate excessive path speeds. For further design criteria, please refer to the department's *Road Planning and Design Manual* Volume 3, Part 6A.

3.4 Physical devices

Refer to the department's *Road Planning and Design Manual* Volume 3, Part 6A for path design criteria for physical devices and path speed limiting devices.

The frequency of crashes between people walking and people riding bikes on footpaths and bikeways is extremely low (compared with road crashes) and the average speed of each (shared use path) facility at peak times approximates a reasonable design speed for each location, suggesting the bike riders can self-moderate speeds that are appropriate to the location.

The following section demonstrates some examples of 'best practice' speed management, using the path speed limiting devices listed in the department's *Road Planning and Design Manual* Volume 3, Part 6A.

3.5 Pavement markings and segregation

The use of line marking and signage (see Section 3.6 *Advisory devices*) on pathways has an effect on user behaviour. The overuse of centre-line pavement markings and advisory signage can result in shared paths looking like 'roads' and risk people riding bikes treating the facility as a 'road' – a dedicated right-of-way, travelling at higher speeds. The alternative is to use an uncluttered 'shared space' look with minimal or zero demarcation of user space, allowing for slower speed 'mixing' of users.

Placing people walking on a 'view' side of the path (for example, the riverside) and people riding bikes on the 'non-view' side will minimise conflicts and encourage the 'through' movement of people riding bikes, whilst allowing people walking to enjoy the amenity / scenery.

In Queensland, while walking people tend to use facilities with shade; for example, a 'bicycle only' path with shade from overhanging tree branches may have significant use by people walking if the adjoining footpath has none.

The following section demonstrates some examples of 'best practice' speed management, using the path speed limiting devices listed in the department's *Road Planning and Design Manual* Volume 3, Part 6A.

Figure 3.5(a) – A shared path adjacent to Perth central railway station

This particular section of path is crossed by people walking and traversed by people riding bikes and service vehicles. The flush brick paving makes the area look like a pedestrian plaza (that is, not like a road), thus encouraging drivers and people riding bikes to be alert and respectful when traversing this area. To assist people riding bikes (this is a major cycling network route) and to provide clear definition of the facility, edge lining and centre lining have been installed. The bollards have been installed to physically prevent parking at the curve.

Figure 3.5(b) – Pavement markings use on a sight restricted corner to manage approach speed

Distinctive pavement markings have been added to the pavement of this curving shared path as it enters an underpass on a downhill slope. Normanby Pedestrian Cyclist Link, Brisbane, QLD.

Figure 3.5(c) – Shared path slow point treatment at railway station access point

City West Station, Perth, WA.

3.6 Advisory devices

Advising people riding bikes and people walking that they are on a designated shared path and to take additional care is best done through clear sightlines and traditional warning devices, such as signs and pavement markings. In most instances, the use of a R8-2 shared path with pavement markings (centre lining – solid in the case of tight curves and constrained widths, edge lining particularly in low-light locations and bicycle / pedestrian pavement symbols) will communicate a strong regulatory / safety message to people riding bikes and people walking.

Additional departmental warning signage is also available for shared path use, shown in Figure 3.6.

Figure 3.6 – Warning advisory signage recommended for use on paths in Queensland

Left to right: W4-3 Path Narrows (also W4-3 Narrow bridge); TC9605 Steep descent – W4 signs and TC9605 to be 450 mm square; TC1608 (300 mm wide) SLOW DOWN – used in conjunction with other diamond shape warning signs); TC1592-2 SLOW DOWN FOR PEDESTRIANS.

3.6.1 Path behavioural signage

A properly designed path may still experience major safety issues if the type of use changes from that for which it was designed. Similarly, a narrow path (less than 2.5 m width) may not operate safely if, over time, the volume of people walking or people riding bikes increases.

In place of a costly full upgrade, path management measures will need to be implemented to reduce risk to users. These may be unpopular with the path users as they may reduce the level of service of the path and require changes in behaviour. Balancing safety with path amenity and level of service for the users should always be given careful consideration and any introduced physical measures communicated to the path users.

Repeated instances of poor path user behaviour can be address by the installation of the path behaviour signage which is designed to remind path users of four key behaviour messages.

Figure 3.6.1 – Path behavioural signs

TC2306_1

TC2306_2

Details on additional path advisory signs can be found in the department's suite of TC signs which are available for download from the department's website.

4 Further information

For further information on this guideline, please contact:

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