Safety Essentials: Accommodating Pedestrians and Bicycle Riders at Temporary Road Works

Best Practice Guidance

Updated December 2023

VICTORIA State Government | Department of Transport

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Any photos, figures or illustrations where a source is not provided should be assumed to be produced by the combined authors and organisations acknowledged below.

This resource was developed as part of the Construction Trucks and Vulnerable Road User project. This best practise guidance note was commissioned by Melbourne Metro Rail Authority (now Rail Projects Victoria) and developed by the Aurecon Jacobs Mott MacDonald joint venture. The first iteration of this document was prepared by: Steve Cotton, Lydia Foster-Smith, Christian Bodé, Terry Lau, and Jamie Ross (RPV).

Input was also provided by members of the Temporary Traffic Management working group including Rachel Carlisle, Penny Drew, Russell Greenland, Thuan Nguyen, and Sonia- Marie Grotaers (all Dept. of Transport); Jessica Herberte and Anthony Cockerel (WorkSafe); and Dr Bruce Corben (consultant). It was subsequently summarised for Department of Transport by Christian Bodé, and Jeremy Lis, GTA.

In 2023 it was updated by Stantec to include reference to the 2021 updates to the AGTTM guidelines.

1. Purpose

Victoria is currently in a transport construction boom with in excess of 119 major road and rail projects being delivered. It is not just about current works, with significant planning also underway for a number of projects that are set to transform the way Victorians travel. The scale of transformation happening on our transport network now and into the future means extensive planning has been and is required to minimise disruption. This disruption is affecting all modes of transport and in dense urban surroundings can have adverse effect on pedestrians and cyclists.

In Victoria various strategies and policies are seeking to encourage and support both walking and cycling for transport. This includes '*Plan Melbourne'* and the '*Victorian Cycling Strategy 2018-2028'*. The '*Transport Integration Act 2010'* also supports an integrated multi-modal approach to transport planning. At Council level most Integrated Transport Strategies also reiterate this support and encouragement.

On the ground we are seeing increased numbers of both pedestrians and cyclists as the city grows and becomes more developed.

This document "*Safety Essentials: Accommodating Pedestrians and Bicycle Riders at Temporary Road Works*" (referred to within this document as 'the Guidelines') provides those with responsibility for traffic management arrangements with a source to determine whether pedestrians and cyclists have adequately been considered around construction sites, and provide practitioners with a summary reference document on the topic. The Guidelines present a document, where industry standards and guidelines concerning pedestrians and cyclists are summarised and given clarity.

This document brings together current standards, guidance and advice to reduce as far as practical the risks that pedestrians and cyclists may be exposed to around construction sites, ensuring that work is undertaken in a manner that meets legislative work safety responsibilities. This document is intended to be a reference tool only for industry in the consideration of pedestrians and cyclists when preparing detailed traffic management plans.

It should be noted that this Guideline does not include requirements for motorcyclists. Further, the Guideline does not cover worker safety within worksites, nor traffic disruption.

1.1 Objectives

The guidelines are intended for use in the development and implementation of Traffic Management Plans (TMPs) and Traffic Guidance Schemes (TGSs) in Victoria. The Guidelines aim to:

- ensure that traffic management implemented on construction sites meets the legislative requirements set out in Victoria with regards to pedestrians and cyclists;
- provide best practice recommendations to provide safe environments for pedestrians and cyclists around construction sites without compromising the safety of workers; and
- provide practitioners with a basis to ensure the safety of pedestrians and cyclists is significantly improved during construction activities.

1.2 Who should use this document?

Anyone planning or implementing TMPs will find this document essential reading.

It should be considered in developing TMPs, and as a reference for the future content and scope of TGSs.

2. Background Research

A large multi-stakeholder forum run in December 2016 by a number of major transport project agencies, looked at the safety of vulnerable road users during major transport project construction. As a result of this forum a number of working groups were set up to address particular elements of vulnerable road safety during major project works, and one was set up to look specifically at how traffic management practices could be improved in the face of the multiple large transport construction projects being planned.

In addition due to concerns raised by stakeholders about incidents during ground investigations, and observations made in the early phases of the Metro Tunnel Project, a need was identified to understand the existing regulations and guidance for pedestrians and cyclists around worksites and identify if additional traffic control processes and measures were required for these road users.

Firstly, a study was undertaken by Aurecon Jacobs Mott MacDonald (AJM) / Rail Projects Victoria (RPV) (formerly known as Melbourne Metro Rail Authority (MMRA)) forming Stage 1 of the development of the Guidelines. The key issues identified through that work were:

Traditional focus on construction worker safety needed to be broadened

Existing standards and guidelines mainly focus on providing protection for workers from passing vehicle traffic, and do not adequately consider pedestrians and cyclists around worksites.

Standards were inconsistent regarding levels of detail

There are varying amounts of detail provided in different standards and guidelines.

Improve compliance with standards

Where standards and guidelines do exist, custom and practice seems to dominate with many TMPs and traffic management layouts falling short of the standards required in current documents. This is industry wide behaviour and, is exacerbated by previously low levels of enforcement.

Improve workforce experience

Consultation with stakeholders as well as site visits has shown that the onsite workforce, such as traffic controllers, are frequently observed to lack experience in managing situations around construction sites that involve complex multi-modal urban environments.

Worksite auditing

The need for traffic management auditing once implemented. New auditing teams have been created in order to manage more stringent auditing processes and the application of penalties for non-compliance with standards and approved TMPs.

Provide guidance and build consideration of treatments for pedestrians and cyclists

The research highlighted a lack of guidance on measures to protect pedestrians and cyclists around construction sites. Traffic management is generally interpreted to mean management of vehicles and not pedestrians and cyclists.

In general, advice on providing for pedestrians and cyclists around construction sites is limited and, in most cases, does not consider the context such as the type of surroundings, or the volume of pedestrians and cyclists activity that would be encountered in city and inner-urban environments.

Updates to Standards and Guidance

The relevant Australian Standard 1742.3 was updated in 2019, and the associated Austroads Guides to Temporary Traffic Management was subsequently updated in September 2021. These have increased the level of advice and requirements around providing safely for pedestrians and cyclists.

This document goes some way to illuminating the new updated standards, the changes they contain and their implications.

3. Pedestrian and Cyclists in TMPs

The starting point is to emphasise that pedestrians and cyclists are explicitly covered by requirements and advice in the current core documents around temporary works including the *Australian Standard 1742.3 Manual of uniform traffic control device Part 3: Traffic control for works on roads* (the "Standard") and the Austroads Guides to Temporary Traffic Management (AGTTM).

The table below outlines some key questions and answers in this regard:

TABLE 1: PEDESTRIANS AND CYCLISTS IN AUSTRALIAN STANDARDS AND GUIDANCE

Question/Topic	Comment
Who is covered by guidance and advice on temporary traffic management?	Documents, advice and guidance apply to all road users, or traffic, which includes both pedestrians and cyclists in their definitions e.g. a road user is "driver, rider, passenger or pedestrian using the road." [1] Thus any, and all, modes of transport are covered. In considering pedestrians and cyclists it is important to be aware of the variety of users within these groups. It is not just about the young, fit and mobile. "Pedestrians with impaired vision, mobility, mobility, hearing or cognitive limitations will be considered as part of the design, preparation, approval and implementation of TTM." (Austroads Guide to Temporary Traffic Management, Part 3: Section 3.10, 4.10 and 5.13)
What roads are covered?	These considerations apply not only to roads but also footpaths, bicycle, and shared paths.[2]
Requirement for a Traffic Management Plan	Anyone undertaking works on a road is required to have a Traffic Management Plan. [3]
What should a Traffic Management Plan (TMP) do?	AS 1742.3 outlines what a traffic management plan (TMP) should do: "…provides the means of planning and implementing a road work operation that will ensure as far as reasonably practicable – (a) the safety of road workers **(b) road users in particular vulnerable road users (e.g. pedestrians, people with disabilities, cyclists and motorcyclists) are safely and efficiently guided around, through or past a road works site; and** (c) the performance of the road network is not unduly impacted and, the disruption and inconvenience to all road users are minimised for the duration of the works. (AS 1743.3:2019 p5)
Does this cover the Traffic Guidance Scheme?	Forming part of a TMPs will be a, or series of, traffic guidance scheme (TGS). The Standard identifies a TGS as

[1] See AS 1743.3:2019 p3 and AGTTM01.01-21, p12

[2] "…specifies the traffic control measures and devices to be used to warn, instruct and guide road users in the safe negotiation of work sites on roads including unsealed roads and footpaths. The principles may also be appropriate for work on shared paths and bicycle paths." (AS 1743.3:2019 p1

[3] Section 99A(3)(a) of the Road Safety Act 1986 requires any person conducting works on a road to 'have in operation a traffic management plan', while section 99A(4)(a) requires that a traffic management plan 'comply with the prescribed requirements' of any relevant Regulations, being the Road Safety Regulations 2009.

"…typically describes the arrangement of signs and devices to warn, instruct and safely guide road users around, through or past a works site or temporary hazard."

The principles for consideration in producing a TMP are outlined in (AGTTTM02-19, p7-9). These cover:

- Safety
- Accessibility
- Amenity
- Asset

Under these headings the document makes a number of important points:

- Safety; *"These plans need to be mindful that any feature placed within the road environment has the potential to be a risk for road users. This is particularly so for vulnerable road users such as cyclists, pedestrians and the mobility impaired.*
- Accessibility; TMPs ensure access to the road and essential goods and services is maintained for all road users.
- Amenity; *"TMPs minimise delays to traffic (including pedestrians, cyclists and other vulnerable road users), maximise network efficiency, and, where practical, maintain the most direct and convenient route between destinations…*

Workers should be made aware of both the existence and contents of the traffic management plans that apply to their worksite. The Road Safety (Traffic Management) Regulations 2009 (VicRoads, 2009) Part 4 identifies when a TMP must be made and what is required to be include. (See Background Paper A)

In summary the fundamental points are:

- Temporary traffic management and TMPS covers all road users
- Roads users include pedestrians and cyclists

4. Planning and Risks

A TMP is effectively a risk management plan. In developing a TMP it should involve an identification and analysis of all likely risks.

Code of Practice Worksite Safety – Traffic Management (2023) is the minimum standard required in Victoria. When exploring how to best manage risks or hazards, so far as reasonably practicable, consideration should be given to:

- The severity of the hazard or risk;
- The state of knowledge about that hazard or risk;
- The nature of the works (e.g. long term or short term);
- The availability and practicability of control measures (hierarchy of safety controls);
- The cost of removing or mitigating that hazard or risk.

Overall, the **Occupational Health and Safety Act (2004)** states the following with regards to the responsibilities of risk reduction to individuals:

"to avoid doubt, a duty imposed on a person by this Part or the regulations to ensure, so far as is reasonably practicable, health and safety requires the person to eliminate risks to health and safety so far as is reasonably practicable; and if it is not reasonably practicable to eliminate risks to health and safety, to reduce those risks so far as is reasonably practicable."

Effectively in producing a TMP there is a duty of care to both workers and road users.

When considering safety, a **Safe System approach** should be applied. A Safe System approach relies upon four interconnected 'pillars':

- Roads,
- Speeds,
- Vehicles, and
- People
- Post-Crash Response forms a fifth supplementary pillar.

Through these pillars, Safe System aims to remove the risk of fatal or serious injury crashes, even where human error is made.

To achieve this, the road network must not create environments where humans are exposed to situations where a crash would result in the human body being subjected to physical forces beyond what it can tolerate. This should also be considered in temporary works.

