

Australian/New Zealand Standard™

Design for access and mobility

Part 4.1: Means to assist the orientation of people with vision impairment— Tactile ground surface indicators



AS/NZS 1428.4.1:2009

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee ME-064, Access for People with Disabilities. It was approved on behalf of the Council of Standards Australia on 23 November 2009 and on behalf of the Council of Standards New Zealand on 24 November 2009. This Standard was published on 3 December 2009.

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Australian Association of Occupational Therapists
Australian Building Codes Board
Australian Industry Group
Australian Institute of Building
Australian Institute of Building Surveyors
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Commonwealth Department of Veterans Affairs
Consumers' Federation of Australia
Deafness Forum of Australia
Disabled Persons Assembly New Zealand
Housing Industry Association
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Mobility Research Centre New Zealand
Physical Disability Australia
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Australian/New Zealand Standard™

Design for access and mobility

Part 4.1: Means to assist the orientation of people with vision impairment— Tactile ground surface indicators

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PREFACE

This Standard was prepared by Standards Australia Committee ME-064, Access for People with Disabilities, to supersede AS 1428.4—1992, *Tactile ground surface indicators for the orientation of people with vision impairment* and AS/NZS 1428.4—2002, *Tactile indicators*.

This Standard incorporates Amendment No. 1 (November 2010) and Amendment No. 2 (December 2014). The changes required by the Amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard is part of a series that is comprised of the following:

AS

- 1428 Design for access and mobility
- 1428.1 Part 1: General requirements for access—New building work
- 1428.2 Part 2: Enhanced and additional requirements—Buildings and facilities
- 1428.3 Part 3: Requirements for children and adolescents with physical disabilities
- 1428.5 Part 5: Communication for people who are deaf or hearing impaired

AS/NZS

- 1428 Design for access and mobility
- 1428.4.1 Part 4.1: Means to assist the orientation of people with vision impairment—Tactile ground surface indicators (this Standard)

The objective of this Standard is to assist in providing a safer built environment for persons who are blind or vision-impaired, with particular reference to tactile indicators.

The Building Code of Australia and *Disability (Access to Premises—Buildings)* (Premises Standard) define where access for people with a disability is required and reference a number of Australian Standards (including this Standard) to provide technical solutions to meet deemed-to-satisfy provisions.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

The use of Notes in this Standard are of an advisory nature only to give explanation to guidance to the user on recommended design considerations or technical procedures, or to provide an informative cross-reference to other document or publications. Notes to clauses in this Standard do not form a mandatory part for compliance with this Standard.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

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FOREWORD

People with disabilities have the right to dignified, safe and independent access to the built environment.

A1 | In 2010 nearly 600 000 Australians are blind or have impaired vision and many more have some reduction in the effectiveness of their sight, the majority of whom are over the age of 65 years. The ageing of Australia's population is expected to see the number of people with vision impairment double in 25 years.

This Standard deals with the application of tactile ground surface indicators in the built environment.

A1 | The consistent application of this Standard will enhance the safety, dignity and independence with which people who are blind or vision impaired have access to the built environment.

Tactile ground surface indicators (TGSIs)

TGSIs provide cues, which, when combined with other environmental information, assist people who are blind or vision-impaired with their orientation. Orientation is a person's awareness of where they are, where they are going, and where they have been. Information on wayfinding is given in Appendix A.

A1 | Warning TGSIs indicate an approaching hazard but not what the nature of the hazard will be. When used in conjunction with directional tactile ground surface indicators, TGSIs provide a 'message' to pause and consider a change in direction.

The application of TGSIs will not correct bad design or make an unsafe environment safe. Good design will minimise the need for the use of TGSIs.

TGSIs should be installed to provide guidance and/or warning of an obstruction or hazard in any location where insufficient alternative or 'natural' tactile cues exist.

Luminance-contrast

The majority of people who are blind or vision impaired have some vision. The provision of sufficient luminance-contrast in the choice of TGSIs will enhance access to information for people with vision impairment and for all pedestrians.

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Australian/New Zealand Standard
Design for access and mobility

**Part 4.1: Means to assist the orientation of people with vision impairment—
Tactile ground surface indicators**

SECTION 1 SCOPE AND APPLICATION

1.1 SCOPE

This Standard sets out requirements for the design and application of tactile indicators for new building work, to ensure safe and dignified mobility of people who are blind or vision impaired.

NOTE: Information on design and installation of tactile indicators is given in Appendix A.

1.2 APPLICATION**1.2.1 General**

This Standard is applicable to the internal and external built environment, throughout Australia and New Zealand, in potentially hazardous situations such as stairs, ramps, kerb ramps and level transition between pedestrian accessways and vehicle carriageways.

1.2.2 New Zealand only

NZS 4121 applies primarily in buildings and related areas and is cited in Section 119 of the *Building Act 2004* as a means of complying with the Building Code. In New Zealand, neither NZS 4121 nor the Building Code require tactile ground surface indicators in buildings. This Standard complements NZS 4121 by describing how tactile ground surface indicators are to be provided in public environments.

The Local Government Act 1974, Section 331(2), states ‘in forming or reforming any road or part thereof (not being a road in a rural area), the council shall ensure that reasonable and adequate provision is made for kerb and channel of any footpath or part thereof to be formed or reformed so as to permit safe and easy passage from kerb to kerb of any mechanical conveyance normally and lawfully used by a disabled person’.

The official New Zealand guide to the design of pedestrian facilities on public roads and paths is the *Pedestrian Planning and Design Guide* (PPDG). The official New Zealand guide to the design and application of ground surface indicators on public roads and paths is RTS 14—*Guidelines for facilities for blind and vision-impaired pedestrians*. Both are published by the New Zealand Transport Agency.

The informative Appendices A to D are not applicable to New Zealand and users in NZ are referred to the PPDG and RTS 14 for guidance on the application of TGSIs for public roads, paths and kerb ramps.

1.3 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

1428 Design for access and mobility

1428.1 Part 1: General requirements for access—New building work

2700 Colour Standards for general purposes

AS/NZS

1580 Paints and related materials—Methods of test

1580.601.2 Method 601.2: Colour—Principles of colour measurement

NZS

4121 Design for access and mobility—Buildings and associated facilities

ISO

11664-1:2007 Colorimetric-Part 1: CIE Standard colorimetric observers

A1

AS

1742 Manual of uniform control devices

1742.7 Part 7: Railway crossings

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.1 Angle of approach

The angle between the centre-line of one continuous accessible path of travel and the centre-line of an intersecting continuous accessible path of travel.

1.4.2 Carriageway

That portion of a road or bridge devoted particularly to the use of vehicles, inclusive of shoulders and auxiliary lanes. It is usually designated as that part of a public road (way) between kerbs.

1.4.3 Circulation space

A clear unobstructed area, to enable persons using mobility aids to manoeuvre.

A1

1.4.3A Composite discrete tactile ground surface indicators (composite discrete TGSIs)

Tactile ground surface indicators that are individually installed and which provide a differing luminance for the sloping sides and upper surface of the truncated cone.

1.4.4 Continuous accessible path of travel (accessway)

An uninterrupted path of travel to, into or within a building providing access to all accessible facilities.

1.4.5 Depth

The distance measured along the direction of travel.

1.4.6 Directional indicator

A1

An indicator used to indicate direction of travel through a space or to an object or service.

