

# TYPICAL SOUTH AFRICA ROADSIDE PEDESTRIAN INFRASTRUCTURE IN A GLOBAL CONTEXT: A COMPARATIVE ANALYSIS WITH AUSTRALIA STANDARDS

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## ABSTRACT

This paper presents a detailed comparative analysis of the roadside pedestrian design standards used in Australia and South Africa.

The study examines the variations and similarities between the design of pedestrian access paths along the roadside with a focus on geometric design of landings, ramps, walkways, kerb ramps as well as safety features such as handrails and tactile ground surface indicators. The design standards related to the elements of design include design criteria from Australian Standards AS 1428.1, Disability Standards for Accessible Public Transport and South African National Standards SANS 10400-S. Evaluating these standards can provide insight into areas where noticeable variations are present and reasoning behind these differences can be explored.

The findings of the comparison provide insights into the variations and similarities between Australia and South Africa design standards. Focussing on the variations could provide insight into areas where more investigations are required or where more studies and development of design standards are required.

**Keywords:** Disability, ramps, landings, walkways, handrails, access, pedestrians, tactile.

## 1. INTRODUCTION

Picture not being able to go anywhere you want, not because you don't have money or time but purely because the pedestrian path provided is inaccessible. For some people, this is an everyday reality, a reality that the world is trying to address and improve by implementing design standards. These standards have different names, classifications and descriptions all around the world. Australia has been making huge strides in improving their shared user paths and making sure it is accessible to all. Both the Australian standards and South African standards focus on facilities for persons with disabilities such as access to buildings and inside buildings. Neither South Africa nor Australia has standards specifically tailored to walkways and shared user paths in terms of roadside pedestrian infrastructure.

Designing roadside pedestrian infrastructure is based on applying the standards applicable to facilities for persons with disabilities. For Australia the AS 1428.1 standard is used and in South Africa SANS 10400-S is used but how do they compare with each other? Is the terminology used the same, do they specify the same grades and crossfall for ramps, landings, walkways, handrails and kerb ramps. This paper will investigate and compare

the available standards of South Africa and Australia for walkways with regards to the similarities as well as the differences.

Australian Standards were used due to the similarity between the South African and Australian climatic conditions as well as the authors' familiarity with the application of the Australian Standards.

## **2. WALKWAY AND SHARED USER PATH ATTRIBUTES**

In Australia distinction is made between paths/footpaths and shared user paths. Paths/footpaths do not necessarily have to adhere to the AS 1428.1 (Design for access and mobility – General requirements for access – New Building Work) however a shared user path has to adhere to the AS 1428.1 standards. Most of the walkways in Australia has to adhere to the standards and therefore most paths in Australia are referred to as shared user paths. The shared user paths are then broken up into various components such as walkways, ramps and landings, all of them having different specifications and implementations along the shared user path.

In South Africa most paths are referred to as walkways or sidewalks.

Tactile ground surface indicators (TGSIs) are used to assist blind or vision impaired persons with guidance and orientation on walkways, kerb ramps and access to buildings.

Throughout this paper reference will be made to two types of tactiles:

- Directional tactile.
- Warning tactiles.

Warning tactiles are used to warn people of an approaching hazard such as a change in grade, intersection or kerb ramp. The warning tactiles do not specify the type of hazard that is being approached. Directional tactiles are used to guide and direct people on a safer route, avoiding the approaching hazard. Using directional tactiles in conjunction with warning tactiles, a message can be conveyed to the vision impaired persons that a hazard is being approached, and direction should be changed to avoid the hazard.

The following standards will be used to compare the difference in standards for walkways, ramps and landings:

- South Africa
  - Department of Public Works – Standard electrical, mechanical and architectural guideline for the design of Accessible buildings (Facilities for Disable Persons).
  - SANS 10400:S – The application of the National Building Regulations – Part S: Facilities for persons with disabilities.
- Australia
  - AS 1428.1 - Design for access and mobility – General requirements for access – New Building Work.
  - AS 1428.4.1 - Design for access and mobility – Means to assist the orientation of people with vision impairment – Tactile ground surface indicators.
- The Universal Standards Guide for person with disabilities.