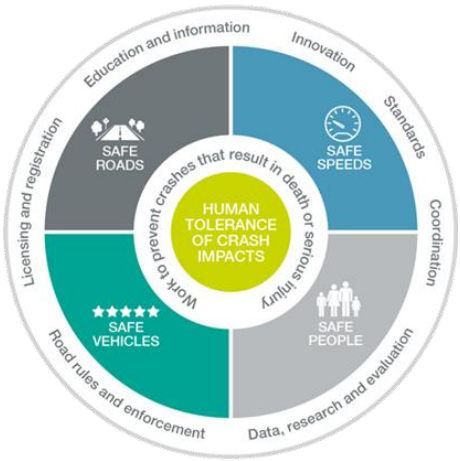


FIGURE 1: SAFE SYSTEMS DIAGRAM[4]

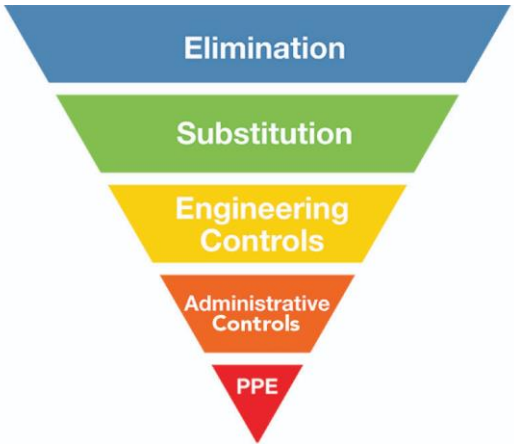


FIGURE 2: HIERARCHY OF CONTROLS[5]

In determining necessary safety control measures to eliminate or reduce the hazard, a hierarchy of safety controls must be considered. It should be noted that more than one control can be applied.

Elimination should not be default for pedestrians and cyclists

Whilst 'elimination and substitution of hazards' lies at the top of the treatment hierarchy; this is not intended to encourage the closure of pedestrian and cycle facilities around construction sites. Pedestrians and cyclists are less inclined to divert from existing routes and this needs to be considered where provisions are changed. Failure to adequately consider this resistance to divert often leads to poor and "less safe" behaviour that places those users at greater risk. This is not the fault of the pedestrian or cyclist, but inadequacy or lack of consideration in TMPs.

[4] Safe System Approach, National Road Safety Strategy, 2011-2020, Australian Transport Council, https://www.roadsafety.gov.au/nrss/safe-system
[5] *"Hierarchy of Controls"*. *U.S. National Institute for Occupational Safety and Health*

Planners should be aware of a range of common issues and risks. AGTTM1.1 provides a list of those particularly relevant to pedestrians and cyclists:

TABLE 2: COMMON ISSUES AND ASSOCIATED RISKS (AGTTM1.1-21)

Issue	Potential risk	Example of site-specific impact of risk
Vulnerable road users		
Pedestrians, cyclists, people with disabilities and other vulnerable road users such as children, parents with prams, users of small-wheeled vehicles and mobility aides and the elderly	• Unable to pass safely past the site using existing paths	• Unsafe crossing practices in unsigned locations • Schools, clubs or other facilities that may generate high volumes of pedestrian or cycle traffic and facilities such as hotels or taverns where pedestrians may have their judgement impaired
Unacceptable length detour	• Detours have a much larger impact on people walking and cycling	• Detour created for pedestrians with significantly changed length or terrain
Path Users		
Clear direction for path users	• Unfamiliar and illegible paths which are not used by path users	• Pedestrians in the path of work site vehicles, equipment or other vehicles moving through the site
Surfacing of temporary paths	• Surface not appropriate for prams, strollers, wheelchairs and the visually impaired	• Trip hazards
Location of pedestrian crossings	• Crossing position unfamiliar to path users	• Unpredictable pedestrian behaviour when crossing roads
School Crossings		
Presence of school crossings within site area requiring relocation	• Safe school crossing practices compromised	• Children crossing the road in an unsafe and unpredictable manner in and around the site
Speed choices		
Credible speed limits, considering the safety of workers and road users	• Road users travel at inappropriate speeds due to lack of understanding of applicable speed limits	• Increased likelihood and severity of incidents
Traffic Impacts		
Traffic queues and delays	• Unacceptably long delays to road users	• Aggressive driver (or rider) behaviour and lack of community acceptance of worksite
Interference with the operation of permanent traffic signals	• Compromised legibility of traffic controls for road users	• Road user confusion leading to increased likelihood of traffic incidents

Detouring of traffic on a major or multi-lane road	• Volume of detoured traffic has unacceptable on surrounding areas	• Increased volume of traffic on residential streets leading to compromised safety outcomes for residents.
Public Transport		
Bus stops, tram stops, and railway crossings located within the traffic control zone	• Provision of usual public transport services	• Unpredictable public transport passenger movements near the worksite.
Heavy and Over-size vehicles and loads		
Accommodation of truck traffic and over-sized loads	• inadequate lane widths • Inadequate provision for turning movements	• Turning truck catches parked vehicles (or other road users) in shoulder

5. Examining the Context of a Worksite Location

5.1 Data

As a TMP (and TGSs) need to consider the context of the site anyone planning temporary traffic managements should familiarise themselves with the location and obtain any available background information.

This may include volume counts per mode, origin-destination counts, peak period surveys or other types of data collection. These results will help build a representative profile of the area in which works are to be carried out, to adequately cater for anticipated road users, including pedestrians and cyclists.

Table 3.3 of Austroads Guide to Temporary Traffic Management: Part 2 (2021) outlines potential sources of input data to assist in ensuring that a TMP considers all relevant issues. Background Paper B A provides a comprehensive list of these data sources. In some situation new surveys may be required to gain this understanding on context.

Planners should be aware peak times for pedestrians and cyclists are not necessarily the same as vehicles.

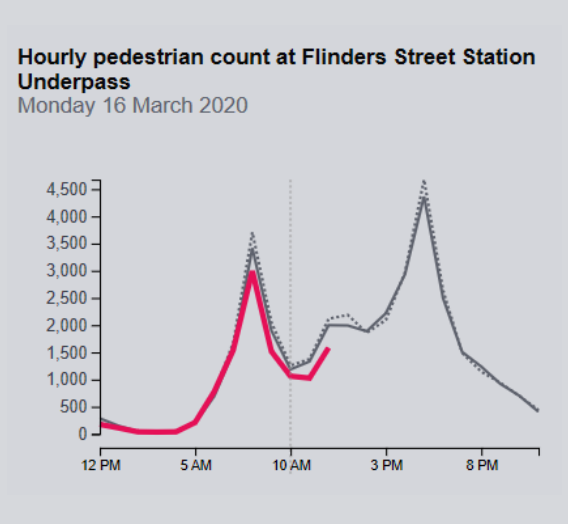


FIGURE 3: SNAPSHOT OF CITY OF MELBOURNE PEDESTRIAN COUNTERS AT FLINDERS STREET STATION UNDERPASS[6]

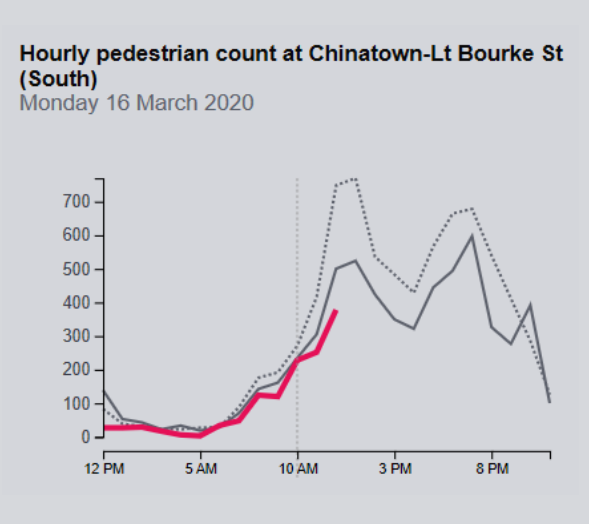


FIGURE 4: SNAPSHOT OF CITY OF MELBOURNE PEDESTRIAN COUNTERS ON LITTLE BOURKE STREET

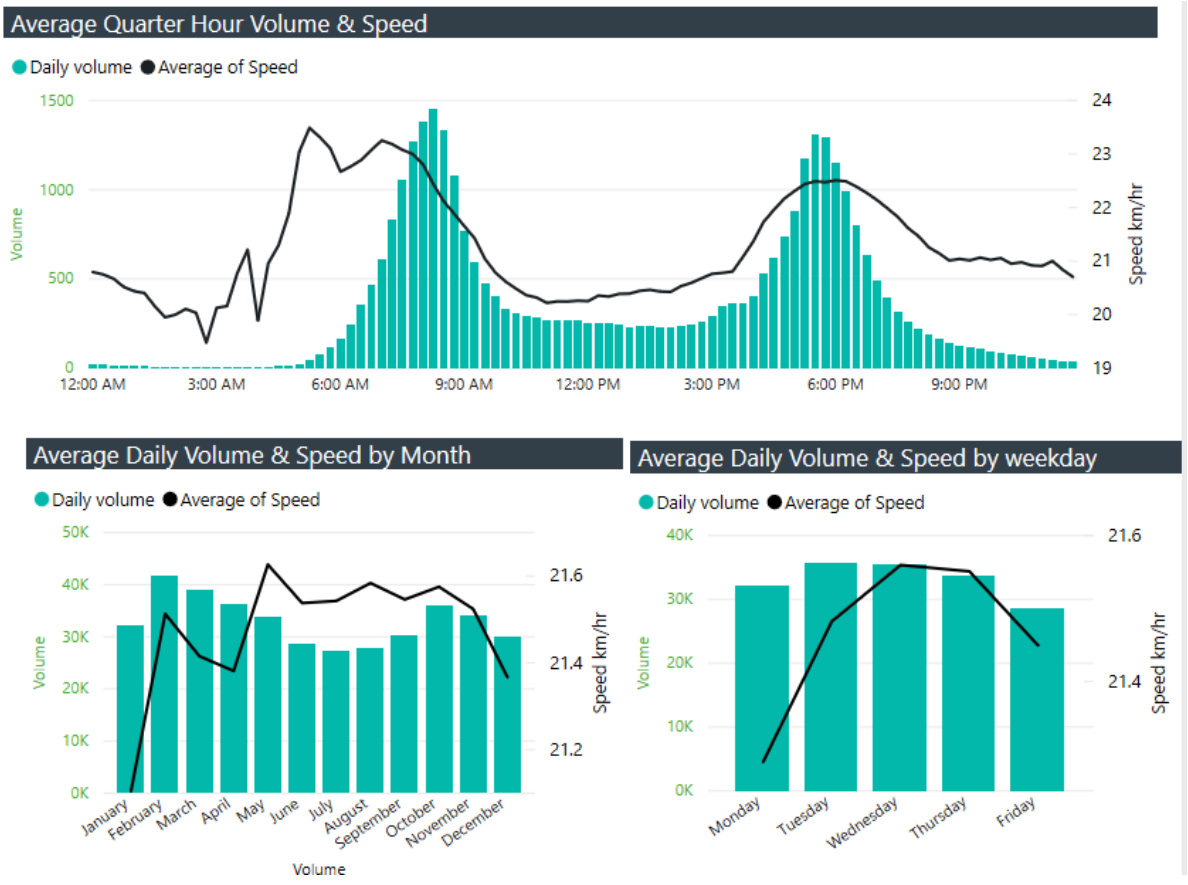


FIGURE 5: EXCERPT FROM VICROADS/DOT BICYCLE COUNTERS[7]

6 Data has been sourced from City of Melbourne pedestrian Counting System, http://www.pedestrian.melbourne.vic.gov.au/
7 Data has been sourced from Department of Transport 'Bicycle Counters' PowerBI platform: https://app.powerbi.com/view?r=eyJrIjoiZmFjYjE1ODEtZWZlZS00MzdjLWI4ZGQtZGJlYjU3YzJjMjczIiwidCI6IjUwOTRjN2E3LTA3NDgtNDY2ZS05NDFlLTcyODgyYzMwOTdiYSJ9

5.2 Network Priorities

In developing a TMP, consideration should also be given to the network priorities and dominant modes of transport. The Department of Transport and Planning is continuing to develop the Movement and Place Framework to plan and manage the transport network. Movement and Place views streets not only as thoroughfares for the movement of people and goods but also as integral places for living, working, and recreation. The Framework places emphasis on recognising the role of place, people who walk and people who cycle when assessing transport for a corridor.

