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Shared path audit guidelines



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Part A: The audit process

1. Introduction

1.1 Purpose of these guidelines

The purpose of these guidelines is to provide additional guidance on auditing shared use paths. These guidelines should be read in conjunction with *Austrroads Guide to Road Safety Part 6: Road Safety Audit (2009)* and *Appendix C of Austrroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths*.

1.2 Purpose of a shared path audit

The purpose of a shared path audit is to identify, record and prioritise existing and potential concerns for cyclists and pedestrians.

1.3 Risk as a basis for the audit process

The guidelines have generally been prepared with reference to, and in accordance with the procedures for Road Safety Audits set out in the *Austrroads Guide to Road Safety Part 6: Road Safety Audit (2009)*, which states:

A road safety audit is a formal examination of a future road or traffic project or an existing road, in which an independent, qualified team reports on the project's crash potential and safety performance.

Part 6 also highlights that road safety audits are more than checking standards, and are more about checking "fit for purpose". The essential elements of road safety audits are that they are:

- A formal process and not an informal check;
- Carried out by people who are independent of the design (where possible);
- Carried out by people with appropriate experience and training; and
- Restricted to issues around risk.

Traditionally, road safety audits prioritise high severity/low probability issues before low severity/high probability issues. This approach is not necessarily recommended in the auditing of shared paths, and the reverse may be more appropriate, either in the recommendations, or response by the client.

2. The audit process

Step 1: Assemble the audit team

The audit team should consist of at least two people, and can include members of a local bicycle (and/or pedestrian) user group, council officers and land managers. At least one member of the audit team should have a good knowledge of relevant standards and guidelines and have auditing experience. However, the team may also benefit from including a 'non-professional' who may highlight concerns from a different perspective.

An inception meeting should be held by the client (eg local authority or land manager) to outline any background information and safety concerns raised by the community. Ideally, the meeting would also be attended by key stakeholders such as Parks Victoria or VicRoads.

Step 2: Collect and review background information

The audit team will review the background information provided by the client, including maps, aerial photography, community concerns, crash data (where available) and descriptions of the path and condition. Review any information available on the original construction of the path – plans, cross-sections, dates of construction etc. Try to obtain user volume (and directional split) information – this should be collected by the path manager, prior to the audit.

Step 3: Inspect the site

The existing shared path should ideally be inspected on both foot and bicycle, and in both directions to reveal issues relevant to that mode and speed and direction of travel. Identification of safety issues for pedestrians and cyclists will vary and need to be recorded separately.

As well as travelling 'along' a shared path, it is important to inspect each connecting path or entry point (by foot and bicycle) to fully understand these locations. Intersections are places of increased movement, decision-making and user conflict and so must be given close attention.

If time allows, consider carrying out a second inspection on a day with different weather conditions - light, shadow, rain and wind can have a notable effect on the condition and prominence of safety issues. If the path is used during the hours of darkness (eg winter afternoons), a night time inspection is necessary.

Step 4: Record your observations

Be careful to record the location of each observation in relation to direction of travel, if relevant.

Observations during the site inspection can be recorded in several ways – it is helpful to use more than one method to minimise methodology bias.

- By bicycle: video recorders, dictaphones and GPS tracking devices
- By foot: cameras, sketches, clipboard notes and 'palm pilot' recorders

Step 5: Write the report

The report introduction should contain:

- Description of audit team members (professional role, qualifications and reason for involvement)
- Background information considered during the audit
- Details of when and how the site inspection took place
- The location and general usage of the shared path, along with any other information that will establish its position within the wider walking / cycling network.

The main body of the report could contain:

- Aerial photos (and/or cadastral maps) with numbered sites for each safety concern
- Listed safety concerns in tabular format including:
 - Location description
 - Appropriate photo(s),
 - Melways reference or GPS coordinates,
 - Description of the hazard
 - Risk rating
 - Recommended action(s)
- Prioritisation of safety concerns
- Recommendations for action.

For each location and issue, a combination of written description and numerical ranking should be provided to give a quantitative analysis of risk and prioritisation. See section 3.0 for more detail.

Step 6: Conduct a completion meeting

A completion meeting may be held between the audit team and the client to discuss the findings and recommendations of the audit report, and to clarify any issues. This meeting should take place before the report is finalised, however care must be taken to maintain the independence of the report.