1.4.7 Direction of travel

The path a person travels along, which may be a footpath, passageway, walkway, ramp, stairs, landing or similar.

1.4.8 Discrete Tactile Ground Surface Indicators (Discrete TGSIs)

- A1 | Tactile ground surface indicators that are individually installed, which provide the same luminance for the sloping sides and upper surface of the truncated cone.

1.4.9 Handrail

A rail used in circulation areas, such as corridors, passageways, ramps and stairways, to assist in continuous movement.

1.4.10 Hazard

- A1 | Any area or fixed object in or immediately adjacent to a path of travel, which may place people at risk of injury.

1.4.11 Height

The distance measured above the finished floor or ground surface.

- A1 | **1.4.12 Integrated tactile ground surface indicators (integrated TGSIs)**

Tactile ground surface indicators that are in a defined pattern and which are of the same luminance and material as the base surface.

1.4.13 Kerb

A side barrier to a trafficable or accessible pedestrian surface.

- A1 | **1.4.14 'Deleted'**

1.4.15 Luminance-contrast

The light reflected from one surface or component, compared to the light reflected from another surface or component.

1.4.16 Luminance factor

The ratio of luminance of a surface to that of a perfect reflector, identically illuminated.

1.4.17 Orientation

A person's awareness of their position and relationship to significant objects in their environment.

1.4.18 Pedestrian push-button assembly

An enclosure incorporating a push-button switch that is designed for use in conjunction with a signalized intersection or foot crossing for the purpose of registering a pedestrian demand.

NOTES:

- 1 It could also include, or have associated with it, facilities for the generation of audible and tactile signals and an arrow legend on the face of the button indicating the direction or directions to which it applies.
- 2 For requirements for pedestrian lights and push-button assemblies, see AS 1742.14.
- 3 Pedestrian push-button assemblies should be positioned within the zone of common reach (see AS 1728.2).

1.4.19 Pedestrian-operated signal (POS)

Pedestrian-activated traffic signals operated through push-button assemblies.

1.4.20 Ramp

An inclined surface on a continuous accessible path of travel between two landings with a gradient steeper than 1 in 20 but not steeper than 1 in 14.

1.4.21 Ramp, kerb

An inclined surface on a continuous accessible path of travel with a maximum rise of 190 mm, a length not greater than 1520 mm and a gradient not steeper than 1 in 8, located within or attached to a kerb.

1.4.22 Ramp, step

An inclined surface on a continuous accessible path of travel with a maximum rise of 190 mm and length not greater than 1900 mm and a gradient not steeper than 1 in 10.

1.4.23 Ramp, threshold

An inclined surface on a continuous accessible path of travel with a maximum rise of 35 mm, length not greater than 280 mm and a gradient not steeper than 1 in 8.

1.4.24 Shall

Indicates that a statement is mandatory.

1.4.25 Should

Indicates that a statement is a recommendation.

1.4.26 Tactile ground surface indicator (TGSi)

Truncated cones and/or bars installed on the ground or floor surface designed to provide pedestrians who are blind or vision-impaired with warning or directional orientation information.

1.4.27 Tactile indicators

Indicators designed to provide blind or vision-impaired pedestrians with orientation information by means of tactile perception.

1.4.28 Tactile perception

The process of feeling the shape, surface and size of an object.

1.4.29 Vision impairment

Any significant loss of sight.

1.4.30 Walkway

Any surface on a continuous accessible path of travel with a gradient not steeper than 1 in 20.

1.4.31 Warning indicator

An indicator that is used as a warning of a hazard and the need to stop, consider, investigate and wait before proceeding.

1.4.32 Width

The distance measured at right angle to the direction of travel.

A1 | SECTION 2 CRITERIA AND APPLICATION OF WARNING TACTILE INDICATORS

2.1 SCOPE OF SECTION

This Section provides requirements for the application of TGSIs in various situations.

The following situations are covered:

- (a) Stairways.
- (b) Ramps (other than a threshold ramp).
- (c) Escalators.
- (d) Level and inclined moving walkways.
- (e) Overhead hazard.
- (f) Carriageways.

NOTE: The BCA and Premises Standards exempt step ramps, kerb ramps, and swimming pool ramps from the requirements to install TGSIs to the extent that the BCA and Premises Standards are applicable.

- A1 | (g) Railway platforms (see Clause 3.4) and railway crossings (see AS 1742.7).
- (h) Passenger wharves (see Clause 3.5).
- (i) Bus stops and tram/light rail stops (see Clause 3.6).

2.2 GENERAL REQUIREMENTS

The following applies to a tactile indicator:

- (a) It shall be detectable by tactile means.
- (b) It shall have luminance-contrast to the base surface as follows:
 - (i) Where the integrated TGSIs are of the same colour as the underlying surface—not less than 30% across its entire area.
 - (ii) Where discrete TGSIs—not less than 45%.
 - (iii) Where discrete TGSIs are constructed using two colours or materials, the raised surface shall have a section that has 60% luminance contrast for a diameter of 25 ± 1 mm tested as required below.

Luminance contrast shall be tested in accordance with Appendix E.

2.3 WARNING TGSIs

2.3.1 General

In addition to the requirements of Clause 2.2, the following criteria apply:

- (a) TGSIs shall be laid so that there is no likelihood of the edges lifting.
- (b) Where TGSIs are placed across the direction of travel, to ensure they are detected, they shall be arranged as shown in Figure 2.1.
- (c) A TGSIs shall be slip-resistant.
- (d) TGSIs shall have the top surface no more than 4 mm to 5 mm above the base surface (see Figure 2.1).

- (e) The base surface of an integrated TGSi shall be not more than 3 mm above the abutment surface of the surrounding floor or ground surface and shall have all exposed external edges chamfered.

2.3.2 Design requirements

The design and arrangement of warning tactile ground surface indicators (TGSIs) shall comply with Figure 2.1.

2.3.3 Placement

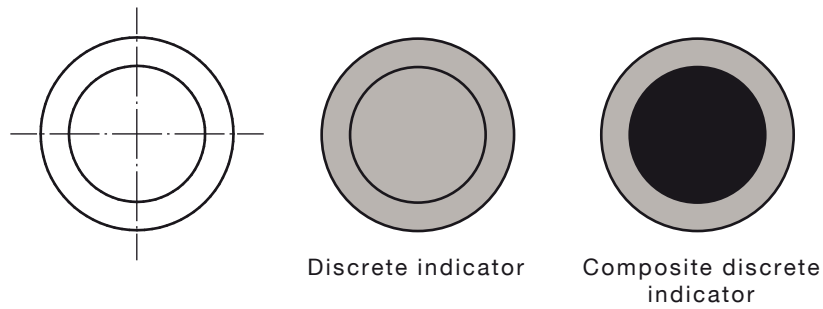
Warning indicators shall be installed as follows:

- (a) For the full width of the path of travel.
- (b) Perpendicular to the direction of travel when approaching the hazard.
- (c) Set back 300 ± 10 mm from the edge of the hazard except at railway platforms and wharves.

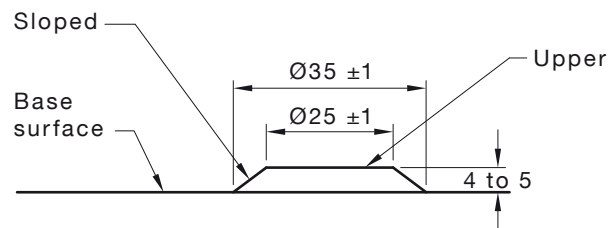
NOTE: See Clauses 3.4 and 3.5 for further details on set-backs at railway stations and wharves.