To effectively plan and develop the transport network, a balance is maintained between the needs of various places and transport users to ultimately align with the strategic vision for the street. Movement and Place identifies modal hierarchies to address competing demands across diverse functions offering a framework for prioritisation. These priorities can be used to inform temporary traffic control arrangements. Planners should take these into account when undertaking works. Further information on Movement and Place can be sought from the Department of Transport and Planning website and the '*Movement and Place in Victoria*' document.

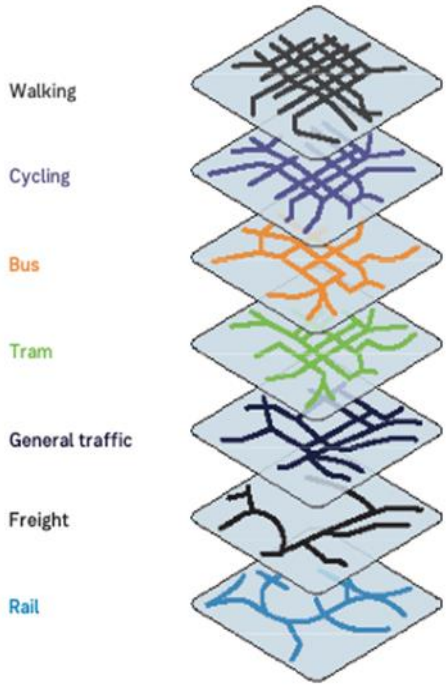


FIGURE 6: MOVEMENT AND PLACE MODAL HIERARCHIES[8]

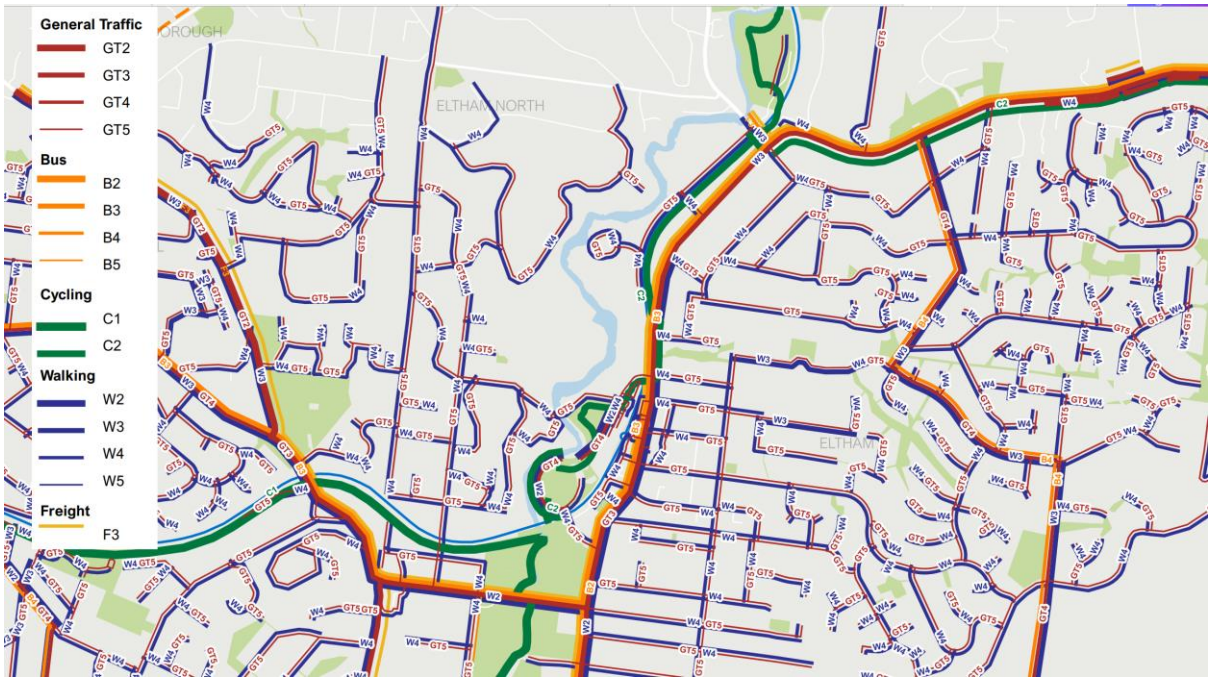


FIGURE 7: SAMPLE MOVEMENT AND PLACE NETWORK PLAN

[8] Movement & Place in Victoria, Department of Transport, February 2019

6. Key Design Topics

This document identifies a series of key design topics to facilitate a safer environment for pedestrians and cyclists. These cover topics that require more specific consideration for pedestrians and cyclists during temporary works. It is acknowledged that this list is not exhaustive in the aspects that require consideration.

It is recommended that those developing, reviewing, and implementing TMPs should draw upon these sections to check that pedestrians and cyclists have been adequately considered.

The topics are as follow:

- Path location, and alignment;
- Path width;
- Path surface;
- Safety barriers and fencing;
- Signage;
- Path Lighting; and
- Speed.

Within this document, each section provides the minimum standards that need to be adhered to. In addition, best practice suggestions and improvements to the minimum design requirements are given, along with examples of practices that are to be avoided.

The structure of these Guidelines allows practitioners to check on individual design items where required.

6.1 Path Location and Alignment: Requirements

Requirements relating to pedestrians and cyclists and provided below

Standard	Content
Road Management Act 2004, Worksite Safety – Traffic Management **Clause 51 (1) (3)**	***Providing for pedestrians and cyclists*** Special provision should be made for pedestrians (including people with disabilities) and cyclists if they are expected to pass through, past or around the worksite. The path to be taken should be located as far as is reasonably practicable from the roadway, be smooth and free from obstructions, be of adequate width (e.g. 1.5 metres for pedestrian paths and 2.0 metres for shared paths), be well delineated and constructed to prevent pedestrians from walking through the work area, and provide clear guidance where the path changes direction. If the works make it necessary for pedestrians or cyclists to cross the road within the worksite, particular attention should be paid to the crossing point to ensure that the pedestrians or cyclists are visible to both the approaching traffic and the operators of roadworks plant and equipment on the worksite.

Path Alignment and Location: Guidelines

Standard	Content
AGTTM (2021) Part 3: 3.10, 4.10, 5.13	***Diverting Pedestrians and Cyclists*** Road features that are hazardous to motorcyclists and on-road cyclists should be treated. This may include transverse and longitudinal changes in pavement level, changes in surface condition and hazards on the road. Pedestrian and cyclists should not be led into direct conflict with the worksite or traffic moving around the worksite. Where pedestrians and cyclists are diverted onto an existing roadway, the new path must be separated from vehicular traffic by an appropriate traffic control method (e.g. delineation, barriers, warning signs) Cyclists may be directed into lanes carrying traffic if the traffic conditions are suitable for mixed traffic. Safe and obstruction free temporary paths must be provided where footpath, bicycle lanes and/or roads used by public transport are blocked by the work. Pedestrian and bicycle paths should where possible, be on the same scale and to the same width as any facilities for pedestrian or bicycle traffic that exists prior to the works. If this cannot be achieved, ensure the safe movement of pedestrians, on-road and off-road cyclists is provided to separate vulnerable road users from traffic. The diversion of pedestrians and cyclists shall consider all appropriate clearances. This includes width and height. Shared zones need consideration and where possible, pedestrians should be excluded from the worksite completely. Pedestrians with impaired vision, mobility, hearing or cognitive limitations will be considered as part of the design, preparation, approval and implementation of TTM.

AGTTM (2021) Part 3: 3.10.1, 4.10.1, 5.13.1	***Temporary Paths and Crossings***

If permanent pedestrian controls (e.g. signals, signs) are not in place, a traffic controller should be used to safely direct pedestrians to appropriate crossing points and assist with crossing the road.

If footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrians that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps). If these routes are not practicable, alternative routes must be provided with a firm, smooth surface and no trip hazards in the following order of preference:

- On the side of a road reserve away from traffic;
- Between the work area and road but not in a traffic lane;
- Onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane;
- Across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool); and
- A traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.

Appropriate surfacing must be provided for prams, strollers, wheelchairs or any other mobility aids.

Containment fences or longitudinal channelising devices should be installed at unattended worksites or where pedestrians may gain access.

If falling debris is a risk and there is no alternative footpath available, a structure may need to be provided to protect pedestrians and a traffic controller provided to guide pedestrians safely past the hazard.

Temporary paths must be illuminated at night to the level of lighting previously available on the original footpath or crossing, or as referenced in AS 1158.4, whichever is the lesser level.

Temporary crossings must be provided as near as practicable to pedestrian routes with the same level of functionality as the crossings they replace. This includes signals and provisions for people with vision, mobility, hearing or cognitive limitations.

If a temporary crossing becomes unusable or the pavement markings are obliterated, cover any remaining indication of the crossing and install barricades/safety fences on both sides of the road to prevent access crossing. An alternative crossing system must be provided instead.

If the roadway is converted from one-way to two-way and pedestrian crossings are required, consider the following:

- Containment fences and pedestrian mazes should be considered to restrict where pedestrians cross the road. Ensure that containment fences do not put pedestrians at risk by impacting on

	visibility between vehicles and pedestrians, including children. (refer to the 'Safety Barriers and Fencing' section of this guideline). • Traffic controllers may be required to provide guidance at pedestrian crossings. • LOOK BOTH WAYS and TWO-WAY TRAFFIC signs shall be placed facing approaching pedestrians on both sides of the crossing (refer to the 'Signs' section of this guideline). • The crossing must be limited to a maximum of two lanes. If this is not practicable, provide a central refuge for pedestrians Where pedestrians have been diverted onto an existing roadway: • The pedestrian path must be separated from other traffic with plastic mesh fencing (see Section 5.3.2); and • A minimum clearance of 1.2 m should be provided from the plastic mesh fencing to the nearest traffic lane for speeds up to 60 km/h. If this clearance is not practicable, the speed must not exceed a maximum of 40 km/h. If a temporary speed limit is required see Section 5.5.1; or • If speed is 70 km/h or more, a road safety barrier system must be used instead of the plastic mesh fencing. Pedestrians must be clear of the deflection zone behind road safety barriers.
AGTTM (2021) Part 3: 3.10.2, 4.10.2, 5.13.2	***Cycle path diversion and closure*** Are cyclists currently sharing traffic lanes, using bike lanes or shoulders, or riding on pathways? Relevant warning signs should be used to warn cyclists of any changes. If the existing bicycle path is on-road and affected by works, a temporary bicycle path to a similar standard should be provided elsewhere. Alternative paths off-road are desirable. If there is insufficient width for a temporary bicycle path (same width as the existing bicycle lane), merge cyclists into an existing traffic lane or shoulder. This should include: • Appropriate approval as required by the Road Infrastructure Manager. • Delineation. • Additional signage should be placed to alert road users of merging cyclists. This signage must be placed at the relevant stopping distance in advance of the closed section of the bicycle lane. • Consideration of differing speeds and behaviours between cyclists and other road users. Cyclists tend to move slower and in a different manner to other road users. • Separating cyclists from other road users by time, if the existing traffic lane is narrow or rough, by allowing other road users to manoeuvre past the worksite first and cyclists second. Traffic controllers must be provided to ensure that no other road users follow behind cyclists until they have cleared the area. Multiple traffic controllers will be required, one for traffic and one for cyclists.