Step 7: Respond to the audit (by the client)

Audits are a formal process and the client should provide a written response to the audit findings and recommendations. The client is under no obligation to accept all the audit findings and recommendations and should consider these in conjunction with all other considerations. It is advisable that the reasons for not accepting the recommendations of the report are clearly recorded for future reference. Once a response to the audit is written, the audit process is completed; the audit team does not need to counter-respond to the client.

Subsequent to the completion of the audit, the client may wish to write a separate prioritisation / action list for improvements to the shared path. This may differ significantly from the audit recommendations, as it needs to consider issues such as recommendations from previous audits on other paths, budget constraints, path aesthetics and function, considerations of wider 'risk transfer', and general community or political concerns.

3. Prioritisation of issues

3.1 Why prioritise

The audit can highlight many concerns, the solutions to which may vary in cost. Due to financial constraints, audit recommendations can be difficult to implement simultaneously. Prioritising the recommendations will help the client act on the findings of the report.

3.2 Establish a risk rating for each issue

Each identified issue can have a risk rating established. The purpose of a risk rating is to establish a score that represents how important the issue is and the extent to which it should be addressed.

The risk rating is a function of the consequences if a crash did occur (Severity Rating), and the likelihood that a crash could occur (Probability Rating). Descriptions of these are provided in Table 1 and Table 2.

As shown in Table 3, issues with a low Severity Rating and low Probability Rating have a low Risk Rating.

It is a matter of professional judgement, and agreement among the audit team, as to which rating (for severity and probability) should be given for each safety issue.

3.3 How to prioritise

The Risk Rating will play a critical role in the prioritisation of issues, but it should not be the sole factor to consider. For instance, to prioritise issues that have the same Risk Rating, other factors such as user volume or type could be taken into account – in other words, how many people are potentially exposed to the issue.

Table 1: Severity Rating

Severity Rating (SR)	Definition
1	No injury likely
2	Minor injury
3	Significant injury
4	Serious injury
5	Permanent disability / death possible

Table 2: Probability Rating

Probability Rating (PR)	Definition
1	Incident unlikely to occur
2	Incident likely to occur on occasion
3	Incident likely to occur once every 5 years
4	High probability of incident – likely to occur each year
5	Incident almost certain – likely to occur several times per year

Table 3: Risk Rating matrix with word and numerical values

		Severity Rating				
		1	2	3	4	5
Probability Rating (PR)	1	Low (1)	Low (2)	Low (3)	Medium (4)	Medium (5)
	2	Low (2)	Medium (4)	Medium (6)	Medium (8)	High (10)
	3	Low (3)	Medium (6)	High (9)	High (12)	High (15)
	4	Medium (4)	Medium (8)	High (12)	High (16)	Extreme (20)
	5	Medium (5)	High (10)	High (15)	Extreme (20)	Extreme (25)

Part B: Safety considerations

This section provides guidance on the issues that path auditors need to focus on as part of the audit process. Shared paths should be considered in terms of the path itself as well as the area that surrounds the path. In road safety engineering terms, the surrounding area is often called the "clear zone" which implies that there is an area around the path that should be free of obstacles and hazards that may cause a cyclist to crash should the cyclist leave the path.

Many safety concerns on shared paths relate to cyclists due to the higher speed that cyclists travel. As a result, most obstacles and hazards pose a greater risk to cyclists than they do to pedestrians, often resulting in more severe injuries to cyclists.

The main safety issues that need to be identified, recorded and prioritised as part of a shared path audit are:

- 1) path width, 2) obstacles, 3) hazards, 4) horizontal and vertical alignment, 5) surface condition and quality and 6) path intersections.

When considering appropriate treatment options for identified safety concerns, a common approach is to consider a hierarchy response of removing the hazard, relocating the hazard, or protecting the hazard. The potential impact of most path hazards can be minimised significantly by following this approach.

1. Path width

Paths must be wide enough to accommodate the numbers of cyclists and pedestrians who use the path. They must allow sufficient room for cyclists and pedestrians to pass each other (including people in wheelchairs) so that conflicts can be avoided and cyclists can overtake slower path users with adequate clearances. Paths that are too narrow may result in cyclists riding off the path to pass or overtake other path users.

