

# Pedestrian and Cyclist Walkthroughs and Refuges





# TRAFFIC MANAGEMENT Operational Instructions

## Pedestrian and Cyclist Walkthroughs and Refuges - 10.4

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## 1. Scope

The purpose of this operational instruction is to provide a uniform approach to the installation of pedestrian and cyclist walkthroughs and refuges on roads under the care and control of the Department of Planning Transport and Infrastructure.

This instruction should be read in conjunction with Australian Standard AS 1742.10 - 2009 *Manual of Uniform Traffic Control Devices Part 10: Pedestrian Control and Protection*, AS 1742.9 - 2018 *MUTCD Part 9: Bicycle Facilities* and the Austroads Guides to Traffic Management and Road Design. *The Austroads Australasian Pedestrian Crossing Facility Selection Tool* may also be used to assist in the determination of appropriate pedestrian facilities.

## 2. Definitions

**Walkthroughs (Pedestrian and Cyclist)** may be installed at mid-block locations within existing or proposed raised medians on single or multi-lane two-way roads to provide fully accessible crossing opportunities for pedestrians and cyclists.

**Refuges (Pedestrian and Cyclist)** may be installed within mid-block locations where centrally located raised medians do not exist or installed within existing or future painted island schemes.

## 3. Initial assessment

An initial assessment of the ease with which a pedestrian is able to cross the road should be conducted to assist in determining whether further investigation and treatment is required. The delay or Level of Service (LOS) experienced by a pedestrian waiting for a safe gap in a traffic stream based on the volume of traffic is the key factor in determining if pedestrians can safely cross a road. As traffic volumes increase, the number of gaps long enough for pedestrians to cross decreases, making it more difficult to cross and increasing delays to pedestrians. As volumes increase further, a point is reached at which there are few, if any, gaps of sufficient length for pedestrians to cross safely and delays become significant. This has two potential impacts:

- Pedestrians take risks by crossing in less than desirable gaps
- Pedestrians do not try to cross, or give up after waiting for some time – i.e. the road becomes an impassable barrier.

The gap required (or crossing time) for a pedestrian to safely cross the road is based on the width of traffic lanes required to be crossed in one movement and the pedestrian walking speed. A road divided by a pedestrian refuge stages the crossing into two movements, reducing the length of gap required for a pedestrian to safely cross each section of road. It is considered that a maximum delay of 30 seconds for pedestrians who wish to cross a road is a reasonable time period and therefore a crossing facility is not generally warranted.

Once the peak hour traffic exceeds the volumes shown in the tables below, the delay for pedestrians is likely to increase beyond 30 seconds and additional pedestrian facilities should be considered.

The tabulated volumes were calculated using SIDRA Intersection 8.0 based on the following assumptions:

- pedestrian walking speed is 1.2 m/s
- all traffic lanes are equally utilised (i.e. all lanes assumed to have the same volume)
- all lanes are of equal width.

It should be noted that SIDRA does not take into account the number of pedestrians as the analysis is based on available gap.

The traffic volumes in the following tables are based on a maximum delay of 30 seconds for pedestrians which is equivalent to Level of Service D (refer Appendix A).

Given the same road width, the volume threshold for a two-lane, two-way road is lower than that of a four-lane, two-way road. This is attributed to the traffic volume being spread across more lanes, creating more crossing opportunities which result in a higher threshold for a four lane, two-way road.

**Two-lane, two-way road**

Total road width (m)	Maximum volume (veh/hr)	
	Undivided road <sup>1</sup>	Divided road <sup>2</sup>
6	1560	3536
7.2	1290	3184
8.4	1087	2854
9.6	929	2564
10.8	804	2310
12	704	2090

**Four-lane, two-way road**

Total road width (m)	Maximum volume (veh/hr)	
	Undivided road <sup>1</sup>	Divided road <sup>2</sup>
12	744	2504
13.2	653	2238
14.4	578	2014
15.6	516	1820
16.8	463	1656
19.2	380	1384
21.6	–	1176
24	–	1010

**NOTES:**

- <sup>1</sup> If the peak hour volume is greater than the maximum volume indicated in the table for an undivided road, consider treatments such as narrowing the road width with kerb extensions or a pedestrian refuge.
- <sup>2</sup> If the peak hour volume is greater than the maximum volume indicated in the table for a divided road, consider treatments such as narrowing the road width with kerb extensions or providing pedestrians with a priority crossing. However, if the peak hour volume is less than the maximum volume indicated in the table for a divided road, consider the provision of a pedestrian walkthrough.