	• A temporary speed limit for road users applied to provide safe entry of cyclists into traffic lanes.
AGTTM (2021) Part 3: 3.10.3, 4.10.3, 5.13.3	***Motorcyclists*** Has the location of traffic control devices that might destabilise a motorcycle been avoided on their travel path? Is there sufficient clearance of obstructions (e.g. signs, delineation) so that motorcyclists can lean into curves? Is the advance warning and delineation adequate for motorcyclists? Is the road surface safe for motorcyclists?
AGTTM (2021) Part 3: 3.11, 4.11, 5.14	***Public Transport Users*** The following issues to consider, in conjunction with a risk assessment and TMP, will assist with mitigating the impacts of works on different modes of transport, connections and users: • Have the needs for public transport been considered, adequately signed and catered for? • Have the needs of public transport users been considered? • Have the manoeuvring needs of public transport vehicles been considered? • Have bus stops been well positioned for safety? Where activities impact public transport facilities, note the following: • Approval must be obtained from the relevant public transport authority to conduct works around tram lines and/or bus stops. • Bus stops should be relocated to a temporary position if required. • Detours should be provided for bus services if required. Detours must have an acceptable swept path and turning circle for buses. • Safe passenger access to and from bus and tram stops must be provided. • Appropriate warning to public transport passengers and road users should be provided by use of warning signs, delineation and/or barriers.
AGTTM (2021) Part 3: 3.8.1	***Detours and Traffic Management*** All detour routes must be designed using roads that are capable of handling the volume and type of traffic that would normally use the closed road. The following must be considered when designing a detour for vulnerable road users: • Types of road users (i.e. pedestrians, cyclists, public transport). • areas of the road corridor that pedestrians and cyclists are currently using and providing them with a direct and safe facility during the detour. • Environment (e.g. dust, noise, lighting). • Length of a detour. • Expected time of road closure and detour.

Pedestrians: Best Practice Principles

Principles are in-line with Austroads 6A (2017), with the below including measures to achieve the desired best practice principles.

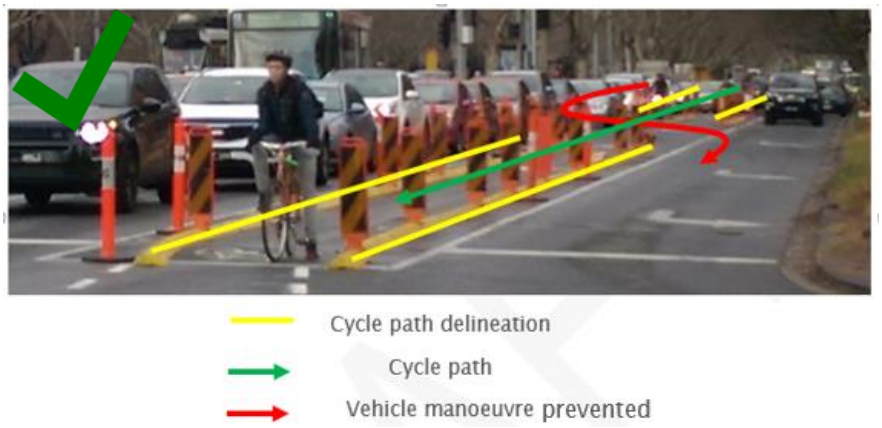
Principles	Description
Safe	• Provide good quality surfaces, clear of obstructions and well maintained • Cater for urban design and follow Crime Prevention Through Environmental Design (CPTED) principles • Provide adequate lighting to ensure users feel safe
Connected	• Walking networks are integrated with public transport to ensure short distances to stops from the area severed • Pedestrian routes to key destinations are continuous and as short as possible without barriers that are difficult to cross (e.g. major roads, railways) • Paths provide good access to key destinations • Pedestrian crossings are located at locations that are difficult to cross • Important pedestrian routes are given sufficiently high priority (e.g. short waiting times at signalised crossings on routes to bus and rail interchanges). Where pedestrian flows are very high and consistent, such as inner-city routes, consideration should be given to prioritising and wherever practicable coordinating traffic signals to improve the level of service for pedestrians
Legible	• Clear signposting (direction signs and distances to key destinations) • A coherent layout and design where it is obvious how to get to various facilities (e.g. shops, leisure centre, bus stops) • Readily available supporting information (e.g. published local maps, information boards, tourist information) • Clearly visible street names and place names and sufficient repeater signs.
Comfortable	• Meet design standards with respect to footpath widths and desired Level of Service (LoS). • Provide adequate and safe storage areas where queuing occurs • Ensure that cyclists do not conflict with pedestrians • Provide a walking surface that is clear of obstructions and is well maintained. For example, broken paving can present a trip hazard to pedestrians • Ensure that walkways are set back an adequate distance from the roadway

	• Ensure that surface water does not pool on roads and result in splashing of pedestrians from passing vehicles • Provide adequate lighting to ensure that pedestrians feel safe when using paths at night and do not walk on the edge of the road instead of a path • Ensure that parking (vehicle and motorcycle) does not create a problem around construction sites, acting as a barrier by obstructing routes and access points or impeding sight distances at road crossings
Comfortable	• Forewarn about diversions ahead • Be as continuous as practicable • Ensure that streets can be crossed easily and safely • Minimise delays to pedestrians at all existing facilities • Include efficient pedestrian signals or phases at signalised intersections; which may include retiming existing provision
Convenient	• Having gradients that cater for mobility users where practicable • Having contrasted coloured pavement surfaces to highlight demarcated areas of paths • Having tactile treatments and physical features
Legible	• Wherever possible, temporary paths should be located to maximise the local amenities.

FIGURE 8: OBSTRUCTED ROUTE AND UNEVEN SURFACE - DIVERSION PATHS SHOULD BE SMOOTH AND CLEAR OF OBSTRUCTIONS

FIGURE 9: NO CLEAR ROUTE EXCEPT IN ROAD - ENSURE CLEAR, LEGIBLE ROUTES FOR PEDESTRIANS IF THE FOOTPATH IS CLOSED

Cyclists: Best Practice Principles

Principles	Description
Minimisation of travel path length	Detours that result in a travel time increase of more than a factor of 1.2 will likely result in low compliance.
Provisions for suitable diversion routes	If cyclists cannot be separated from pedestrians, and as a result, cyclists are to be diverted onto the footpath as a last resort, then the designer needs to check that the remaining footpath width can accommodate the pedestrian usage to the agreed service level. (AGRD 6A (2017))
Manoeuvres to be avoided	Manoeuvres that should be avoided when diverting cyclists includes: • Cyclists turning right at busy intersections. Where required, hook turn facilities or bicycle jump boxes should be considered. • Left turning vehicles crossing the travel path of cyclists right ahead. Where required, delineation of cycle paths is provided to enhance their presence to vehicle drivers.  FIGURE 7: EXAMPLE OF CYCLE PATH DELINEATION[9]
Sight Distance	The sight distance of temporary paths should be, where practicable, the same as under permanent conditions. Ensure sight distance is not obstructed by vegetation or temporary works and where this cannot be avoided, suitable diversions routes should be sought, or warning signs put in place. Sight distance calculations can be found in Section 5.7.1 of AGRD 6A (2017).
Managed interface with construction traffic	Where high construction vehicle volumes are expected around sites, a coordinated approach is required with cyclists, especially where bike paths cross site access points. The use of remote-controlled barriers or other barriers that can be operated by onsite traffic controllers is recommended.

[9] Sketch produced by AJM as part of document.

FIGURE 10: EXAMPLE OF CONTROLLED BARRIER TO MANAGE INTERFACE WITH CONSTRUCTION SITE ACCESS

FIGURE 11: TEMPORARY BARRIERS TO PROTECT CYCLISTS FROM TRUCK MOVEMENTS OUT OF SITE

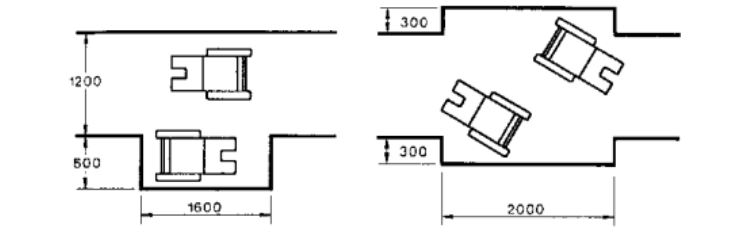
Considered realignment or detouring options	Steep gradients, gradients should be less than 3% and never exceed 5%. Landings are required for paths between 3% and 5%. Rough and slippery surfaces and sharp corners. Temporary surfaces such as metal road plates and plastic ramps present a slip danger to cyclists.

FIGURE 12: TEMPORARY BOOM GATE TRAFFIC CONTROL FOR CYCLISTS

6.2 Path Width

Path Width: Requirements

Regulatory requirements relating to pedestrians and cyclists are provided below .

Standard	Content
AS 1428.2 (1992) **Section 6.5***	***Footpath widths*** The minimum width of space required for two wheelchairs to pass each other shall be 1800 mm. Where a path of travel is less than 1800 mm wide, passing spaces at intervals of not more than 6 m shall be provided as follows: (i) On one side of the path of travel—the path of travel shall be not less than 1600 mm long and 1800 mm wide. (ii) With the space distributed equally on both sides of the path of travel—the path of travel shall be not less than 2000 mm long and 1800 mm wide.  (a) On one side of path of travel (b) On both sides of path of travel DIMENSIONS IN MILLIMETRES FIGURE 13: SPACE REQUIRED FOR WHEELCHAIRS TO PASS EACH OTHER
Road Management Act 2004, Worksite Safety – Traffic Management **Clause 51 (1)**	***Quality of diversion routes*** Special provision should be made for pedestrians (including people with disabilities) and cyclists if they are expected to pass through, past or around the worksite. The path to be taken should be located as far as is reasonably practicable from the roadway, be smooth and free from obstructions, be of adequate width (e.g. 1.5 metres for pedestrian paths and 2.0 metres for shared paths), be well delineated and constructed to prevent pedestrians from walking through the work area, and provide clear guidance where the path changes direction.

Path Width: Guidelines

Standard	Content
AGTTM (2021) Part 3 **3.10.1, 4.10.1, 5.13.1**	***Providing for mobility impaired users*** Desirably, if footpaths or pedestrian crossings have been partially closed or temporarily relocated, a temporary footpath should be provided with minimum width of 1.8 m to allow for all pedestrians including those with mobility aids or on the same scale and to the same width as any facilities for pedestrian that existed prior to the works. This width should also be applied to any temporary ramps (e.g. kerb ramps).