- (d) Where integrated warning TGSIs are used, they shall be arranged according to Figures 2.1(c), over the required area [see Figures 2.2(A), 2.2(B), 2.3(A), 2.3(B), 2.4, 2.5(A), 2.5(B), 2.6(A) and 2.6(B)].
- (e) Where integrated warning TGSIs need to be detected by a person approaching at an angle to the continuous accessible path of travel, the TGSIs shall be arranged as shown in Figure 2.1, over a minimum depth of 600 mm to 800 mm from the direction of approach.
- (f) Where discrete warning TGSIs are used over a depth of 300 mm to 400 mm, the arrangement shall be as shown in Figure 2.1 with a minimum of 6 discrete truncated cones in the direction of travel.
- (g) Where discrete warning TGSIs need to be detected by a person approaching at an angle to the continuous accessible path of travel, the TGSIs shall be arranged as shown in Figure 2.1 with a minimum of 12 discrete truncated cones in the direction of travel.

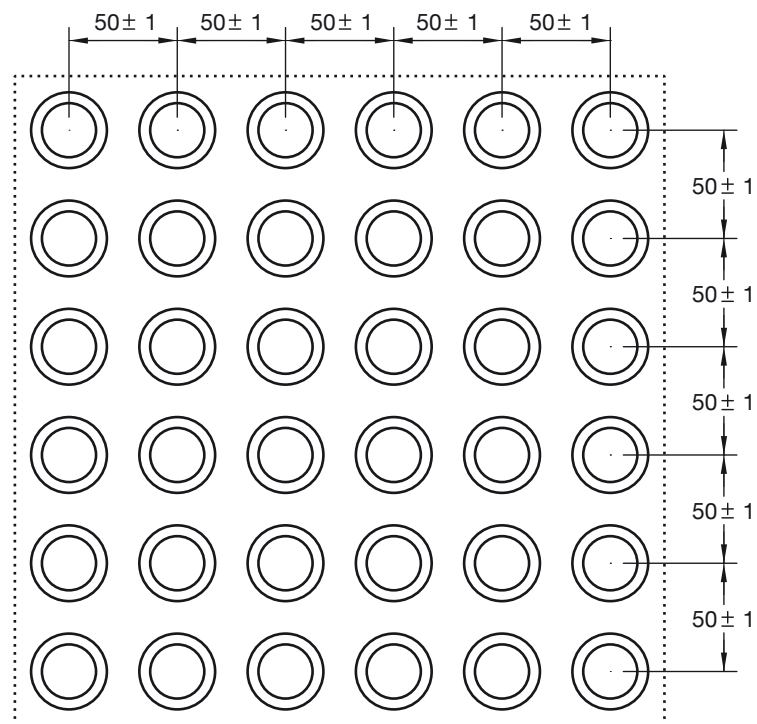
A1

A2
A1

(a) Plans of individual truncated cones



(b) Elevation of individual truncated cone



(c) Plan arrangement of truncated cones for TGSIs

DIMENSIONS IN MILLIMETRES

FIGURE 2.1 DESIGN AND ARRANGEMENT OF WARNING TGSIs

2.4 STAIRWAYS, RAMPS, ESCALATORS AND MOVING WALKS

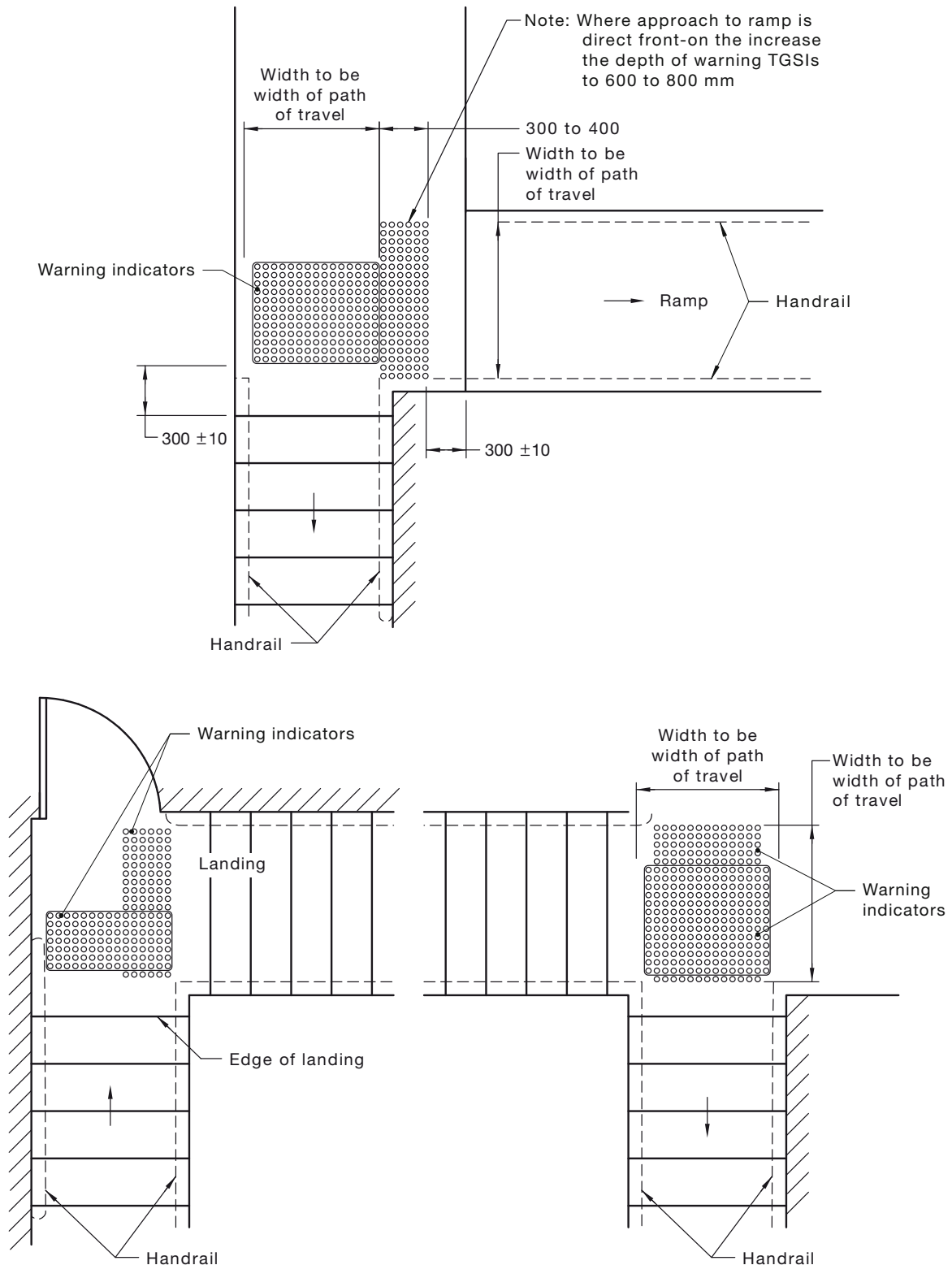
Where required on a path of travel, warning indicators shall be located at both the top and bottom of stairways, ramps, escalators and moving walks, as shown in Figures 2.2(A), 2.2(B), 2.3(A), 2.3(B) and 2.4.