In most circumstances shared paths that are 3.0m wide provide sufficient space for cyclists and pedestrians to pass and overtake one another safely and effectively. However, as the volumes of pedestrians and cyclists increase, paths may need to be widened or a separate path be provided for pedestrians to use. For further information on the widths of paths, please refer to VicRoads Cycle Notes No. 21 (2012).

Table 4 provides guidance on the actions that can be taken to address situations where the width of the path has been determined as too narrow.

Table 4: Issues around narrow paths

Problem	The path is too narrow to accommodate the numbers of cyclists and pedestrians who use the path.
Possible Risk Rating	Low to medium (1-8). An incident may occur, but the chance of injury is minimal unless cyclist hits a hazard or obstacle.
Recommended solutions	Widen the path to suit the numbers of cyclists and pedestrians.
Other treatments	Provide a separate path for pedestrian use. Develop an alternative route for cyclists to take such as an on-road route. Use signing and edge lines to highlight "pinch points" where the path narrows. Keep the "clear zone" free from obstructions and mow grass so that cyclists may leave the path safely, if necessary.
Examples	Figures 1 and 2 are examples of two paths that can accommodate only one cyclist travelling in one direction at a time or two pedestrians. If a cyclist encountered a pedestrian or another cyclist on one of these paths, one of the path users would need to move off the path to avoid a collision



Figure 1: Narrow path with poor path side maintenance



Figure 2: Narrow path with poor quality surface

2. Obstacles

Obstacles are normally visible structures (signs and poles) and may be located within the path and in a cyclist's line of travel, within the area surrounding the path where a cyclist may be expected to ride.

Typical examples of in-path obstacles include bollards used to prevent unauthorised access, fences and gates. Obstacles close to the path include buildings, bridge piers, signs, trees, rubbish bins, seating, drainage grates, culverts and pit lids. Overhanging branches and the tops of culverts could also be hazardous to cyclists.

The lateral clearance that needs to be provided between the edge of the path and an obstacle depends on the speed that cyclists are travelling along the path – the higher the speed, the more clearance is required. In general, a clearance of 1.0m (0.5m minimum) should be provided. On downhill sections of path, increased clearances to obstacles should be encouraged.

Table 5 provides guidance on addressing issues around obstacles on or near shared use paths.

Table 5: Issues around obstacles

Problem	An obstacle is too close to the path or is in the line of travel of a cyclist and may cause a hazard for cyclists.
Possible Risk Rating	Low to medium during daylight hours. Medium to high at night when obstacles may not be visible.
Recommended solutions	Remove or relocate the obstacle beyond 1.0m clearance of the path edge.
Other treatments	Mark a centre line or edgeline to direct cyclists away from the obstacle. Use a hazard marker or high visibility illumination to mark out the obstacle, including low structures. Paint rocks white to make them more conspicuous. Install overhead lighting to ensure that obstacles can be seen at night.
Examples	Figures 3 and 4 are examples of obstacles. These include end of path treatments within the actual path and rubbish bins right on the edge of the path. These can pose a significant hazard for cyclists – especially at night.



Figure 3: End of path treatments can present a hazard to cyclists



Figure 4: Rubbish bin and post causing a hazard for cyclists

3. Hazards

Hazards are different to obstacles as they are often more difficult for cyclists to see and are usually located adjacent to the path or within the area around the path where cyclists may be expected to ride (ie within 5.0m of the path).

Common hazards include open drains that are covered by vegetation, concrete culverts and end walls, rocks, tree roots, depressions and deposits of soft material such as sand that can cause cyclists to crash.

Some paths have steep embankments or drop-offs that may cause cyclists to fall if they travel off the path. The danger that invisible hazards pose for cyclists and pedestrians is more significant when the hazard is closer to the path.

It is critical that hazards are either removed, marked out or shielded from path users. For example, concrete pipes can be used instead of open table drains, especially when they are close to the edge of the path (ie 2.0m). Vegetation must be removed from open table drains so that cyclists can see the hazard ahead of them and fences should be installed with appropriate off-sets to protect cyclists from steep embankments and along the sides of bridges.

For further information on treating steep embankments and adjacent hazards, please refer to Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths (2009).

Table 6 provides guidance around the issues associated with hazards and how these issues may be addressed.