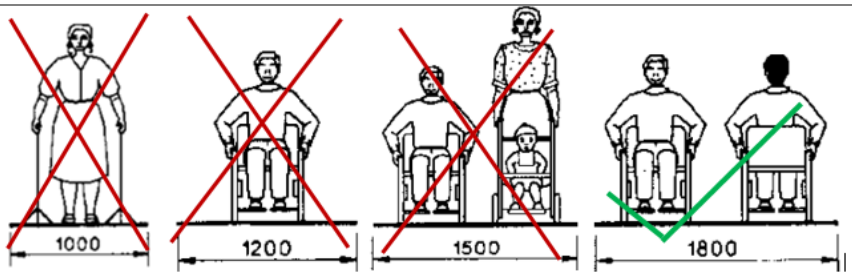


FIGURE 14: DESIRABLE FOOTPATH WIDTH

If these widths are not practicable, alternative routes must be provided with a firm smooth surface and no trip hazards in the following order of preference:

1. On the side of a road reserve away from traffic.
2. Between the work area and road but not in a traffic lane.
3. Onto the road either in a lane used for parking or a delineated and protected section of an existing traffic lane.
4. Across the road to a footpath on the opposite side with delineation at crossing points and kerb ramps. Consideration is required for persons with impaired vision, mobility, hearing or cognitive limitations. Only use this option if an appropriate crossing facility can be provided (see Austroads Pedestrian Facility Selection Tool).
5. A traffic controller to safely guide pedestrians around the operation. Only use this option if there is no safe temporary path available.

Appropriate surfacing must be provided for prams, strollers, wheelchairs or any other mobility aids.

AGTTM (2021) Part 3 3.10.2, 4.10.2, 5.13.2

Warning of cycle lane closures

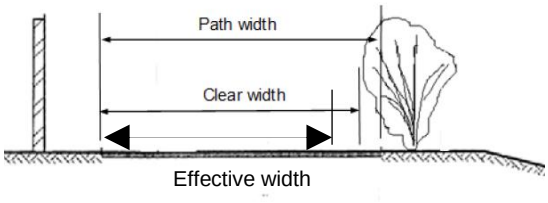
If there is insufficient width for a temporary bicycle path (same width as the existing bicycle lane), merge cyclists into an existing traffic lane or shoulder. This should include:

- appropriate approval as required by the Road Infrastructure Manager
- appropriate delineation
- additional signage should be placed to alert road users of merging cyclists. This signage shall be placed at the relevant stopping distance in advance of the closed section of the bicycle lane.
- consideration of differing speeds and behaviours between cyclists and other road users. Cyclists tend to move slower and in a different manner to other road users.
- separating cyclists from other road users by time, if the existing traffic lane is narrow or rough, by allowing other road users to manoeuvre past the worksite first and cyclists second. Traffic controllers shall be provided to ensure that no other road users follow behind cyclists until they have cleared the area. Multiple traffic controllers will be required, one for traffic and one for cyclists.
- a temporary speed limit for road users applied to provide safe entry of cyclists into traffic lanes.

FIGURE 15: FOOTPATH BLOCKED BY VMS SIGN

FIGURE 16: FOOTPATH NARROWED THROUGH CONSTRUCTION WORKS WITH NO CLEAR ROUTE FOR PEDESTRIANS

Pedestrians: Best Practice

Principles	Description
Recommended path width, including effective path width and obstructions	Overall, it must be ensured that the effective width of paths is free of any obstructions as per AS1428.2 (1992) Clause 6.4. It is recommended that around construction sites, effective footpath widths of 1.8m or wider are provided to allow two wheelchair users to pass each other comfortably. (AGRD 6A (2017)) The application of a 0.4 m buffer should be added to the minimum recommended 1.8m effective footpath width, resulting in an overall minimum clear width of 2.2m. (AGRD 6A (2017)) This primarily concerns narrow hoarded footpaths, bordering walls and paths that border next to active traffic lanes. This provides pedestrians and people with disabilities less manoeuvre space than open paths, as the enclosure does not allow movement outside of the path footprint. Pedestrians will shy away from physical edges of paths with hoarding/barriers. (Transport for London's Pedestrian Comfort Guidance (2010))  FIGURE 17: EXAMPLE OF CLEAR WIDTH[10]
Demand based approach	Consideration should be given to providing space for pedestrians based upon demand requirements. Fruin Levels of Service (LoS) can be used to ensure adequate is provided. LoS A-C are ideal. **Walking** LOS A: 35 sq ft (3.3 m^2) per person or greater LOS B: 25 sq ft (2.3 m^2)-35 sq ft per person LOS C: 15 sq ft (1.4 m^2)-25 sq ft per person LOS D: 10 sq ft (0.93 m^2)-15 sq ft per person LOS E: 5 sq ft (0.46 m^2)-10 sq ft per person LOS F: 5 sq ft (0.46 m^2) per person or less **Queueing** LOS A: 13 sq ft (1.2 m^2) per person or greater LOS B: 10-13 sq ft per person LOS C: 07-10 sq ft per person LOS D: 3-7 sq ft. per person LOS E: 2-3 sq ft per person LOS F: 2 sq ft (0.19 m^2) per person or less **Stairs** LOS A: 20 sq ft (1.9 m^2) per person or greater LOS B: 15-20 sq ft per person LOS C: 10-15 sq ft. per person LOS D: 7-10 sq ft per person LOS E: 4-7 sq ft per person LOS F: 4 sq ft (0.37 m^2) per person or less FIGURE 18: LOS MEASURE FOR PEDESTRIANS BASED ON CROWD DENSITY[11]

[10] AGRD 6A, 2017
[11] Fruin, J. J. (1971). Pedestrian planning and design (No. 206 pp).

Cyclists: Best Practice

Principles	Description
Obstructing cycle paths through signage	Temporary signage should not impact the minimum required cycle path and cycle lane width.
Recommended Path Widths	"Pedestrian and bicycle paths should where possible, be on the same scale and to the same width as any facilities for pedestrian or bicycle traffic that existed prior to the works. If this cannot be achieved, ensure the safe movement of pedestrians, on-road and off-road cyclists through the area is provided to separate vulnerable road users from traffic." (AGTTM 2021 Part 3, Section 3.10, 4.10 and 5.13). Recommended widths are provided under AGRD 6A (2017) section 5.1.4 – 5.1.5 and it is recommended that these are adopted for cycle paths around construction sites. Best Practice Widths are taken from AGRD 6A (2017) section 5.1.4 – 5.1.5

FIGURE 19: TEMPORARY SIGNAGE OBSTRUCTING CYCLE LANE FORCING BIKES INTO VEHICLE LANE

FIGURE 20: TEMPORARY SIGN LEAVING INADEQUATE WIDTH ON SHARED PATH FOR PEDESTRIANS AND CYCLISTS

Shared Path Widths			
	Local access path	**Regional path**	**Recreational path**
Desirable minimum width	2.5	3.0	3.5
Minimum width – typical maximum	2.0[1] – 3.0[2]	2.5[1] – 4.0[2]	3.0[1] – 4.0[2]
Separated Two-Way Path Widths			
	Bicycle path	**Footpath**	**Total**
Desirable minimum width	2.5	2.0	4.5

Minimum width – typical maximum	2.0 – 3.0	≥ 1.5	≥ 4.5
Shared Paths			
	Bicycle path	**Footpath**	**Total**
Desirable minimum width	1.5	1.5	3.0
Minimum width – typical maximum	1.2[3]	≥ 1.2	≥ 2.4

[1] A lesser width should only be adopted where cyclist volumes and operational speeds will remain low.

[2] A greater width may be required where the numbers of cyclists and pedestrians are very high or there is a high probability of conflict between users (e.g. people walking dogs, roller bladders and skaters etc.).

[3] A minimum width of 2.0 m is required where passing within the cyclists' path section occurs or where that passing manoeuvres by cyclists occur outside of the pedestrian path section of the facility.

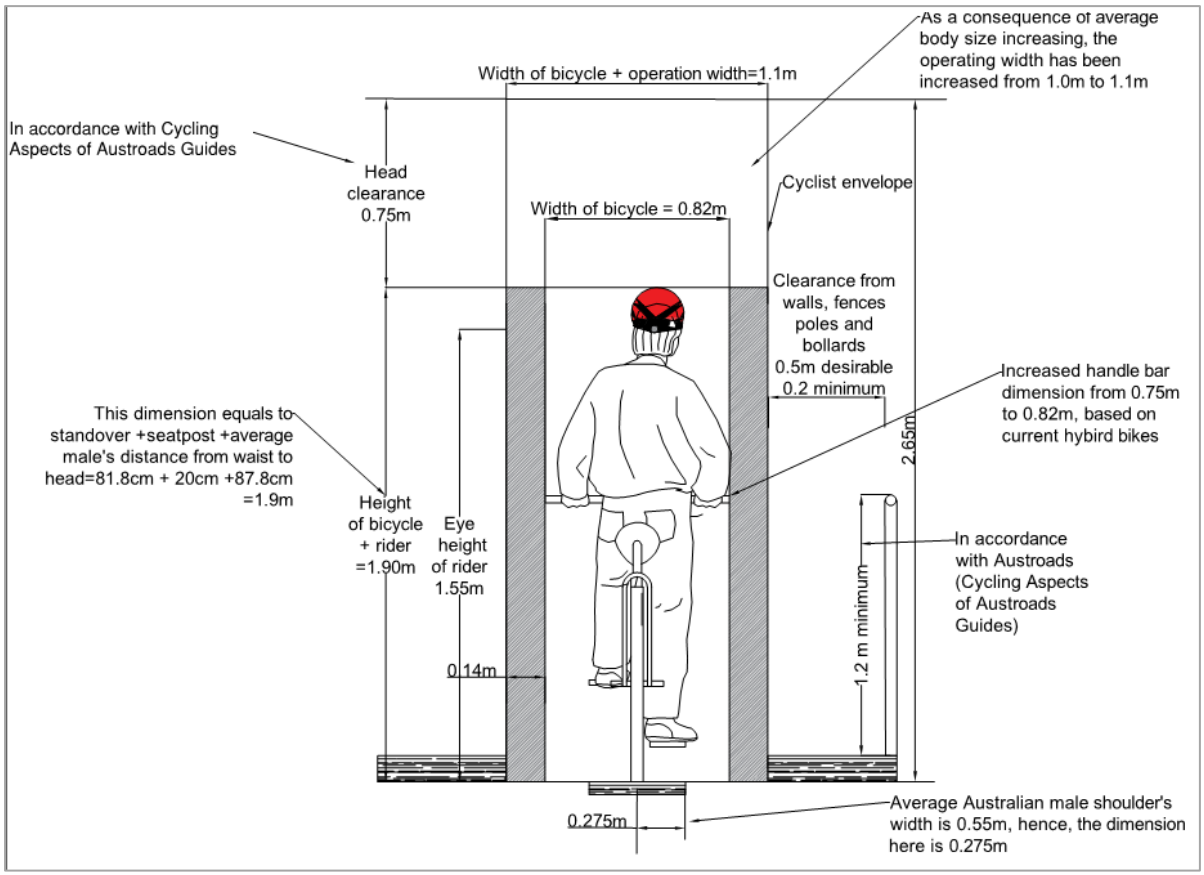


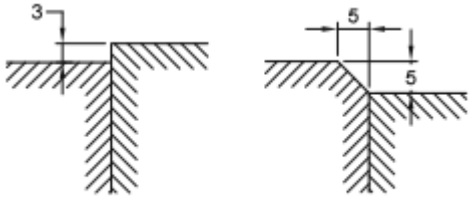
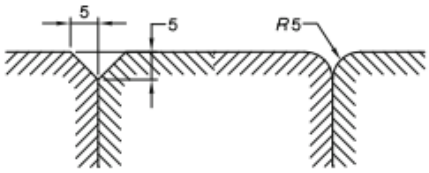
FIGURE 21: CYCLIST SPATIAL ENVELOPE[12]