The Austroads Pedestrian Facility Selection Tool ([www.austpedtool.com](http://www.austpedtool.com)) provides additional guidance on the assessment and selection of pedestrian facilities. Guidelines for assessing pedestrian volumes in determining the need for controlled pedestrian crossings are specified in DPTI's [Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices, Part 2 – Code of Technical Requirements](#).

## 4. Walkthroughs for Pedestrian and Cyclist

Walkthroughs may be installed at locations where there is a significant frequency of pedestrian and/or cyclist movement but the traffic volume and numbers of pedestrians and cyclists do not warrant the installation of a controlled pedestrian crossing (refer Section 3).

Walkthroughs may be created by removing a segment of existing central raised median to allow pedestrians including those using or in wheeled devices, or cyclists to cross the road carriageway without having to negotiate the kerb of the raised median or travel to the nearest intersection to cross the road. Walkthroughs may also be included in new designs as part of road engineering projects. All walkthroughs must have appropriately located fully accessible kerb ramps leading to the walkthrough. The exact location of a walkthrough may be aligned with the location of pedestrian network paths leading to a road or be determined by conducting a pedestrian and traffic survey in accordance with Appendix E of DPTI's [Code of Technical Requirements](#).

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Figure 3.1 Separated Walkthrough



Figure 3.2 Shared Walkthrough

## 5. Refuges for Pedestrian and Cyclist

Refuges are installed to provide a physical separation of pedestrians and cyclists from vehicles within the roadway when there is no existing median to provide a walkthrough. A pedestrian or shared use refuge is a short length of isolated median and approach pavement marking provided as a staging area to assist pedestrians and cyclists crossing the road. They may be installed in existing or proposed road environments. They may also be installed at midblock locations and located within existing or proposed flush painted median devices.



**Figure 4.1** Shared Refuge

The exact location of a refuge may be aligned with the location of pedestrian and shared network paths leading to a road or be determined by conducting a pedestrian and traffic survey in accordance with Appendix E of DPTI's [Code of Technical Requirements](#).

### 5.1 Linemarking and Retroreflective Raised Pavement Markers

Approach line marking is needed to ensure that vehicles are safely guided past the refuge. Line marking shall be in accordance with DPTI [Pavement Marking Manual](#) Section 3.3.24.1 and Departmental Standard Drawing [S-4075 Sheet 4](#). Retroreflective Raised Pavement Markers (RRPMs) shall be installed in accordance with AS 1742.2 and DPTI's [Pavement Marking Manual](#) Section 2.1.14 Raised Pavement Markers.

## 6. Dimensions and Alignment

Departmental Standard Drawing [S-4075 Sheet 4](#) shows the design layout of pedestrian refuge/walkthrough and AS 1742.10 shows crossing dimensions and signs layout.

The minimum median width shall be not less than 2.0 m and the gap between the medians for the refuge/walkthrough shall be a minimum of 2.1 m.

All refuge/walkthrough in medians shall be aligned at 90 degrees to the median kerb to provide directional wayfinding clues to assist pedestrians who are blind or vision impaired to cross the road and find the destination kerb ramp.

Refuges should not unexpectedly constrict road width, or create a hazard for on-road cyclists. Vehicles must be able to successfully negotiate any deviation from their normal travel path around the refuge while maintaining sufficient clearance from the refuge and parked vehicles. Care should be taken when locating refuges in the vicinity of bus stops.

For further information refer to AS 1742.10 - 2009 Section 9.2 and Austroads *Guide to Road Design Part 4: Intersections and Crossings* Figure C2. For information on shared refuges refer to AS 1742.9 - 2018 Section 3.7.3.

## 7. Adequate Sight Distance

Refuges/walkthroughs must provide appropriate sight lines for pedestrians and cyclists waiting at kerb ramps, kerb protuberances and the central median to oncoming vehicles. Sight distance calculations can be made using Austroads *Guide to Road Design Part 4A – Unsignalised and Signalised Intersections* Section 3.3 Pedestrian Sight Distance Requirements.

Care must be taken with the selection, planting and maintenance of vegetation, and the installation of signs near the refuges/walkthroughs to ensure that adequate sight distance is maintained at all times for pedestrians, children and vehicles.

