

# Safety Audit Checklist for Dual-Use Paths



## September 1997

This document is a safety audit checklist for Multiple-Use Paths. It should be read in conjunction with the AUSTROADS Road Safety Audit guidelines, which explain many of the general principles of safety audits. Road Safety Audits have been used in Western Australia for several years. During this time, they largely focussed on roads, in existence and at design stage. This document extends the general principles of Road Safety Auditing as detailed on AUSTROADS – (Road Safety Audit) to dual-use paths. Before examining the checklists for Dual-Use Paths some key principles of Road Safety Auditing.

A Road Safety Audit is a formal examination of an existing or future road and traffic project, or any project which interacts with road users, in which an independent, qualified examiner reports on the projects crash potential and safety performance.

The purpose of the Road Safety Audit is to look at the crash potential and safety performance of the road or road proposal. It is a formal process using a defined procedure and not an informal check. The outcome of a road safety audit is a Road Safety Audit Report, which identifies any road safety deficiencies and if appropriate, makes recommendations aimed at removing or reducing these deficiencies. The benefit of this is the likelihood of crashes on the road network can be reduced, severity of crashes minimised, road safety is given greater prominence in the minds of road designers and traffic engineers, the need for costly remedial work is reduced and the total cost of a project to the community, including crashes, disruption and trauma is reduced.

It is essential that personnel conducting a safety audit have previously acquired knowledge of a range of conditions and operational requirements associated with the path to be audited through travelling the path on a bike and on foot.

The type of bicycle(s) used is also important. Bicycles with large cross-section tyres and/or suspension system, although comfortable to ride, may mask many pavement surface defects.

Despite the current popularity of fat-tyred mountain bikes, recent counts of cyclist using Main Roads dual-use paths in the morning peak period showed that narrow-tyred racing bikes outnumbered mountain bikes over 2 to 1. Therefore, it is important that the bicycle(s) used for the dual-use path safety audit have tyres no wider than 32mm.

It is also important that the safety audit personnel ride at speeds typical of most path users - at least 25km/h. Riding at slower speeds may not reveal potential problems such as restricted sight distances or pavement surface defects.

A safety audit should be performed by a person or team of people who have sufficient experience and expertise in the areas of road safety engineering, road construction works, crash investigation and prevention, and traffic engineering. A cross-fertilisation of ideas can result from discussions involving a team with diverse backgrounds who possess different approaches, as this leads to a more in-depth approach than that would be obtained using a single person.

The whole basic process can be summed up in a few basic straight forward steps. Firstly the designer or client needs to select the auditor or audit team with appropriate skills and independence. The designer must then provide background information by collecting plans and site information for the auditor and provide a statement of the project objectives. A commencement meeting must then be held with the client, designer and auditor all present to discuss the audit and hand over the information. The auditor must then assess the documents (use checklists, drawings, data and field notes) and inspect the site both by day and night. The types of road users and likely conditions must be considered as a result of the inspection. A report must be written by the auditor to identify items of safety deficiencies and make recommendations. For major projects it is usually necessary for the client/designer plus the auditor to once again meet, in a completion meeting, where the recommendations can be discussed. The client/designer must then consider each recommendation, and document reasons for accepting or rejecting each one. A copy of this report must be forwarded to the auditor for feedback. Elements of the project are then redesigned according to the recommendations.

As well as knowledge of general road safety and traffic engineering reference documentation, dual-use paths safety audit personnel should be familiar with the following specific documents :

1. Bikewest Guidelines for the Design of Bicycle Facilities. 1992
2. AUSTROADS Guide to Traffic Engineering Practice Part 14 – bicycles. 1994
3. Main Roads Western Australia Guidelines for Provision of Bicycle Facilities. 1994

## **1. General items**

- 1.Landscaping
- 2.Reticulation
- 3.Parking
- 4.Temporary Works
- 5.Headlight Glare
- 6.Conflict Between Paths Users

## **2. Alignment and Cross Section**

- 1.Visibility, Sight Distances
- 2.Design Speed
- 3.Overtaking
- 4.Readability by Users
- 5.Widths
- 6.Edges
- 7.Kerbs

## **3. Intersections**

- 1.Location
- 2.Warning
- 3.Control
- 4.Layout
- 5.Visibility, Sight Distances
- 6.Intersections with roads

## **4. Signs and Lighting**

- 1.Lighting
- 2.Signs
- 3.Marking and Delineation

## **5. Traffic Signals**

- 1.Operation
- 2.Push Buttons
- 3.Sensor Loops

## **6. Physical Objects**

- 1.Fences and Guard Rails
- 2.Bollard
- 3.Chicanes
- 4.General Obstructions

## **7. Pavements**

- 1.Pavement Defects
- 2.Skid Resistance
- 3.Ponding

# DUAL-USE PATHS SAFETY AUDIT

## Existing Paths ( Stage 5 )

Location : \_\_\_\_\_

Date of On-Site Inspection : (Day) \_\_\_ / \_\_\_ / \_\_\_ (Night) \_\_\_ / \_\_\_ / \_\_\_