[12] Image created by AJM, source material AGTTM Part 3 (2021) and AGRD 6A (2017)

6.3 Path Surface

Path Surface: Requirements

Requirements relating to pedestrians and cyclists are provided below

Standard	Content
AS 1428.1 (2009) **Section 7.1**	***Surface type*** A continuous accessible path of travel and any circulation spaces shall have a slip-resistant surface. The texture of the surface shall be traversable by people who use a wheelchair and those with an ambulant or sensory disability.
AS 1428.1 (2009) **Section 7.2**	***Transitions*** Abutment of surfaces shall have a smooth transition. Design transition shall be 0 mm. Construction tolerances shall be as follows: 0 ± 3 mm vertical, as shown in the figure below (a)  (a) Change in level 0 ±5 mm, provided the edges have a bevelled or rounded edge to reduce the likelihood of tripping, as shown in the figure below (b)  (b) Continuous paving units—flush-jointed with level surfaces DIMENSIONS IN MILLIMETRES AND ARE MAXIMUM
AS 1428.1 (2009) **Road Management Act 2004, Worksite Safety – Traffic Management** **Clause 51 (1)**	***Providing for pedestrians and cyclists*** Special provision should be made for pedestrians (including people with disabilities) and cyclists if they are expected to pass through, past or around the worksite. The path to be taken should be located as far as is reasonably practicable from the roadway, be smooth and free from obstructions, be of adequate width (e.g. 1.5 metres for pedestrian paths and 2.0 metres for shared paths), be well delineated and constructed to prevent pedestrians from walking through the work area, and provide clear guidance where the path changes direction.
AS 1428.1 (2009) **Section 7.5**	***Grates*** Grates shall comply with the following: • Circular openings shall be not greater than 13 mm in diameter. • Slotted openings shall be not greater than 13 mm wide and be oriented so that the long dimension is transverse to the dominant direction of travel. NOTE: Where slotted openings are less than 8 mm, the length of the slots may continue across the width of paths of travel.

AS 1428.1 (2009) **Section 10.2-2, 10.7**	***Walkways, Ramps and Kerb ramps*** Requirements on the following items can be found in Background Paper B: • Walkways (landings, gradients) • Ramps (landings, gradients, change in directions, at intersections, handrail, kerbs and kerb rails). • Kerb ramps (alignment, profile)
AS 1428.4.1: (2009)	Tactile Ground Surface Indicators (TGSIs) shall be installed in accordance with AS/NZS 1428.4.1: (2009) Warning and directional tactile ground surface indicators are required to achieve the following slip resistance ratings per AS 4586 (2013) 'Slip resistance classification of new pedestrian surface materials':
Road Management Act 2004, Worksite Safety – Traffic Management **Clause 29 (6)**	Consideration should be given to the needs of pedestrians (including people with disabilities) and cyclists if they are expected to pass through the worksite. The path should be smooth and clear of obstructions.

FIGURE 22: TEMPORARY SIGNAGE CORRECTLY PLACED SO NOT OBSTRUCTING CYCLE LANE

FIGURE 23: PROVIDE TEMPORARY RAMPS FOR MOBILITY IMPAIRED AND WHEELCHAIR USERS

Path Surface: Guidelines

Existing guidelines relating to pedestrians and cyclists are provided below

Standard	Content
AGTTM (2021) Part 3 **3.10, 4.10, 5.13**	***Surfaces and other hazards*** Road features that are hazardous to motorcyclists and on road cyclists should be treated. This may include transverse and longitudinal changes in pavement level, changes in surface condition and hazards on the road. Alternative routes shall be provided with a firm smooth surface and no trip hazards. If the existing bicycle path is on-road and affected by works, a temporary bicycle path should be provided elsewhere to a similar standard.

Pedestrians: Best Practice

Principles	Description
Ramp Gradient	In line with the recommendations from AGRD 6A (2017), gradients on kerb ramps are recommended to not exceed 1:10, as wheelchairs may tip backwards when being wheeled up steep ramps. This is less than the maximum grade of 1:8 as stated in AS 1428.1 (2009).
Crossfall	Under permanent conditions, AGRD 6A (2017) states: *"The crossfall of a paved pedestrian path may vary from flat (but achieving an adequately drained surface) to 2.5%. Provided that drainage is satisfactory, a lower crossfall is preferred (i.e. 1.0%) as a higher crossfall may cause problems for some people."* Paths of travel with steeper crossfalls are extremely difficult and tiring for many pedestrians with a mobility disability to traverse and contribute to trips and falls. See section on "Uneven surface and grass", for recommended crossfall for other surface.
Uneven surface and grass	Uneven surfaces as well as grass or similar areas should be avoided, as they are difficult for wheelchair users to manoeuvre and can also pose difficulties for people with vision impairments who use canes to help navigate. Unsealed surfaces are not acceptable for semi-permanent or long-term works. Around construction sites, temporary paths are frequently unsurfaced. AGRD 6A (2017) notes that: *"Unsealed surfaces may require an increase in crossfall (up to 5%) to prevent puddles of water from developing, though AS 1428.1:2009 specifies that a path crossfall should not exceed 2.5% to cater for people who have a disability."*
Steps	Steps should be avoided at all costs when building a temporary path. Where people with disabilities can't access ramps, the suitability of steps should be looked at on a case-by-case basis.

Cyclists: Best Practice

Principles	Description
Crossfall	AGRD 6A (2017) recommends the following crossfalls for permanent paths, also to be adopted under temporary conditions: • On straight sections crowning of the pavement is preferable as it results in less accumulation of debris. • 2-4% on sealed surfaces (sufficient to effectively dispose of surface water) • 5% on unsealed surfaces (to prevent puddles of water from developing)
Provision of ramps	From Cycling Aspects of Austroads Guides (2017) • The exit ramp from the road should be orientated to enable the cyclists to leave the road at a speed appropriate to the abutting development and the level of pedestrian usage of the path • The ramp for re-entering the traffic stream should be placed at an angle that enables cyclists to conveniently view traffic approaching in the left-hand lane • Consideration should also be given to providing a kerb extension to shelter the reintroduction of a bicycle lane • The gradient of ramps to and from raised path sections should be constructed to avoid an abrupt change of grade (in excess of 5%) and in general should not be steeper than 15:1 where high bicycle speeds are likely • The surface of ramps should have a suitable skid resistance so that cyclists don't slip

6.4 Safety Barriers and Fencing

Safety Barriers and Fencing: Requirements

Requirements relating to pedestrians and cyclists are provided below.

Standard	Content
AS 1742.3 (2019) **Section 4.17**	**Barricades or Mesh Fence** Longitudinal channelizing devices or mesh fences may be used to control pedestrian movements at a work site. Where pedestrian traffic has been diverted onto an existing roadway, a safety barrier may be required. Barrier boards or tapes shall not be used for pedestrian containment adjacent to moving traffic.
AS 1742.3 (2019) **Section 4.2.7**	**Safety Barriers** Safety barriers should be provided for the following situations: • Inadequate separation of temporary footpaths, shared paths or bicycle paths from vehicular traffic paths
AS 1742.3 (2019) **Section 4.12.1**	**Containment Fences** • All types of containment fence shall have sufficient stability to resist displacement, fracture or deflection of more than 0.5 m resulting from all expected wind conditions, air turbulence from passing traffic and minor vehicular impacts. • ***Tapes*** *shall not be used for pedestrian containment adjacent to traffic.* • ***Plastic mesh fencing*** *may be used for pedestrian containment as well as for the containment of workers on foot and plant. It comprises a flexible orange mesh approximately 1 m high. It shall be supported so that the top of the fence is at least 800mm above ground level at all times.* • **Longitudinal channelizing devices** are preferred to delineate a pedestrian path of travel a person with vision impairment may become entangled in mesh fencing causing a trip or fall.
AS 1742.3 (2019) **Section 4.12.2**	**Longitudinal Channelizing Barricades** They shall comprise interconnected lightweight modules such as plastic water ballasted modules. They may be used either as containment fences for workers or pedestrians.
AS 1742.3 (2019) **Section 4.12.3**	**Road Safety Barrier Systems** They are typically used between traffic and a severe hazard such as a deep excavation, a bridge pier or a hazardous stockpile, and for the protection of workers and non-vehicular road users in vulnerable situations where lateral clearance to moving traffic would otherwise be insufficient for safety.

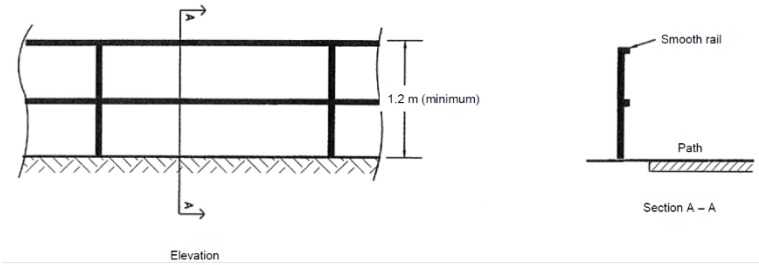
FIGURE 24: INCORRECT USAGE OF TAPE ADJACENT TO LIVE TRAFFIC LANE

Safety Barriers and Fencing: Guidelines

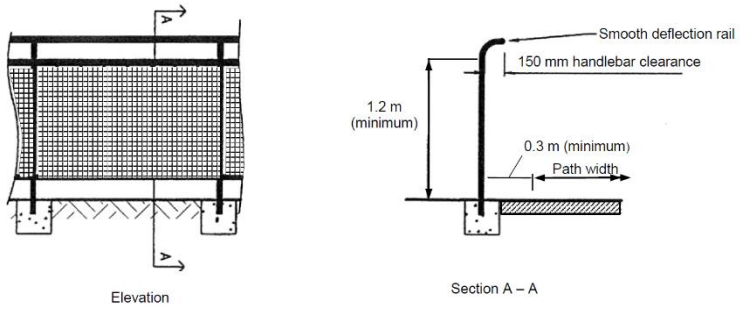
Standard	Content
AGTTM (2021) **Section 4.10.1**	**Use of Mesh Fencing** Where pedestrian traffic has been diverted onto an existing roadway: • The pedestrian path shall be separated from other traffic with plastic mesh fencing • A minimum clearance of 1.2 m should be provided from the plastic mesh fencing to the nearest traffic lane for speeds up to 60 km/h. If this clearance is not practicable, the speed shall not exceed a maximum of 40 km/h. • If speed is 70 km/h or more, a road safety barrier system shall be used instead of the plastic mesh fencing. Pedestrians shall be clear of the deflection zone behind road safety barriers.
AGRD 6A (2017) **Section 5.5.3**	**Batters and Fences** The installation of a fence at the side of a path used by cyclists is desirable where:

- there is a steep batter or large vertical drop located in close proximity to the path
- the path is adjacent to an arterial road and it is necessary to restrict cyclist access to the road
- a bridge or culvert exists on a path
- a hazard exists adjacent to a particular bicycle facility
- cyclists are likely to be 'blazing a separate trail' at an intersection between paths or around a path terminal.