A1 | Where the Building Code of Australia does not require the installation of TGSIs (e.g. residential aged care facilities), handrails shall have a raised tactile warning, in the form of a domed button 4 mm to 5 mm in height and 10 mm to 12 mm in diameter, and shall be provided on the top of the handrail, 150 ± 10 mm from the end of the handrail.

Where the distance of the landing is 3000 mm or more to the nearest nosing edge, the warning indicators shall be over a distance of 600–800 mm [see Figure 2.2(B)(b)].

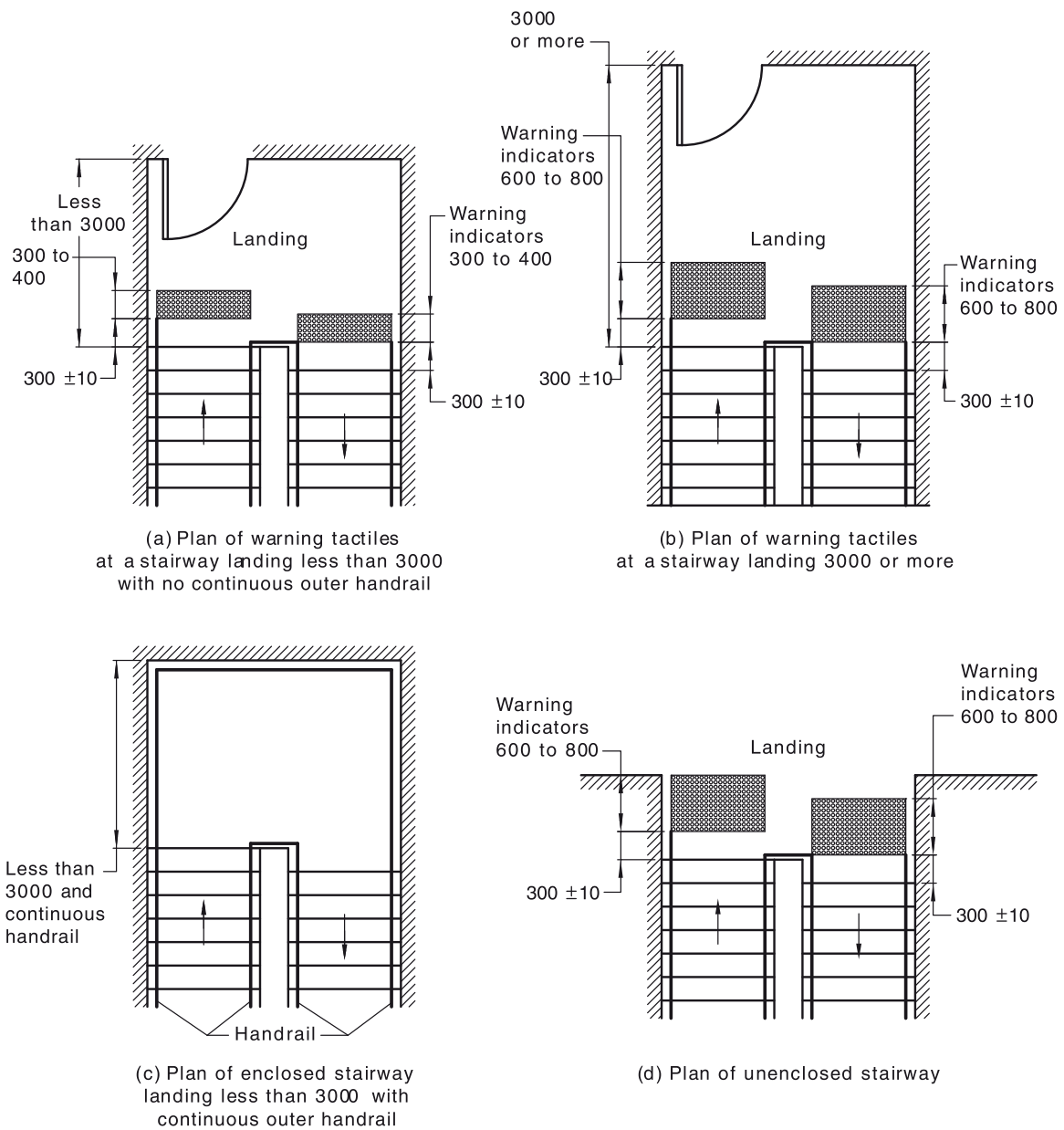
A1 | Where the distance of the landing is less than 3000 mm to the nearest nosing edge, the warning indicators shall be over a distance of 300–400 mm (see Figure 2.2(B)(a)).

Where handrails are continuous on both sides of the landing and the distance of the landing is less than 3000 mm to the nearest nosing edge, indicators are not required (see Figure 2.2(B)(c))