Table 6: Issues around hazards

Problem	A hazard is present in the area surrounding the path and/or within the area around the path where cyclists may ride (ie within 5.0m of the path).
Possible Risk Rating	Medium to high (4-6) during daylight hours. High to extreme at night and/or where the hazard would cause a severe crash to occur.
Recommended solutions	Remove the hazard by installing concrete pipes, levelling the surface, filling in holes or replace loose sand and other material with harder compacted material. Shield the hazard by installing fencing or other protective barriers. Replace non-compliant drainage grates with traversable grates.
Other treatments	Use hazard markers or high visibility illumination to delineate the hazard. Clear vegetation and keep grass mown to ensure that cyclists are aware of the presence of hazards.
Examples	Figures 5 and 6 are examples of typical hazards. They can include unprotected drop-offs at the edge of a shared use path or unprotected pit lids or service covers close to the path as shown.



Figure 5: Drop off hazard close to the edge of a path



Figure 6: Hazard close to the edge of a path

4. Horizontal and vertical alignment

Cyclists and pedestrians need to know what is ahead of them on a path so that they can adjust their speed and position in order to avoid hazards, give way to other path users and stay on the path.

In addition, paths that are too steep may present a hazard for less experienced cyclists and for pedestrians, especially people using wheel chairs.

Issues with a path's horizontal and vertical alignment may present a hazard to cyclists and pedestrians in situations where there is insufficient sight distance. This may occur as a result of embankments, crests, overgrown vegetation and tight corners. A steep downhill path that includes a tight corner at the end of the path can present a hazard when cyclists are travelling too fast.

To address these issues, sections of paths may be reconstructed and/or widened to improve sight distances and soften sharp bends.

Signing and linemarking treatments should also be considered to guide cyclists safely through these areas. Centre lines and shared path behavioural signage can be particularly effective at keeping cyclists and pedestrians on the left of the path. Hazard boards and warning signs can also be used on tight corners to encourage cyclists to slow down.

For further information regarding acceptable gradients, sight lines and path alignments, please refer to Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths (2009).

Table 7 provides guidance on issues associated with horizontal and vertical alignment and what can be done to address these concerns.

Table 7: Issues around horizontal and vertical alignment

Problem	The horizontal and/or vertical alignment of a path restricts sight distance and causes cyclists to travel too fast, to cross onto the wrong side of the path or creates conflict with other path users.
Possible Risk Rating	Low to medium (1-8). In most cases cyclists will slow down and take greater care when presented with cases of poor sight distances, particularly if they are familiar with the location.
Recommended solutions	Reconstruct and/or widen the path to improve sight distances. Remove obstructions that limit sight distances on bends at close to the path.
Other treatments	Install edge lines and centre lines to guide cyclists through these areas and to encourage cyclists and pedestrians to keep to the left of the path. Install chevron alignment markers on the outsides of tight corners to give cyclists advanced warning that they should slow down before they enter the corner. Where necessary, install convex mirrors to allow path users to see around very tight corners. Install signage and line markings to warn users of impending steep gradients. Provide a forgiving path-side environment around tight bends to reduce the chance of injuries.
Examples	Figures 7 and 8 are examples of steep paths that include path side hazards such as railings and/or overgrown vegetation which can cause a hazard for cyclists, especially when there is insufficient sight distances to intersections and other path users.



Figure 7: Path side hazards can reduce sight distances on steep paths



Figure 8: Steep paths and path side vegetation can reduce sight distances

5. Surface condition and quality

Smooth surfaces play a key role in the prevention of crashes and the level of service experienced by path users.

Issues such as longitudinal or lateral cracks in asphalt or concrete paths, erosion of path edges, potholes, deep pockets of sand or gravel, concrete slab misalignment, debris, raised or depressed service pit covers, wet timber surfaces and gaps between parallel timber planks can all contribute towards destabilising a cyclist, pedestrian, roller blader or scooter rider.

Many of these issues are exacerbated for cyclists when they are located on tight corners, particularly following steep descents. Attention should also be given to sections coping with a peak demand and higher frequencies of passing and overtaking.

Path managers must ensure that all longitudinal or lateral cracks in asphalt or concrete paths, potholes and eroded edges are filled in with appropriately compacted material. Longitudinal cracks pose an additional hazard to cyclists if they are wide enough to fit a bicycle wheel. Pockets of sand, gravel and other debris must be removed and timber surfaces treated to increase their skid resistance.