Time : \_\_\_\_\_ Weather : \_\_\_\_\_

### CHECKLIST - General items

Item	Issues to be considered	Comments
<b>1</b> <b>Landscaping</b>	Is landscaping in accordance with guidelines (eg: clearances, sight distance?)  Are required clearances and sight distances likely to be maintained following future plant growth (landscaping and natural)?	
<b>2</b> <b>Reticulation</b>	Are any automatic reticulation sprinklers timed to avoid major period of path use?  Are reticulation sprinklers located so as to spray away from path (rather than across it)?	
<b>3</b> <b>Parking</b>	Are provisions for any car parking in the vicinity of the path satisfactory in relation to operation and safety for path users?	
<b>4</b> <b>Temporary Works</b>	Are all locations free of construction or maintenance equipment, and any signing or traffic control devices that are no longer required?	
<b>5</b> <b>Headlight Glare</b>	Have any problems due to headlight glare (eg: two-way path close to road) been addressed?	
<b>6</b> <b>Conflict Between Path Users</b>	Have any potential problems of conflict between various path users (eg: pedestrians and cyclists) been addressed?	

## CHECKLIST - Alignment and Cross Section

Item	Issues to be considered	Comments
<b>1</b> <b>Visibility , Sight Distances</b>	<p>Is sight distance adequate for the speed of traffic using the path?</p> <p>Is there adequate sight distance at intersections and crossings (eg: with other dual-use paths, roads, railways, etc)?</p>	
<b>2</b> <b>Design Speed</b>	<p>Is the horizontal and vertical alignment suitable for the likely traffic speed on the path? If not:</p> <p>Are warning signs installed?</p>	
<b>3</b> <b>Overtaking</b>	<p>Are adequate overtaking opportunities provided?</p>	
<b>4</b> <b>Readability by Users</b>	<p>Are there any sections of path which may cause confusion for users, eg:</p> <p>(a) is alignment of path clearly defined, particularly at unexpected bends or at night?</p> <p>(b) has disused pavement (if any) been removed or treated?</p> <p>(c) have old pavement markings been removed properly?</p>	
<b>5</b> <b>Widths</b>	<p>Is the path width, including bridges, adequate?</p>	
<b>6</b> <b>Edges</b>	<p>Are the edges of the path in good condition?</p> <p>Is the ground adjoining the path (shoulder) level with the path surface?</p> <p>Is the ground adjoining the path firm and safe in the event of a cyclist running off the path?</p>	

<b>7</b> <b>Kerbs</b>		
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## CHECKLIST - Intersections

Item	Issues to be considered	Comments
<b>1</b> <b>Location</b>	Are intersections located safely with respect to horizontal and vertical alignment of the path?	
<b>2</b> <b>Warning</b>	Is presence of intersections obvious to path users?	
<b>3</b> <b>Controls</b>	Are pavement markings and intersection control signing satisfactorily?  Are there continuity lines where appropriate, eg: where the path crosses a driveway and vehicles using the driveway must give way to path users?	
<b>4</b> <b>Layout</b>	Are turning radii adequate, particularly left turns from road to path?  At kerb ramps, is the slope satisfactory (1 in 8 maximum)?  At kerb ramps, is the ramp surface flush with the road?  If grab rails are provided, are they positioned so as to not unduly interfere with access, for wheelchair users and cyclists (Consider tandem cyclists and cyclists with trailers)?  Are kerb ramps suitable for wheelchair user (width, slope, flush surface)?	
<b>5</b> <b>Visibility, Sight and Distance</b>	Is sight distance adequate for all movements and all users?	
<b>6</b> <b>Intersections with Roads</b>	At intersections with busy roads, are there appropriate facilities, eg: traffic signals, underpass, overpass or median refuge, to allow path users to safely cross?	