Fences may also be needed where the path geometry, e.g. a downhill grade followed by a sharp curve in the path may be a location where cyclists misjudge the speed the curve can accommodate and run off the path. In these locations a recovery area is needed for the cyclists if they travel off the path and the criteria in the below figures may not be appropriate. Treatments in these situations should be guided by a risk assessment.



Example of a partial barrier fence details



Example of a full barrier fence details

The minimum height of a fence should be 1.2 m and should be used only where the severity of the hazard is considered to be low. A higher fence ≥ 1.4 m should be considered where the fence is protecting path users from a very severe hazard (e.g. high vertical drop from a structure to a body of water or rocks) or at a location where there is a risk of cyclists being vaulted off their bicycle if they collide with the fence, such as on a sharp curve following a steep downhill grade. The fence heights suggested should be verified by a risk assessment for each location that considers the type of hazard and its location near the path.

Pedestrians and Cyclists : Best Practice

Principles	Description
Fence footings	Where pedestrian volumes are low, these may be acceptable for use, whereby bright coloured fence footings should be used to aid visibility. However, in areas of high foot traffic, where individuals are inclined to walk at the edge of the path, these footings are not recommended.

FIGURE 25: FENCE FOOTINGS CAN BE A TRIP HAZARD IN HIGH PEDESTRIAN FLOW AREAS

FIGURE 26: ALTERNATIVE DESIGN FENCING WITH LOW PROFILE FOOTINGS

Delineation of Barriers	**To provide guidance, there should be a consistent and steady detectable edge at the base of the route to enable individuals with visual impairments to find the way**
Keep cycle path clear of barrier	Use of barriers adjacent to cycling facilities should ensure that they do not infringe upon their path of travel, forcing them into the general traffic lane without adequate protection. Consideration of handlebars and pedals should be given when placing barriers adjacent to cycle paths and cycle lanes.
Mesh fencing	Barriers such as tape and mesh can create dangers to cyclists as they tend to deform over time and can flap and fall onto cyclist's paths creating a hazard to catch the pedals and handlebars.
Safety Barriers for cyclists	Where cycle paths are diverted onto the road due to works being carried out on the path, safety barriers are required between the cyclists and live traffic. Implementing such lane dividers, that have interlocking rubber modules provide cyclists a clear vision of their designated path of travel around the works and ensure drivers are aware of the presence of the (altered) cycle path.
Barrier Selection	The most suitable barrier / fencing for pedestrians (and cyclists) around worksites depends on the required function (for example protection or segregation), location, type of worksite and surrounding land use. infrastructure often lies in finding the balance between providing adequate protection using durable, often heavy materials, such as concrete, whilst still being agile and easy to install and remove. The provision of barriers that provide adequate protection around worksites, takes precedence over the use of barriers that can be easily moved.

FIGURE 27: DELINEATION OF CYCLISTS FROM TRAFFIC LANE

6.5 Signs

The following section summarises guideline advice for signs erected for temporary traffic management. It is emphasised that installation of these devices could have considerable impact on the previous sections. For example, as required by AS1742.3, sign placement shall not be positioned so that they become a hazard to pedestrians and cyclists, nor direct them into an undesirable path.

Signs for Pedestrians, Cyclists and Traffic: Requirements

Requirements relating to pedestrians and cyclists are provided below

Standard	Content
AS 1742.3 2019 **Section 4.17** **And** **AS 1742.3 2019 Appendix A Table A.1 TM8**	Available regulatory signs A list of regulatory signs for pedestrians and cyclists can be found in Background Paper D
AS 1742.3 2019 **Section 4.2.1**	Signs specified in this Standard shall be used. However, there will be instances where there is no suitable standard sign. In such cases, the sign developed shall confirm to the format requirements specified in Clause 4.4. Emerging technologies in development of electronic variable messaging signs (see Clause 4.22) are providing alternative methods of displaying standard signs and are providing further opportunities to display more information to road users beyond that covered in this Standard. The use of such signs should be considered within the risk assessment planning stage (see Clause 2.2). The signs shall be in accordance with AS 4852.2. Determination of letter sizes for signs shall be in accordance with AS 1743.
AS 1742.3 2019 **Section 4.3.5**	An inspection shall be undertaken by foot or by bicycle to check paths used by pedestrians or cyclists considering all signs, delineation and accessibility for these road users. The same inspection should be carried out at night considering visibility of all signs, devices and path surface
AS 1742.3 2019 **Section 4.4.3**	**Sign sizes in the T Series** The application of the sign size designations A and B in the T Series in this Section are as follows: • A size ○ Applicable to all signs in T Series. This size will be suitable for— ○ traffic speeds up to 90 km/h where the lateral offset of the sign from the travel path is not more than 8.0 m; or ○ at traffic speeds up to 110 km/h where the offset is not more than 4.5 m; or ○ signs directed at pedestrians. • B size ○ Applicable where an oversize sign may be required— ○ because the recommendations in Item (a) are exceeded; or ○ on expressway type roads for added emphasis of the onset of works, detours or closures; or

	○ for other critical safety messages. NOTE: B size signs should also be considered for all T1 Series signs where the A size signboard is less than 1 m2 in area and traffic speeds exceed 70 km/h.
AS 1742.3 (2019) **Section 4.3.2**	Signs and devices shall be positioned and erected so that they — • do not become a possible hazard to workers, pedestrians, people with disabilities (e.g trip hazards for people with vision impairment), cyclists or vehicles; • do not direct pedestrians, cyclists or vehicles into an undesirable path; On kerbed roads in built-up areas where signs are mounted on posts adjacent to a footpath or where vehicle parking may occur, they should be placed a minimum of 300 mm clear distance behind the kerb and erected a minimum of 2.2 m above the level of the kerb or footpath to the underside of the sign, to reduce interference from parked vehicles. Where neither pedestrians nor parked vehicles have to be considered, e.g on a traffic island or median, a mounting height of 1.5m may be more appropriate. Signs mounted on portable supports used for short-term operation (see Clause 4.5) should generally be located as follows: • In open road areas – On the road shoulder a minimum of 1 m clear of the travelled way. • In built-up areas Behind the kerb if visible to oncoming traffic and not obstructing pedestrians, otherwise on the pavement as near as practicable to the kerb without the sign becoming obscured and without obstructing moving traffic. Signs should not be located in operating bicycle lanes or in shoulders if used by cyclists.
AS 1742.3 (2019) **Section 4.5.1** **(temporary measures)**	Mountings for short-term operations should be arranged so that the signs are prominently displayed to traffic and will command attention. The minimum mounting height of the lower edge of the sign should be 200 mm above the level of the nearest lane and the sign shall be horizontal.
Road Management Act 2004, Worksite Safety – Traffic Management **Clause 95 (5)**	(d) for urban roads, the mobile VMS should be located to ensure it does not interfere with pedestrians, cyclists and other footpath users.
AGTTM (2021), Section 3.10.2, 4.10.2, 5.13.2	Relevant warning signs should be used to warn cyclists of any changes.

Pedestrians and Cyclists: Best Practice

Principles	Description
Additional signage for pedestrians and cyclists	AS 1742.3 2019 only specifies a limited number of signs for the purpose of informing pedestrians and cyclists on works being carried out. In order to improve conditions for pedestrians and cyclists around construction sites, and inform them of works ahead, diversion routes, and any altered pedestrian infrastructure, use of additional signage should be considered. A list of additional recommended signs can be found in Appendix B Approval processes for non-standard signs can be found in Background Paper A.
Advanced warning signage	Placement of T8-3 “USE OTHER FOOTPATH” sign and other directional signs should be located where it is possible for pedestrians to safely cross to the other footpath. If the sign is located away from the last possible point of crossing, then there is a risk that pedestrians will cross unsafely where there is no adequate crossing provision.
Use of sign: “PEDESTRIANS WATCH YOUR STEP”	Whilst the circumstances listed may call for the use of the T8-1 "PEDESTRIANS WATCH YOUR STEP” sign, it should not be used to compensate for poor ground quality around sites. In the first instance, pedestrian pathways around construction sites should always be provided to the highest standard possible so far as reasonably practicable. It is noted that the use of T8-1 sign does not place the responsibility of potential accidents that occur due to poor ground conditions on the pedestrian, as may be interpreted by the wording of the sign. A sign annotating “ROUGH SURFACE”, as suggested under section 5.5.4.1, is deemed more appropriate where ground surfaces are poor around sites.
Use of multiple sign displays	Multiple sign displays are commonly used around construction sites. Those located at ground level can take up a considerable amount of the footpath and are prone to pedestrians tripping over them. Where possible these should be avoided, and signs should be mounted instead to keep the footpath clear for pedestrians. Mounting signs or placing in medians or other protected areas should be considered in CBD and high pedestrian flow environments. Where works are mid to long term, signs should be mounted and not be on any form of moveable display.
Use of permanent sign “CYCLISTS DISMOUNT”	Around construction sites, where the road infrastructure is often temporarily altered, sign G9-58 “CYCLIST DISMOUNT” is frequently drawn upon, although it is not specifically designated for temporary use. AS 1742.9 (2019) specifies that the sign may be ‘used to warn cyclists to dismount before reaching a particular place at or beyond which it would be hazardous to continue riding”. Observations show general use of this sign where practitioners are unable, or not prepared, to consider alternative provision for cyclists.

FIGURE 28: SIGN G9-58 CYCLISTS DISMOUNT

Use of pavement marking for cyclists	Permanent road pavement markings for cyclists are covered in Section 2.3 of AS 1742.9 (2009) Bicycle facilities. It is recommended that where pavement markings are used to temporarily direct cyclists around construction sites, the same level of standards in terms of dimensions and locality are applied to the temporary road markers. Specifications for these are set out in Background Paper C.

Traffic: Best Practice

Principles	Description
Mounting of signs	Where possible, signs should be mounted to avoid obstructing pedestrian or cycle paths, especially for semi-permanent or long-term works. Mounting on permanent signage and street furniture is possible if they do not obstruct their use.
Sizing of construction signage based on road speed	It is recommended that the dimensions of temporary traffic signs be minimised where located on cycle/pedestrian paths, depending on the enforced vehicle speed in the area. More information can be found in Background Paper C.
Pedestrian and cyclists warning signs	Diversion routes for pedestrians and cyclists may require them to enter the roadway to make their way around the works. It is therefore recommended that signs warning motorists of their presence are put in place on approach to the works. Signs W6-7 and W6-1, usually used under permanent conditions are recommended for use and are shown in Figure 20.

FIGURE 29: PEDESTRIAN AND CYCLIST WARNING SIGNS

Obstructing bike and pedestrian paths	As discussed in the 'Path Alignment' section, and specified under AS 1742.3 Manual of uniform traffic control devices – Traffic control devices for works on roads 2019 Section 4.3.2, construction signage for traffic should not impede pedestrians and cyclists.