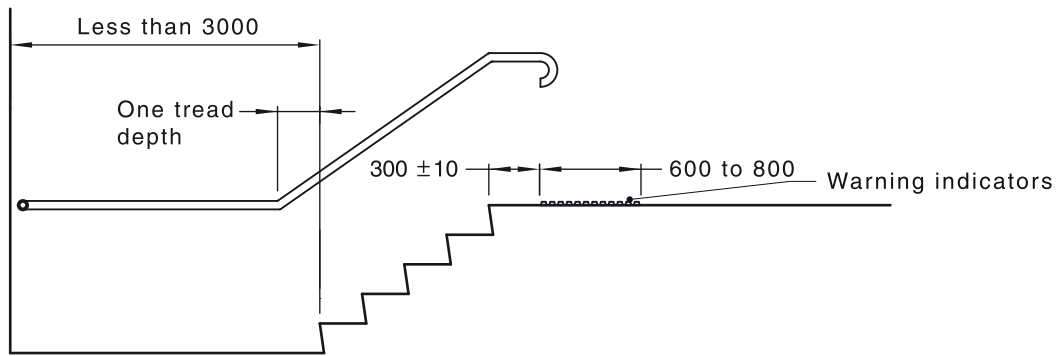
DIMENSIONS IN MILLIMETRES

FIGURE 2.2(A) WARNING INDICATORS—STAIRWAYS, LANDINGS AND RAMPS



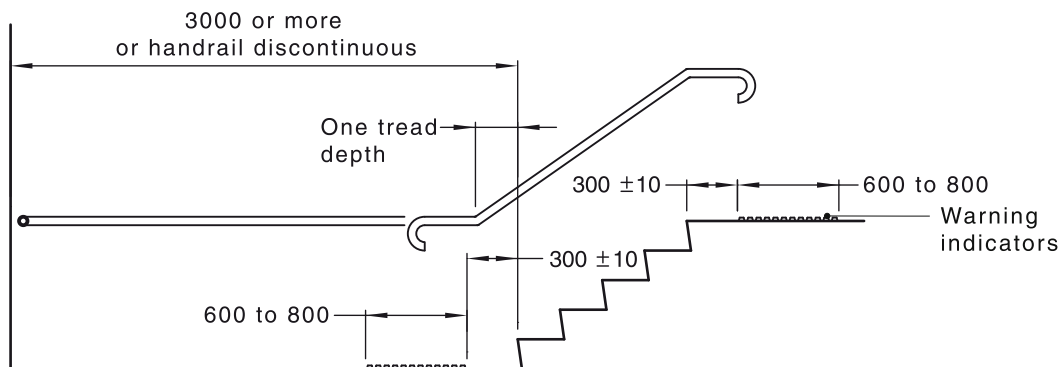
DIMENSIONS IN MILLIMETRES

FIGURE 2.2(B) WARNING INDICATORS—RIGHT ANGLE STAIRWAYS AND LANDINGS

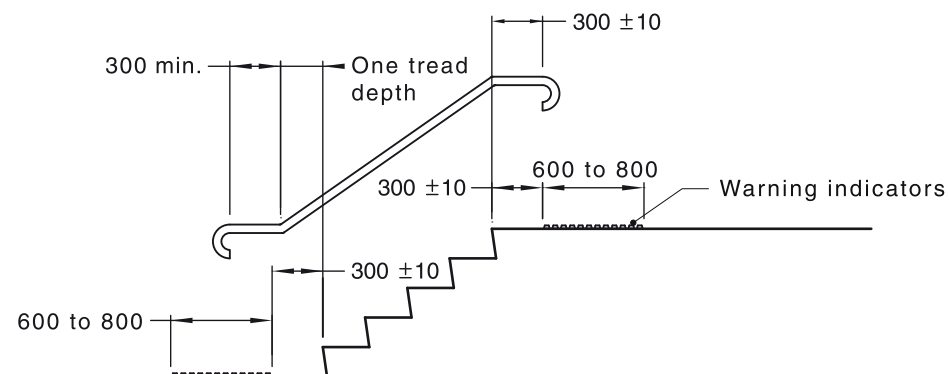


A1

(a) Side elevation where top of stairway or escalator leads to an open area and the bottom landing is enclosed, less than 3000 wide and handrail is continuous on both sides



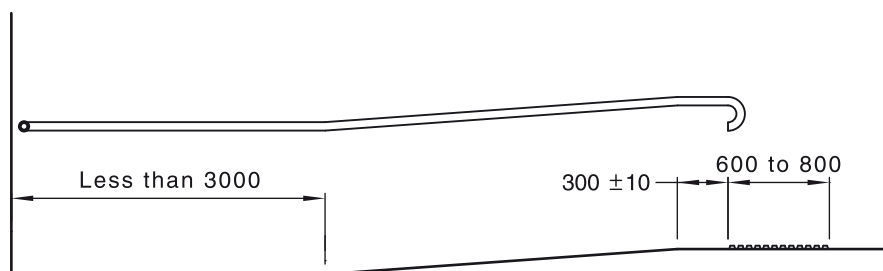
(b) Side elevation where top of stairway or escalator leads to an open area and the bottom landing is enclosed, 3000 or more wide and/or handrail is discontinuous



(c) Side elevation where top and bottom of stairway or escalator leads to an open area

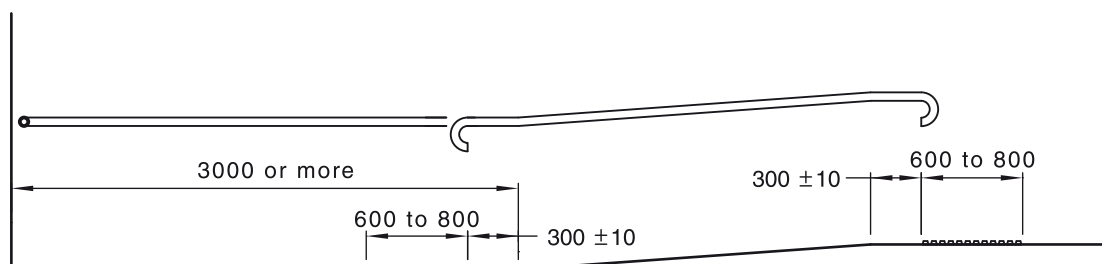
DIMENSIONS IN MILLIMETRES

FIGURE 2.3(A) WARNING INDICATORS—STAIRWAYS

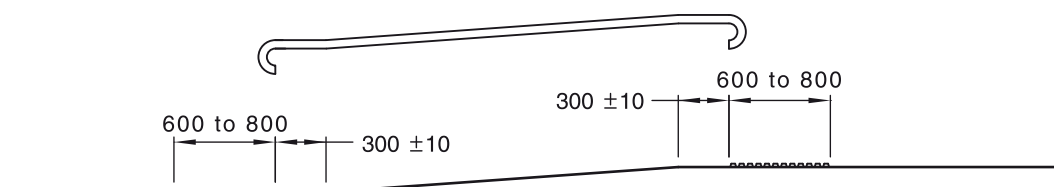


A1

(a) Side elevation where top of ramp leads to an open area and the bottom landing is enclosed, less than 3000 wide and handrail is continuous on both sides



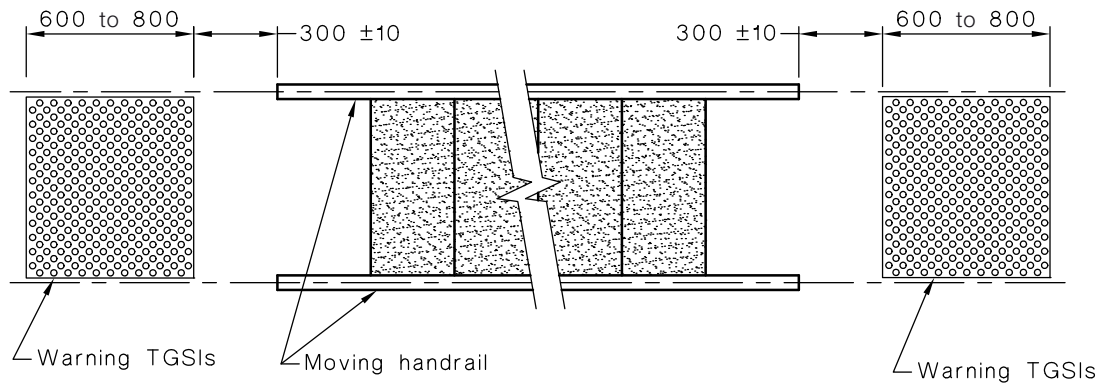
(b) Side elevation where top of ramp leads to an open area and the bottom landing is enclosed, 3000 or more wide and/or handrail is discontinuous



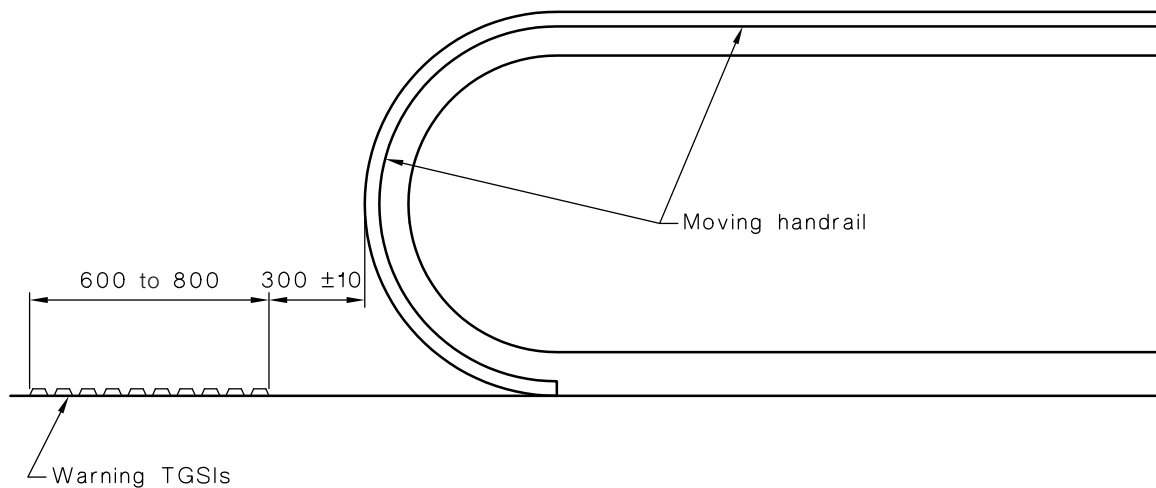
(c) Side elevation where top and bottom of ramp leads to an open area