## CHECKLIST - Signs and Lighting

Item	Issues to be considered	Comments
<p><b>1</b> <b>Lighting</b></p>	<p>Is appropriate lighting installed, particularly at tunnels, underpasses and areas of high night activity?</p> <p>Is all lighting operating satisfactorily?</p>	
<p><b>2</b> <b>Signs</b></p>	<p>Are all necessary regulatory, warning and direction signs in place? Are they conspicuous?</p> <p>Are there any redundant signs?</p> <p>Are signs in their correct locations and properly positioned with respect to lateral clearance and height?</p> <p>Are the correct signs used for each situation and is each sign necessary?</p> <p>Are signs placed so as not to restrict sight distance, particularly for turning manoeuvres?</p> <p>Are signs in good condition and free of graffiti?</p> <p>Are signs effective for all likely conditions (eg: day, night, rain, fog, rising or setting sun, oncoming headlights, poor lighting)?</p> <p>If the path connects to a cul-de-sac, does the 'No Through Road' sign at the entrance to the cul-de-sac have the supplementary 'Bicycles Excepted' sign added?</p>	

Item	Issues to be considered	Comments
<p><b>3</b></p> <p><b>Marking and Delineation</b></p>	<p>Is all necessary pavement marking installed?</p> <p>Are pavement markings (centre lines, 'Keep Left' markings, etc) clearly visible and effective for all likely conditions (eg: day, night, rain, fog, rising or setting sun, oncoming headlights, light coloured pavement surface, poor lighting)?</p> <p>Are movement paths through intersections delineated where required?</p> <p>Are all fixed objects close to or on the path (trees, fences, grab rails, etc) treated to ensure visibility at night (eg: painted white and fitted with reflectors or reflective tape)?</p>	

## CHECKLIST - Traffic Signals

<b>Item</b>	<b>Issues to be considered</b>	<b>Comments</b>
<b>1 Operation</b>	<p>Are traffic signals operating correctly? Are there signal displays located appropriately for path users?</p> <p>Are there separate pedestrian and/or bicycle phases where appropriate?</p> <p>Does the design of the signals prevent conflicting motor vehicle movements during crossing phases for pedestrians and cyclists?</p> <p>Is the duration of pedestrian and/or bicycle phases sufficient?</p>	
<b>2 Push Buttons</b>	<p>If push-buttons have been provided for path users, are they correctly located for convenient operation from the normal stopping position (ie: on left o path or kerb ramp)?</p> <p>Are they at the correct height for people with disabilities.</p> <p>If push-buttons have been provided for path users, do they operate correctly?</p>	
<b>3 Sensor Loops</b>	<p>If sensor loops have been provided for bicycle users, do they operate correctly for bicycles over the whole width of the path?</p>	

## CHECKLIST - Physical Objects

Item	Issues to be considered	Comments
<b>1</b> <b>Fences and Guard Rails</b>	Are any fences or guard rails located adjacent to the path free of exposed vertical elements (which can snag handlebars or pedals)?  Are fences or guard rails located adjacent to the path free of sharp edges or corners and forgiving to minimise the risk of injury in the event of a pedestrian or cyclist hitting them?	
<b>2</b> <b>Bollards</b>	If Bollards, or similar devices, are provided to exclude motor vehicles from the path, do they constitute an unnecessary hazard to path users.)	

<p><b>3</b></p> <p><b>Chicanes</b></p> <p><b>(Transverse grab rails)</b></p>	<p>If chicanes are used to slow cyclists, do they allow access at a reasonable speed of 15 km/h?</p> <p>Note: Chicanes should not generally be used on dual-use paths as they can inconvenience legitimate path users including those in wheelchairs, tandem cyclists, cyclists with trailers, etc.</p> <p>Does the presence of the chicane enhance cyclists' safety, taking into account the gradients of the path, proximity of roads etc, in the vicinity? (If not, it should be removed).</p> <p>Is there sufficient clearance between the path and any parallel road in the vicinity of the chicane in case a cyclist runs off the path?</p> <p>Is the chicane at least 5 m from any road intersection to allow cyclists entering the path to get clear of the road before negotiating the chicane?</p> <p>Are there effective fences or other barriers in place to prevent cyclists from bypassing the chicane?</p>	
<p><b>4</b></p> <p><b>General Obstructions</b></p>	<p>If there are any obstructions located within the path, do they have appropriate line markings extending at least 20 m in each direction to alert path users?</p>	

## CHECKLIST - Pavements

Item	Issues to be considered	Comments
<b>1 Pavement Defects</b>	<p>Is the pavement free of defects (eg: excessive roughness, potholes, etc) which could result in safety problems?</p> <p>Is the pavement free of loose materials (eg: sand, gravel)?</p> <p>Are there suitable retaining walls or other treatments in place to prevent sand building up on the path?</p> <p>Is the pavement free of longitudinal defects (eg: grooves or changes in surface height) which could affect steering (and hence stability) for cyclists?</p> <p>Is the pavement free of weeds or grasses which could lead to surface damage?</p>	
<b>2 Skid Resistance</b>	<p>Does the pavement appear to have adequate skid resistance, particularly on curves and steep grades?</p>	
<b>3 Ponding</b>	<p>Is the pavement free of areas where ponding of water may occur?</p>	