Consideration should also be given to re-aligning timber planks so that they are perpendicular to the direction of travel. Regular path maintenance schedules will ensure paths are kept clear of debris wherever possible.

Table 8 provides guidance on the issues surrounding surface condition and quality.

Table 8: Issues around surface condition and quality

Problem	A path has longitudinal or lateral cracks, eroded edges, potholes, deep pockets of sand or gravel, uneven concrete slabs, debris, misaligned service pit covers, wet timber surfaces or gaps between timber planks.
Possible Risk Rating	Medium to high (4-6), depending on the location of the issue. Large longitudinal cracks can have a higher risk rating.
Recommended solutions	Fill in all longitudinal or lateral cracks in asphalt or concrete paths, potholes and eroded edges. Reconstruct sections of path if necessary and install more effective drainage. Grind down uneven concrete slab edges. Regularly remove (sweep) all pockets of sand or gravel and debris that finds its way onto paths. Treat all timber surfaces to increase their skid resistance, if necessary. Re-fit service lids to be flush with path surface and replace with a non-slip design and material. Re-align and/or replace timber planks so that they are perpendicular to the direction of travel.
Other treatments	Extend concrete or asphalt path surface into connecting gravel paths. Box in adjacent loose path material, being careful not to introduce another hazard.
Examples	Figures 9 and 10 are examples of issues with surface condition and quality that can cause a hazard for path users - especially cyclists and vision impaired pedestrians. Sunken pit covers and misaligned slabs such as these can present a significant hazard, can cause cyclists to become unstable and pedestrians to trip.



Figure 9: Depressed service pit



Figure 10: Slab misalignment

6. Path intersections

Locations where paths intersect roads or even other paths require heightened levels of concentration and decision making. Careful design of intersections can help minimise the risk to path users by prescribing priorities and responsibilities.

Safety at intersections is usually improved when all users are made to adopt a slower speed, giving more time for observation and reaction.

Sight distance to the intersection must be adequate on all approaches so that path users and drivers can easily identify the treatment and priority that applies. Wherever possible, paths for cycling should be aligned to intersect roads at approximately 90 degrees with adequate sight distances between path users approaching the intersection.

At intersections between paths, the layout should favour the predominant flow. Signs and line marking provides consistent and recognisable cues for assigning priority at an intersection.

For further information on safe crossing treatments please refer to *Cycling Aspects of Austroads Guides (2011)*.

Table 9 provides guidance on issues associated with path intersections and how these can be addressed.

Table 9: Issues around path intersections

Problem	The priority status of path or road users is unclear at an intersection in one or more directions.
Possible Risk Rating	Low (1-3). In most cases cyclists will slow down and take care around other path users when priority is not well defined.
Recommended solutions	Re-design the approaches to the intersection (both road and/or paths) so that priority is clear to all path users approaching the intersection to adopt lower speeds. Provide good sightlines in all directions. Use signs and line marking to advise of priority status (eg give way or stop lines). Maintain priority status of main path/trail at path intersections.
Other treatments	Appropriate use of directional signage should be encouraged at any significant path intersection.
Examples	Figure 11 provides an example of a path intersection where the priority direction has been defined by a path centreline. This could be further reinforced by the provision of an edgeline and give way marking on the approach from the left. When shared paths intersect, it is often important to clarify for path users who has right of way.



Figure 11: Path intersections can be improved through the use of a centre line and give way signs

Part C: Overhead lighting, signing and linemarking

Shared use paths can also be improved through the provision of treatments such as overhead lighting, signing and linemarking.

Overhead lighting is very effective at illuminating the path and allowing the cyclists to see other cyclists, pedestrians and hazards. It is also particularly useful at locations where cyclists and/or pedestrians are using the path at night. It is also appropriate at remote locations to improve “passive surveillance”.

The provision of a path centre line, bicycle and pedestrian pavement symbols, edgelines and behavioural signs can also be effective at encouraging greater co-operation between cyclists and pedestrians.

Luminous paint that glows in the dark can also be used to highlight particularly difficult sections of path. For more guidance on signing and linemarking, please refer to Cycle Notes 10-Shared Path Behavioural Signs.



Figure 13: Overhead lighting is an effective way of improving cyclist and pedestrian safety on off-road paths
(Photo: City of Boroondara)

For further information please phone
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