## 8. Warning Tactile Ground Surface Indicators

Warning tactile ground surface indicators (WTGSIs) shall be installed in refuges in accordance with Departmental Standard Drawing [S-4075 Sheet 4](#). Warning and directional tactile ground surface indicators (WTGSI's and DTGSI's) shall be installed in kerb ramps in accordance with Departmental Standard Drawing [S-4074 Sheet 6](#).

## 9. Warning Signs

To maintain the effectiveness of pedestrian and bicycle warning signs, they shall only be installed where the crossing point is not easily detected by an approaching driver due to sight restrictions.

Warning signs are usually used to warn motorists of the unexpected presence of pedestrians and/or cyclists who may be crossing the road and should not be considered as a standard requirement for the installation of a pedestrian and/or pedestrian/bicycle refuge/walkthrough. Warning signs should not be provided where the likely presence of pedestrians is obvious (ie shopping centres).

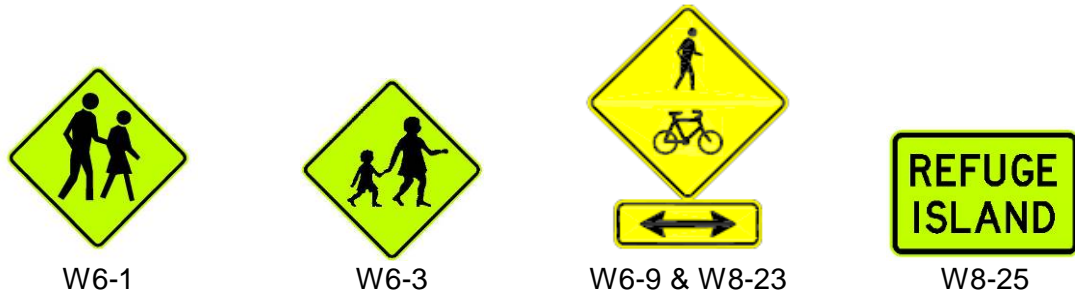
The Pedestrians Warning Sign (W6-1) or Pedestrian/Bicycle Warning Sign (W6-9 & W8-23) or Children Warning sign (W6-3) shall be used in advance of pedestrian walkthroughs only where:

- visibility is restricted, i.e. where the sight distance to the walkthrough is less than the stopping sight distance given in Table 2.3 of *AS 1742.2 - 2009*
- where the presence of pedestrians and bicycles may be unexpected

Pedestrian and bicycle warning signs are generally installed on the left side of the carriageway and may be duplicated on the right side of the carriageway on multi-lane roads. Where signs are duplicate they shall be manufactured and installed to show the pedestrian symbol facing towards the road. Care is needed in locating signs to ensure that they do not obscure visibility.

Where refuges are installed the supplementary sign indicating the presence of a refuge (W8-25) shall be installed.





Refer to AS1742.10 Figure 7 for signing layout

## 10. Parking Restrictions

Refuge locations and parking restrictions should be checked to ensure that vehicles are able to negotiate any deviation from their normal travel path with sufficient clearance from both the refuge and parked vehicles. Parking restrictions greater than those specified in AS 1742.10 - 2009 Figure 7 or Austroads *Guide to Road Design Part 4: Intersections and Crossings* Figure 8.1 may be required to achieve required sight distance for pedestrians or cyclists waiting to cross the road at the kerb ramp or kerb protuberance.

Liaison with local councils is necessary to implement parking restrictions.

## 11. Kerb Ramps

Kerb ramps at pedestrian and cyclist walkthroughs and refuges shall be installed in accordance with Departmental Standard Drawing [S-4074 Sheet 6](#).

### 11.1 Tactile Ground Surface Indicators

Warning and Directional Tactile Ground Surface Indicators (WTGSI's) shall be provided in all accessible kerb ramps in accordance with the requirements of Departmental Standard Drawing [S-4074 Sheet 6](#).

### 11.2 Vertical Plinths

The provision of a vertical plinth and standard holding rail orientated in the required direction of travel can assist the blind or vision impaired to reach the destination median or refuge gap or kerb ramp. Plinths shall be provided on the left side of kerb ramps where a minimum clearance of 1500 mm is available behind the holding rail for circulation space of wheelchairs. Holding rails placed at the back of the vertical plinth will effectively remove any tripping hazard it may cause. Refer Departmental Standard Drawing [S-4074 Sheet 6](#) for Types 3 and 4 kerb ramps.