## 2.1 Walkways

### 2.1.1 Definition

Walkways are paths dedicated to the safe travel of pedestrians. These paths should provide access to amenities and be accessible to all pedestrians regardless of their age or disability. For a walkway/path to be accessible by all, certain standards should be adhered to. The most important criteria to be met for a path to be a walkway, is to have grades that do not require the elderly or people with disabilities having to stop and rest and needing the assistance of a handrail.

### 2.1.2 Grade

The longitudinal incline of the walkway is referred to as the grade. The grades related to walkways in the various standards are listed below:

**Table 1: Walkway grades comparison**

Country	Grade	Source
South Africa	Not specified	SANS 10400:S
	Walkway and ramps have the same grade. Refer to Table 3	Department of Public Works
Universal Standards	Not specified 6% for walkway cutaways 5% not requiring landings	Universal Standards Guide for persons with disabilities
Australia	Not more than 1:20 (5%)	AS 1428.1

### 2.1.3 Crossfall

The slope of the surface perpendicular to the direction of travel is referred to as crossfall. The crossfall related to walkways in the various standards are listed below.

**Table 2: Walkway crossfall comparison**

Country	Crossfall	Source
South Africa	1:50 1:40	SANS 10400:S Department of Public Works
Universal Standards	1:50	Universal Standards Guide for persons with disabilities
Australia	1:30 for bitumen surfaces, 1:40 for all others	AS 1428.1

### 2.1.4 Safety Measures

#### 2.1.4.1 Handrails

None of the standards (SANS 10400:S, Department of Public Works, Universal Standards Guide for persons with disabilities or AS 1428.1) specify the requirement of handrails on walkways. It should be noted that elevated walkways or walkways with a vertical drop will require pedestrian fencing (not handrails) for protection of the pedestrians due to the fall hazard.

#### 2.1.4.2 Tactiles

Warning tactile indicators shall be installed perpendicular to the direction of travel when approaching hazards. These shall be set back 300mm from the edge of the hazard (AS 1428.4.1)

The recommended surface between a pavement and roadway is a ramp fitted with tactile guidance surface indicators. (SANS 10400:S).

Directional tactiles should eliminate the uncertainty of the path or direction of a path for people with visual disabilities when there are gaps such as at an intersection. (Universal Standards Guide for persons with disabilities).

Warning tactiles should be parallel to main pedestrian movement or flow, should be 0.6 m in width and should be far away from manholes or drainage canals to prevent danger or confusion for sight disabled individuals. A tactile surface of 60 cm should be added from outer edge around all tree surrounds and other design elements like planters and street furniture to act as a warning against walking into or tripping over these larger objects. (Universal Standards Guide for persons with disabilities).

## 2.2 Ramps

### *2.2.1 Definition*

Once it becomes necessary for a pedestrian (especially elderly or disabled users) to rest or take breaks along their walk due to the steep incline of a path, the walkway is termed a ramp. SANS10400:S identifies a ramp as a walkway with an incline between 1:20 and 1:12. AS 1428.1:2021 specifies a ramp as a walkway with an incline between 1:20 to 1:14 and the Universal Standards Guide for persons with disabilities refer to ramps as a component incorporated into walkways to ensure easier travel for pedestrians.

### *2.2.2 Grade*

The longitudinal incline of the ramp is referred to as the grade. The grades related to ramps in the various standards are listed below:

**Table 3: Ramp grades comparison**

<b>Country</b>	<b>Grade</b>	<b>Maximum Length</b>	<b>Maximum Height</b>	<b>Source</b>
South Africa	1:12	6m	500mm	SANS 10400:S
	1:15	10m	665mm	SANS 10400:S
	1:20	15m	750mm	SANS 10400:S
	1:10	Not specified	<400mm	Department of Public Works
	1:12	Not specified	>400mm	Department of Public Works
Universal Standards	1:8	0.5m	60mm	Universal Standards Guide for person with disabilities
	1:10	1.2m	120mm	Universal Standards Guide for person with disabilities
	1:12	2m	150mm	Universal Standards Guide for person with disabilities
	1:14	5m	350mm	Universal Standards Guide for person with disabilities
	1:16	8m	500mm	Universal Standards Guide for person with disabilities
	1:20	-	-	Universal Standards Guide for person with disabilities
Australia	1:14	9m	Not specified	AS 1428.1
	1:14 to 1:20	Interpolate	Not specified	AS 1428.1
	1:20	15m	Not specified	AS 1428.1

### 2.2.3 Crossfall

The slope of the surface perpendicular to the direction of travel is referred to as crossfall. The crossfall related to ramps in the various standards are listed below.