DIMENSIONS IN MILLIMETRES

FIGURE 2.3(B) WARNING INDICATORS—RAMPS



(a) Plan



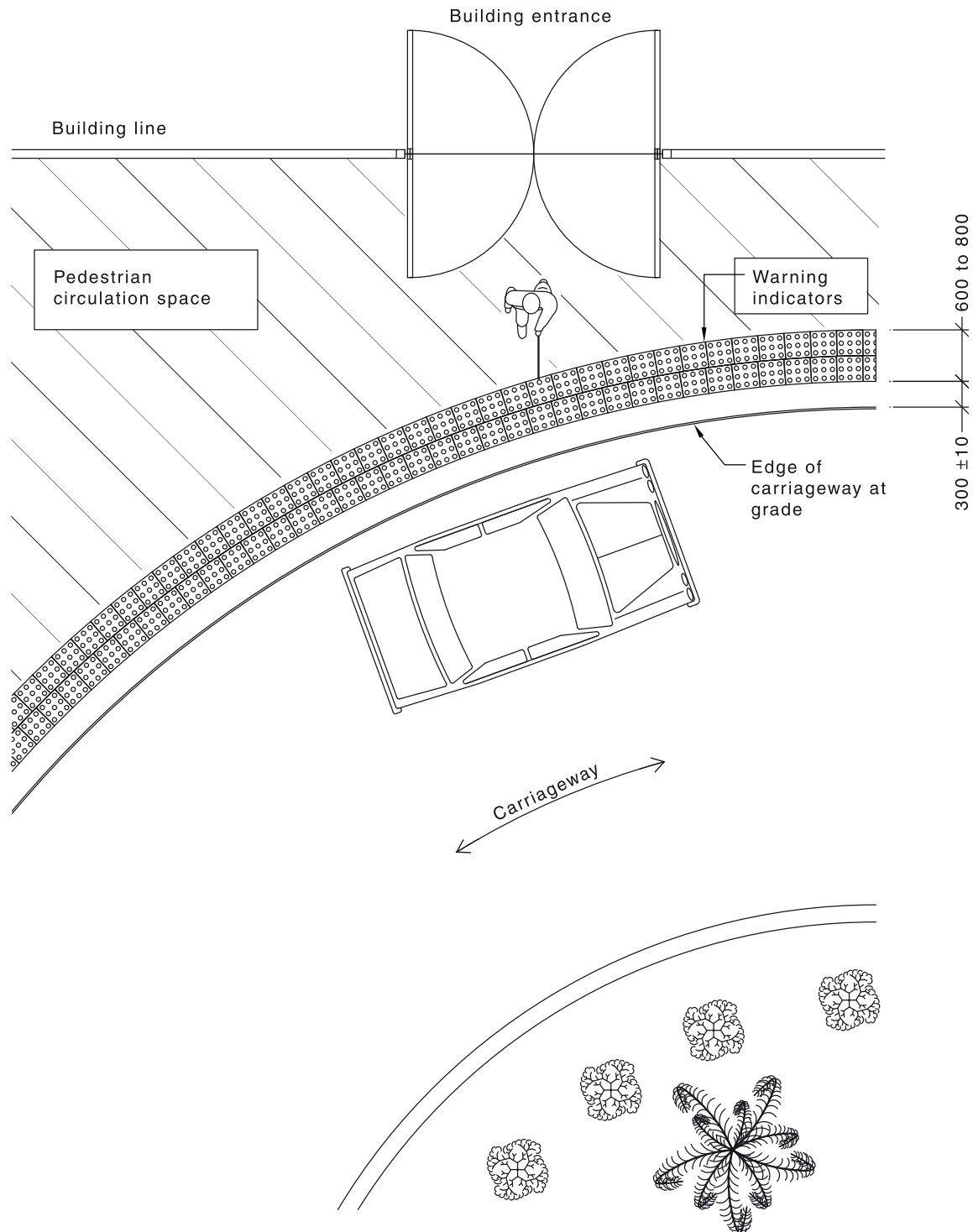
(b) Part elevation of escalators / moving walks

DIMENSIONS IN MILLIMETRES

FIGURE 2.4 WARNING INDICATORS AT ESCALATORS AND MOVING WALKS

2.5 PEDESTRIANS AND VEHICLES AT THE SAME GRADE

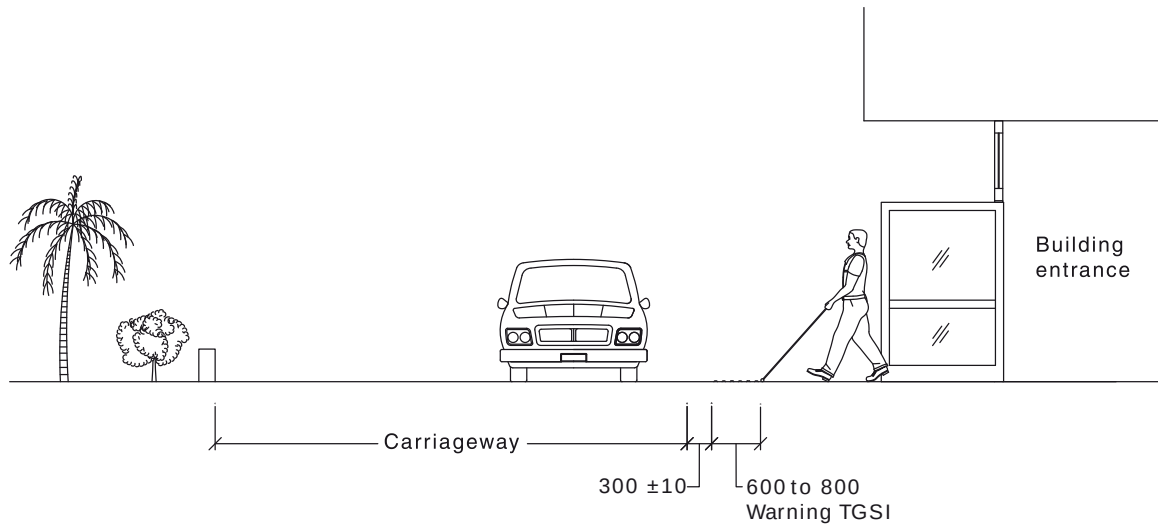
Where a pedestrian area joins a carriageway at grade (i.e. on the same level) or to delineate the pedestrian area from the carriageway, TGSIs shall be provided in accordance with Figures 2.5(A) and 2.5(B).