Standard kerb wings enable wheeled devices to reach the trafficable area adjacent the kerb ramp. Where the area on either side of the kerb ramp is not trafficable (i.e. an unformed un-trafficable verge), vertical plinths shall be used on both sides of the kerb ramp instead of standard kerb wings. Refer Departmental Standard Drawing [S-4074 Sheet 6](#) Types 5 and 6.



Figure 10.1 Kerb Ramp

### 11.3 Kerb Extensions at Pedestrian and Cyclist Refuges

Kerb extensions minimise the width of the carriageway to be crossed, and place pedestrians in a position where their visibility is not obscured by kerb side obstacles or parked vehicles. They shall be constructed opposite a pedestrian refuge where full-time parking is permitted, or where the remaining portion of a road to cross exceeds 4.5 m for two lane-two way roads, to prevent drivers overtaking.

For kerb extensions refer to Departmental Standard Drawing [S-4074 Sheet 5](#). Note dimension K\* is used for the length of a kerb extension at un-signalised crossings. The size of the kerb extension may be adjusted to suit environmental features such as driveways and on-street parking, and the anticipated volume of pedestrians and cyclists which may be stored on the kerb extension at one time. The kerb ramp shall be aligned so that pedestrians cross the road perpendicularly to reach the refuge.



Figure 10.2 Kerb extension

The width of a kerb extension will depend on the available road width and lane width requirements for the expected motor vehicle composition along the road. Kerb extensions should not reduce single travel lane past the protuberance to

less than 4.5 m as this width enables all motor vehicles and cyclists to effectively share road space leaving legal clearances when passing.

A kerb extension can be incorporated in the road verge or nature strip if drainage can be provided. Otherwise a channel between the kerb extension and the existing kerb is required for drainage. If this drainage has the potential to be a hazard to pedestrians, the channel should be covered or the pedestrians should be physically prevented from reaching it.

Tubular loop, “Belmont” style fencing, or the equivalent, 1.2 m in height may be used at the kerb side to direct pedestrians to refuges where possible. Fencing must not be used on the refuge or on the kerb extension.

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A holding rail and vertical plinths shall be provided on the kerb extension in accordance with Departmental Standard Drawing [S-4074 Sheet 6](#), to suit the kerb extension size and trafficable area.

Kerb extensions shall be suitably delineated with painting of the kerbs, pavement marking, and Unidirectional Hazard markers (D4-1-2) in accordance with *AS 1742.2 - 2009*.

## 12. Pedestrian/Cyclist Holding Rail

Holding rails provide stability for pedestrians or cyclists waiting to cross the road. Holding rails and vertical plinths on the left side of kerb ramps also provide additional assistance to people who are blind or vision impaired to determine the required direction of travel.

### 12.1 Holding Rail Position at Walkthroughs and Refuges

Departmental Standard Drawing [S-4074 Sheet 6](#) shows the positioning of holding rails, with holding rail details shown on Departmental Standard Drawing [S-4020 Sheet 1](#). Holding rails shall be placed on the left side of the waiting pedestrian or cyclist.



Figure 11.1 Pedestrian/Cyclist Holding Rail

## 12.2 Holding Rail Position at Kerb Ramps

Holding rails shall be placed at kerb ramps in accordance with Departmental Standard Drawing [S-4020 Sheet 1](#) and [S-4074 Sheet 6](#). Holding rails shall not be installed at kerb ramps if there is insufficient width between the kerb line and the edge of the footpath to accommodate the holding rail leaving 1500 mm behind the holding rail to enable circulation space for a wheelchair.



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**Figure 11.2** Pedestrian/Cyclist Holding Rail at Kerb Ramp

## 12.3 Holding Rail Dimensions

Holding rail dimensions are shown on Departmental Standard Drawing [S-4020 Sheet 1](#). The length of the holding rail on median widths less than 1.8 m wide shall be 600 mm. Holding rail length on medians 1.8 m wide or greater shall be 1200 mm. Kerb ramp holding rail length shall be 600 mm.

## 12.4 Holding Rail Footings

Footing details are shown on Departmental Standard Drawing [S-4020 Sheet 1](#).

Holding rails shall be installed securely so that they are not unstable or loose enough to be removed by the public.