List of Multimessage Sign Panels (AS1742.3:2019 – Appendix A)

Sign	Code	Image
Look Both Ways	TM8-6A	
Watch Your Step	TM8-7A	
Symbolic Pedestrians	TM8-8A	
Footpath Closed Ahead	TM8-9A	
Narrow Footpath Ahead	TM8-10A	
Path Closed Ahead	TM8-11A	
Path Closed	TM8-12A	
Pedestrian Hazard	TM8-13A/B	

Cycling Hazard	TM8-14A/B	
Bicycle Lane Closed Ahead	TM8-15A	
Bicycle Lane Closed	TM8-16A	
Symbolic Bicycle Ahead	TM8-17A	
Symbolic Bicycle	TM8-18A	
Accessible Path and Pedestrian Path	TM8-19C	
Accessible Path	TM8-20B	
Cyclists Dismount	GM9-58A	
Example MMS Signs		 

6.6 Lighting

Lighting: Requirements

Requirements relating to pedestrians and cyclists are provided below

Standard	Content
Road Management Act 2004, Worksite Safety – Traffic Management Section	Lighting should be provided if this would assist users of the path, particularly in urban areas that have existing street lighting.
Road Management Act 2004, Worksite Safety – Traffic Management Clause 49 (6)	To assist pedestrians and cyclists passing through the worksite, lighting should be provided to at least the same standard as the original footpath or crossing, particularly in urban areas that have existing street lighting.
AGTTM (2021) Part 3 3.10.1, 4.10.1, 5.13.1	Temporary paths shall be illuminated at night to the level of lighting previously available on the original footpath or crossing, or as referenced in AS 1158.4, whichever is the lesser level.

FIGURE 30 & 31: EXAMPLE OF POOR PATH LIGHTING DUE TO CONSTRUCTION HOARDING CAUSING SHADOWS AND DARKNESS

6.7 Speed

Speed affects both these pedestrian and cyclist user groups and the approach is to provide strategies that ensure vehicle speeds around construction sites are selected to minimise safety risks to both of these users. The safety of pedestrians and cyclists when selecting speeds around construction sites should be a prime consideration, especially in dense urban surrounds where pedestrian and cycle activity is likely to be high.

Requirements and Key Guidelines

Standard	Content
AS 1742.3 (2019) **Section 3.4.1**	***Temporary speed zones*** Temporary speed zones may be required for workplace safety or for the safety of road users. Temporary speed zones shall be appropriate for the work site. These shall be created by using regulatory speed limit signs and may require additional traffic control devices so that the speed limit is complied with. Further guidance regarding managing speeds at work sites is given in the Austroads Guide to Temporary Traffic Management.
AGTTM (2021) Part 3 **3.5, 4.5, 5.13**	The management of speeds chosen by road users is a crucial contributor to a safe worksite. Prior to undertaking work on any site, the following shall be checked: • the speed limit enforced on road users is correct • the speed limit is checked prior to starting work • the speed of road users is monitored for the whole worksite.
AGTTM (2021) Part 3 **3.10.1, 4.10.1, 5.13.1**	***Where pedestrians have been diverted onto an existing roadway:*** A minimum clearance of 1.2 m should be provided from the plastic mesh fencing to the nearest traffic lane for speeds up to 60 km/h. If this clearance is not practicable, the speed shall not exceed a maximum of 40 km/h. If speed is 70 km/h or more, a road safety barrier system shall be used instead of the plastic mesh fencing. Pedestrians shall be clear of the deflection zone behind road safety barriers.
Road Management Act 2004, Worksite Safety – Traffic Management	Worksite speed limits should be considered when one or more of the following conditions apply – * the safety of road users travelling through the worksite at the permanent speed limit is otherwise compromised. * the safety of pedestrians, cyclists and people with disabilities may be compromised.

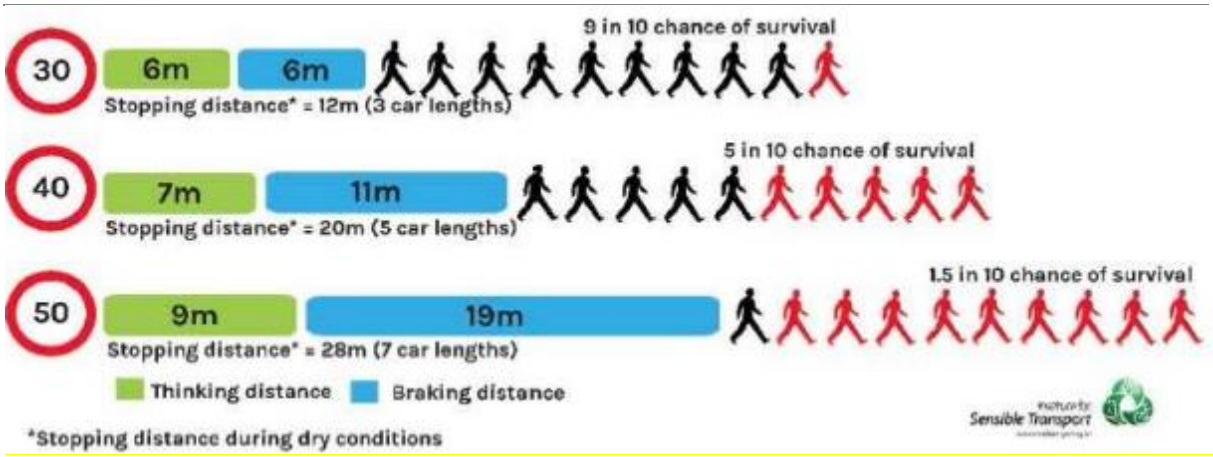


FIGURE 32: SPEED AND STOPPING DISTANCE IMPACT FOR COLLISION WITH A VULNERABLE ROAD USER[13]

Best Practice

Principles	Description
Applying the speed limit	The speed limit applied to the zone shall not exceed the maximum safe speed of travel at which traffic can safely traverse the site. The maximum safe speed of travel depends on a number of factors including: * number and type of vehicles * number of pedestrians / cyclists * type of works undertaken * extent of the works * road characteristics * number of incidences, conflicts or hazards on the road. Where the frequency of incidents, conflicts or hazards on a road increase, the maximum safe speed of travel needs to be reviewed.

Where speeds are reduced, appropriate measures need to be in place to ensure compliance to the altered limit. Figure 20. provides a suggested selection criteria process to ensure appropriate speeds for both pedestrians and cyclists

Cyclists that share the road space with vehicles are particularly at risk owing to their proximity to moving traffic, as well as the size of heavy vehicle blind spots, where cyclists can find themselves in positions where drivers are unable to see them. Consideration should be given to speed differentials particularly when cycles are forced to share a traffic lane, or a narrower lane, from the existing condition.

Where cyclists are to share the road space with vehicles, appropriate signs indicating their presence should be provided, especially if the treatment differs from permanent measures. Figure 20 and Figure 21 provide suggested signs.

FIGURE 33: BICYCLE PRIORITY ROUTE SIGNING

FIGURE 34: 'WATCH FOR CYCLISTS'

[13] Yarra Ranges Council, Integrated Transport Strategy, 2020-2040

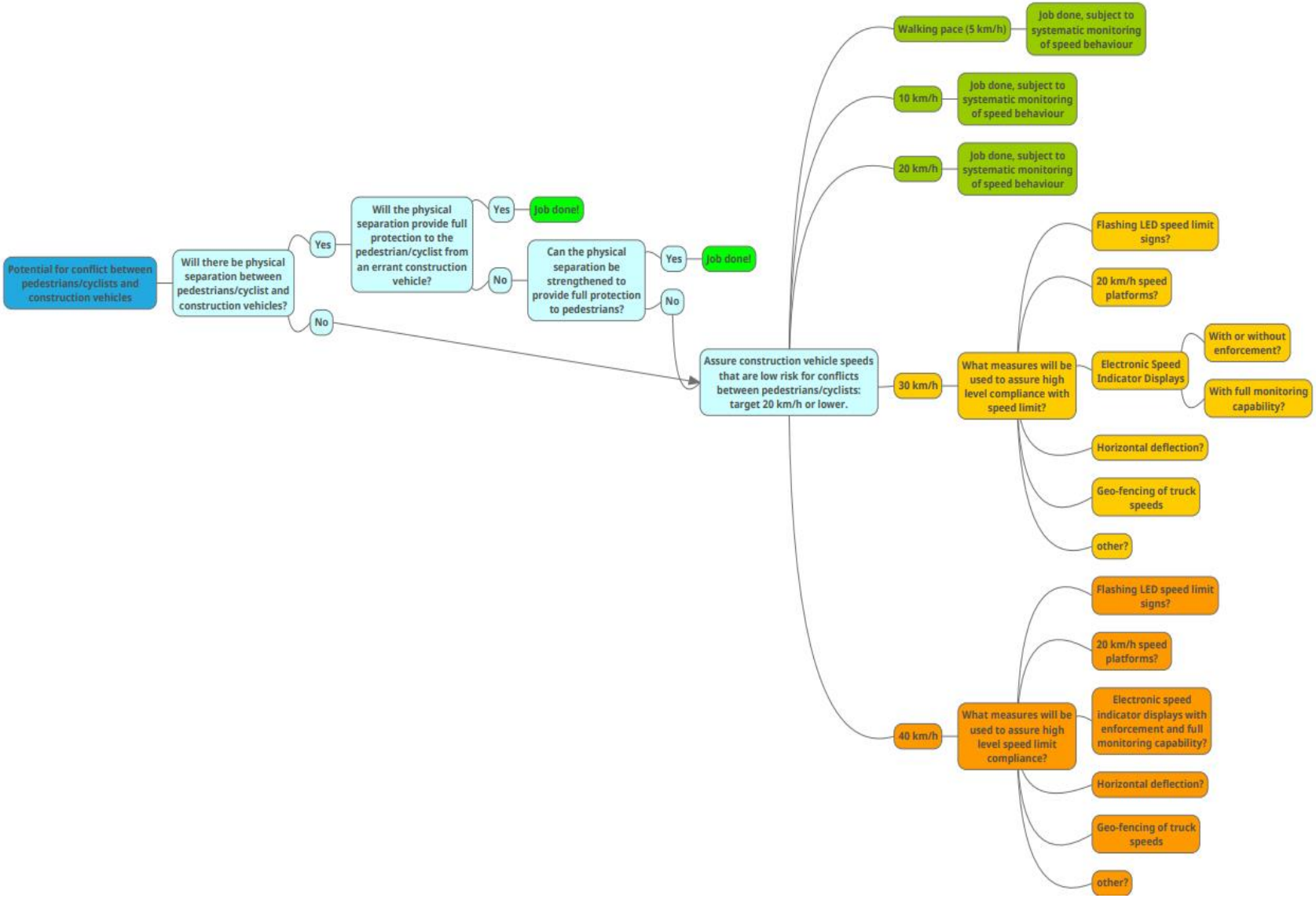


FIGURE 35: SPEED SELECTION CRITERIA (IMAGE SUPPLIED BY CORBEN CONSULTING)

7. Conclusion

This document has brought together a range of material and thinking around improving safety for pedestrians and cyclists at roadworks. It has highlighted and brought together existing information from documents including the Australian standard and AustRoads guidance. As research has shown understanding of that material can be limited with practitioners overly focused on vehicles creating safety issues and poor practices.

Accompanying this document is a series of background papers that provide more detail on aspects of the topics raised including speed, paths and routing and signing.

With increasing numbers of people walking and cycling, the support for greater density in land use, and ideas such as the twenty minute neighbourhood ensuring roadworks adequately and safely consider the needs of pedestrians and cyclists becomes even more important.

Appendices*

A – Data Sources

B – Sign List

Background Papers Related to this Summary*

A – TMP Requirements and Approval Process

B – Paths (Alignment and Surfaces)

C – Signage and Sign Specification

D – Speed

* (see Construction trucks and community safety web page on VicRoads web site:)

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