(a) Plan

DIMENSIONS IN MILLIMETRES

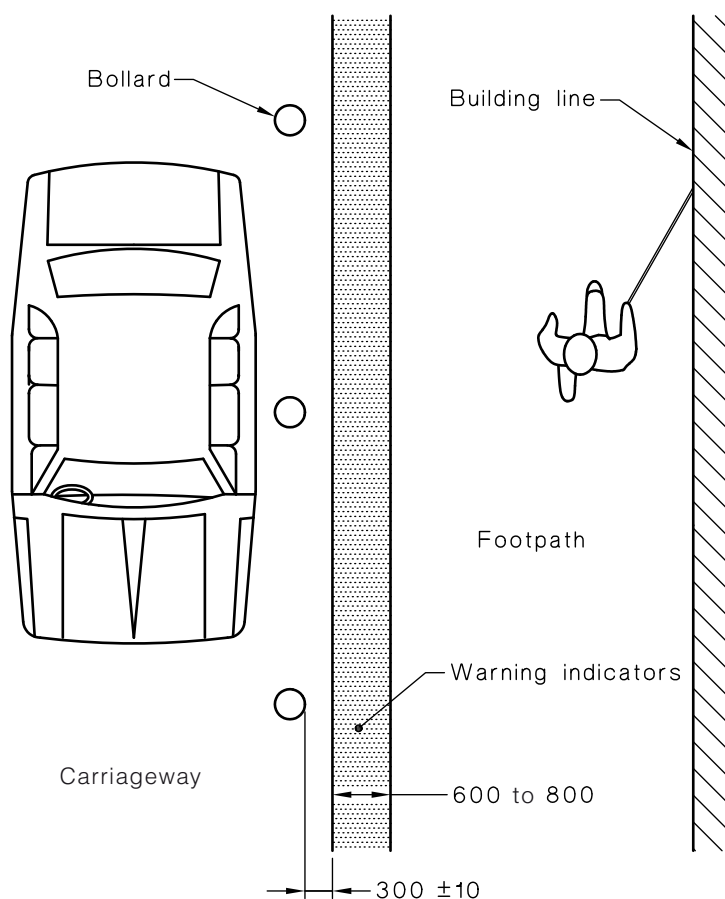
FIGURE 2.5(A) (in part) APPLICATION OF WARNING TGSIs TO DEFINE THE PEDESTRIAN WAY FROM A CARRIAGEWAY AT THE SAME GRADE



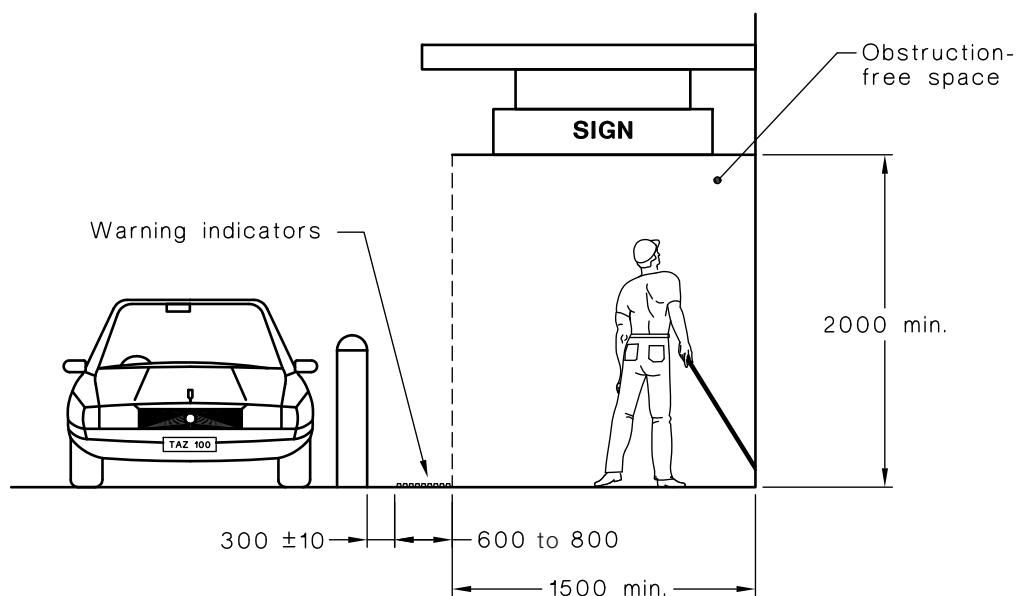
(b) Sectional elevation

DIMENSIONS IN MILLIMETRES

FIGURE 2.5(A) (in part) APPLICATION OF WARNING TGSIs TO DEFINE THE PEDESTRIAN WAY FROM A CARRIAGEWAY AT THE SAME GRADE



(a) Plan



(b) Elevation

DIMENSIONS IN MILLIMETRES

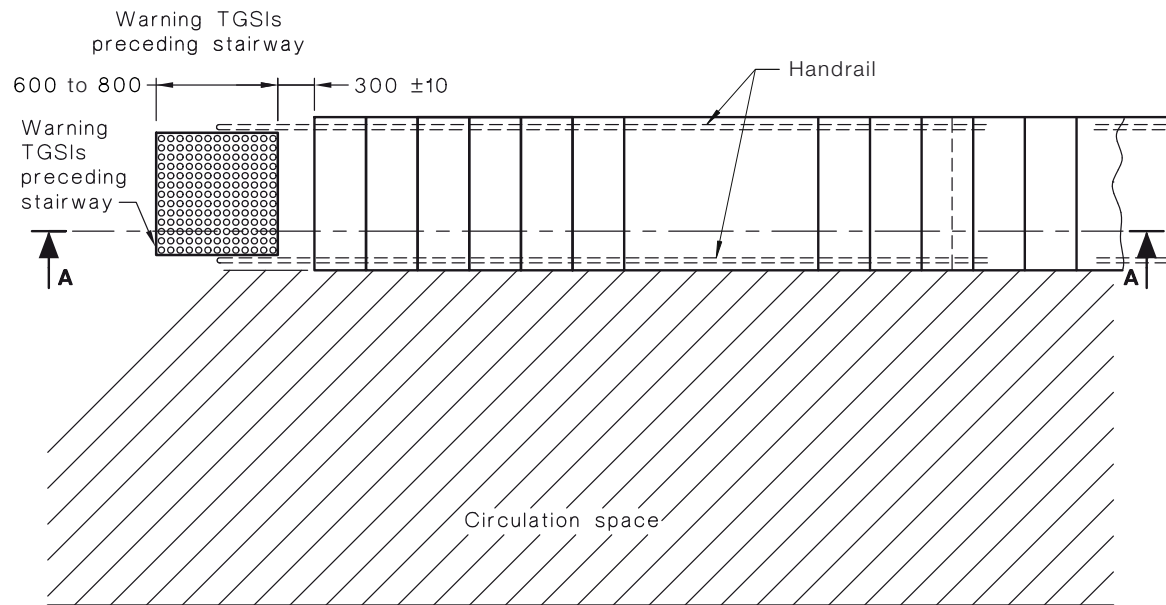
FIGURE 2.5 (B) APPLICATION OF WARNING TGSIs TO DEFINE THE PEDESTRIAN WAY FROM A CARRIAGEWAY IN ASSOCIATION WITH BOLLARDS