During a vehicle collision the holding rails should come free from the footing so that they cause minimal damage to the vehicle and so that the footings are not damaged to the point at which they have to be replaced.

# 13. Road Lighting

Pedestrian/cyclist walkthroughs and refuges should be lit to a level of V3 as specified in AS/NZS 1158.1.1 Table 2.2.

Any kerb protuberances installed for the purpose of reducing the crossing distance for pedestrians should be lit to a level of V3.

For further reading refer to DPTI's Road Design Guide LD001 – '*A Guide to the design of road lighting*' ([www.dpti.sa.gov.au/?a=119946](http://www.dpti.sa.gov.au/?a=119946)).

Note that the provision of kerb ramps from the footpath only (without a pedestrian refuge or walkthrough) require general road lighting or ambient light.

## 14. References

DPTI *Manual of Legal Responsibilities and Technical Requirements for Traffic Control Devices Part 2 – Code of Technical Requirements* ([www.dpti.sa.gov.au/?a=40255](http://www.dpti.sa.gov.au/?a=40255))

Department for Transport Energy and Infrastructure (SA) 2008, *Guidelines for Disability Access in the Pedestrian Environment* ([www.dpti.sa.gov.au/?a=40215](http://www.dpti.sa.gov.au/?a=40215))

DPTI Standard Drawing S-4020 Sheet 1 ([www.dpti.sa.gov.au/?a=101521](http://www.dpti.sa.gov.au/?a=101521))

DPTI Standard Drawing S-4074 Sheet 6 ([www.dpti.sa.gov.au/?a=101528](http://www.dpti.sa.gov.au/?a=101528))

DPTI Standard Drawing S-4075 Sheet 4 ([www.dpti.sa.gov.au/?a=101534](http://www.dpti.sa.gov.au/?a=101534))

DPTI *Pavement Marking Manual* ([www.dpti.sa.gov.au/?a=40257](http://www.dpti.sa.gov.au/?a=40257))

AS 1742.9 – 2018, *Manual of uniform traffic control devices Part 9: Bicycle facilities*, Standards Australia, Sydney

AS 1742.10 – 2009, *Manual of uniform traffic control devices Part 10: Pedestrian control and protection*, Standards Australia, Sydney

AS/NZS 1428.4.1 – 2009, *Design for access and mobility Part 4.1: Means to assist the orientation of people with vision impairment - Tactile ground surface indicators*, Standards Australia/Standards New Zealand, Sydney

AS/NZS 1158.1.1 – 2005, *Lighting for roads and public spaces Part 1.1: Vehicular traffic (Category V) lighting – Performance and design requirements*, Standards Australia/Standards New Zealand, Sydney

Austrroads 2017, *Guide to Road Design Part 3: Geometric Design*, Austrroads, Sydney

Austrroads 2017, *Guide to Road Design Part 4: Intersections and Crossings - General*, Austrroads, Sydney

Austrroads 2017, *Guide to Road Design Part 4A: Unsignalised & Signalised Intersections*, Austrroads, Sydney

Austrroads 2018, *Australasian Pedestrian Crossing Facility Selection Tool [V2.1]: User Guide AP-R592-18*, Austrroads, Sydney

Akcelik & Associates Pty Ltd (2018), *SIDRA INTERSECTION 8 User Guide*

## Appendix A – Extract of SIDRA Intersection 8.0 User Guide

Table 5.14.6

Level of Service method for PEDESTRIANS (based on delay only)

Level of Service	Average delay per pedestrian in seconds (d)		Likelihood of risk-taking behaviour
	Signals	Unsignalised Intersections	
A	$d \leq 10$	$d \leq 5$	Usually no conflicting traffic
B	$10 < d \leq 20$	$5 < d \leq 10$	Occasionally some delay due to conflicting traffic
C	$20 < d \leq 30$	$10 < d \leq 20$	Delay noticeable to pedestrians but not inconveniencing
D	$30 < d \leq 40$	$20 < d \leq 30$	Delay noticeable and irritating, increased likelihood of risk taking
E	$40 < d \leq 60$	$30 < d \leq 45$	Delay approaches tolerance level, risk-taking behaviour likely
F	$60 < d$	$45 < d$	Delay exceeds tolerance level, high likelihood of pedestrian risk-taking

This is the default method for pedestrians for all SIDRA INTERSECTION software setups irrespective of the LOS Method selected for vehicles. Level of Service Target = LOS D is indicated by the table.

10.4