2.6 WARNING OF HAZARDS WITHIN THE CIRCULATION SPACE, OR ADJACENT TO A CONTINUOUS ACCESSIBLE PATH OF TRAVEL

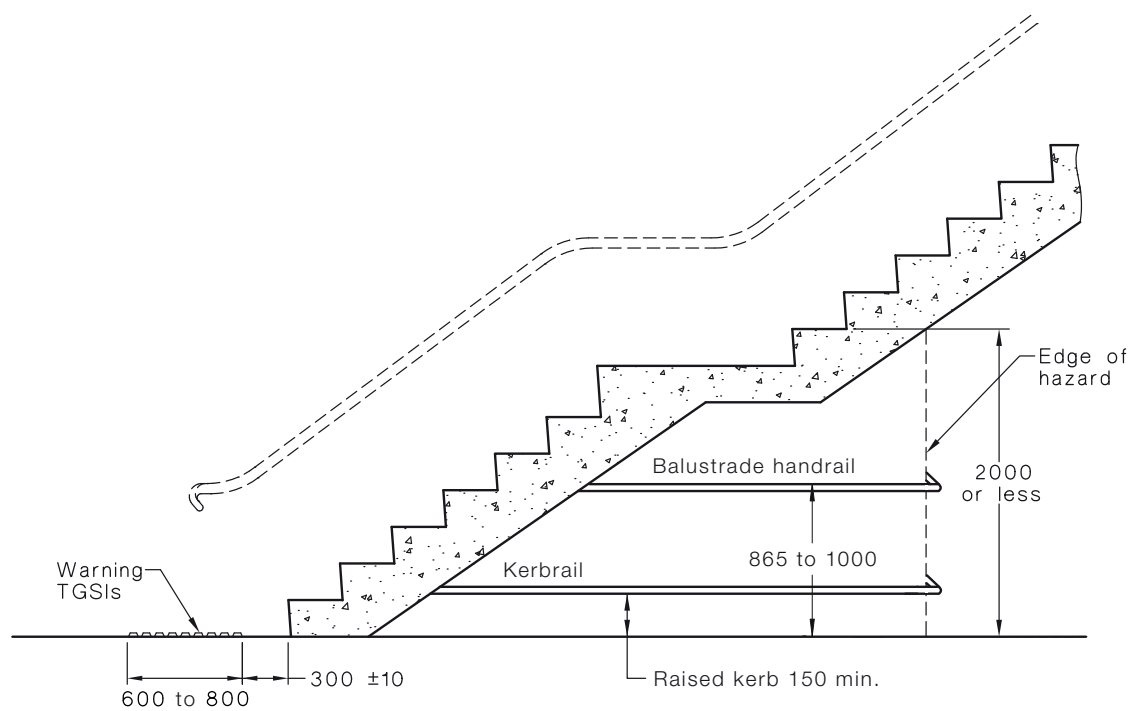
A1 | Where there are impediments or hazards with less than 2000 mm height clearance in an accessible open public space with no clearly defined continuous accessible path of travel (e.g., areas under a stairway, escalator or moving walkway), contact with overhead hazard shall be prevented by a suitable barrier such as—

- (a) enclosing the area; or
- (b) providing handrails with kerbs or kerb rails in accordance with AS 1428.1, [see Figures 2.6(A)].

In the absence of a suitable barrier, TGSIs shall be installed as shown in Figures 2.6(B).



(a) Plan



(b) Section A-A

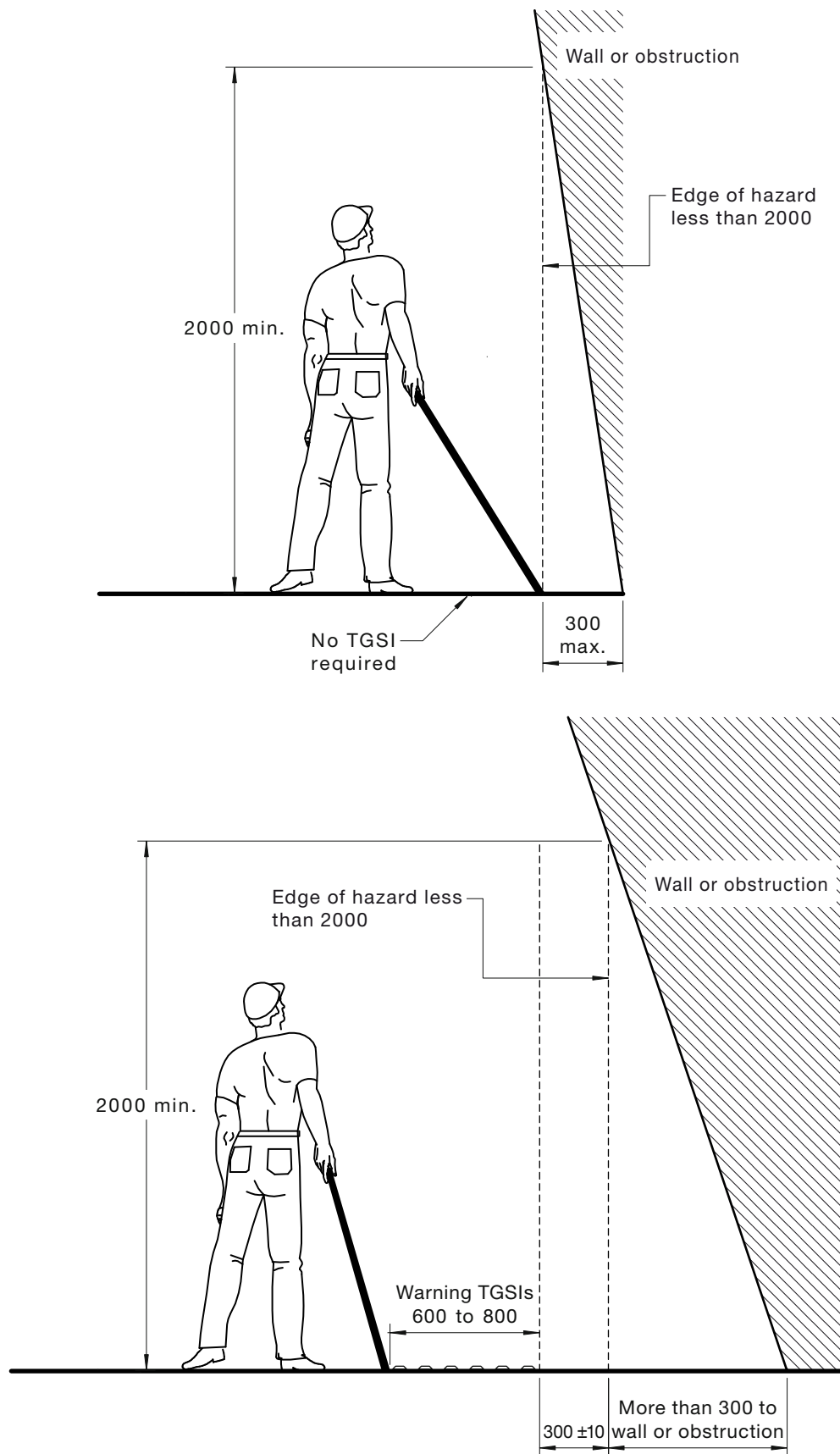
DIMENSIONS IN MILLIMETRES

FIGURE 2.6(A) SUITABLE BARRIERS TO UNDERSIDE OF STAIRCASE, ESCALATOR OR OTHER OVERHEAD HAZARD IN A CIRCULATION SPACE



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(c) Elevation

DIMENSIONS IN MILLIMETRES

FIGURE 2.6(B) (in part) TACTILE INDICATORS WARNING OF A HAZARD IN A CIRCULATION SPACE

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