**Table 4: Ramp crossfall comparison**

Country	Crossfall	Source
South Africa	1:50 1:40	SANS 10400:S Department of Public Works
Universal Standards	To match maximum walkway crossfall - 1:50	Universal Standards Guide for person with disabilities
Australia	To match walkway crossfall - 1:33 for bitumen surfaces, 1:40 for all others	AS 1428.1

#### 2.2.3.1 Handrails

Both the AS1428.1 and the Department of Public works specify the requirement of handrails on both sides of a ramp.

SANS 10400:S specifies the need for handrails on both sides of a ramp. It provides assistance to pedestrians in navigating the steeper grades on a ramp, offers a level of protection in the risk of falling as well as a balancing aid for persons with impaired balance.

The Universal Standards Guide for persons with disabilities has two sections. Part A discusses standards for accessible environments and Part B discusses the standards for accessible buildings. Throughout this paper the focus has been on Part A: Standards for accessible environments and in this section, reference is made to railings/borders/guard not handrails. The railings are used for safety reasons, protecting pedestrians on the unprotected side of the ramp. The railings are required to have vertical or horizontal slats which will prevent pedestrians/users from falling through when travelling along the ramp. The focus of the rails is on the safety of the pedestrians rather than in the assistance to pedestrians when walking up the steeper grades on the ramp.

Each of the standards provide guidelines and requirements for the installation of the handrails in terms of specific heights, cross section and extension. These requirements were not compared as part of this paper.

#### 2.2.3.2 Tactiles

Warning strips shall be provided at the top of the ramp. (AS 1428.2) Warning tactiles should be used at the top and bottom of ramps, but not at intermediate landings that have continuous handrails on both sides, unless the intermediate landing has an entrance from that level to the landing (AS 1428.4).

No explicit standards were provided regarding the use of tactiles on ramps in the Universal Standards or in SANS 10400:S.

## 2.3 Landings

### 2.3.1 Definition

Providing resting areas after a ramp is necessary to recover after the steep uphill on ramps. These resting/recover areas are referred to as either landings or platforms. AS1428.1, Department of Public Works, SANS 10400: S and the Universal Standards Guide for persons with disabilities all specify that landings should be provided at the top

and bottom of ramps as well as between consecutive ramps, exceeding the maximum length specified.

### 2.3.2 Grade

The longitudinal incline of the landing is referred to as the grade. The grades related to landings in the various standards are listed below:

**Table 5: Landing grades comparison**

Country	Grade	Rise	Length	Source
South Africa	Not specified	Not specified	≥ 1200mm	SANS 10400:S
	Not Specified	<1000mm	≥ 1200mm	Department of Public Works
Universal	0% (Level)	Not specified	2500mm	Universal Standards Guide for persons with disabilities
Australia	Not steeper than 1:40		≥ 1200mm – No change in direction ≥ 1500m Change of direction not exceeding 90 degrees	AS 1428.1

### 2.3.3 Crossfall

The slope of the surface perpendicular to the direction of travel is referred to as crossfall. The crossfall related to landings in the various standards are listed below.

**Table 6: Landing crossfall comparison**

Country	Crossfall	Source
South Africa	1:50 1:40 to match maximum ramp crossfall	SANS 10400:S Department of Public Works
Universal Standards	1:50 to match maximum walkway crossfall	Universal Standards Guide for person with disabilities
Australia	To match maximum walkway crossfall - 1:33 for bitumen surfaces, 1:40 for all others	AS 1428.1

### 2.3.4 Safety Measures

#### 2.3.4.1 Handrails

Landings as an individual component do not require handrails due to the flat grade of the landings. However, landings in this paper are looked at in terms of the requirement before and after a ramp with steep grades to provide a resting area for pedestrians. Differentiating between two scenarios in terms of the requirement of handrails is necessary.

- Landings at the top/bottom of a ramp:  
Handrails are not required to be installed for the full length of the landing. It is however a requirement in AS1428.1, Department of Public Works, and SANS 10400: S, that the handrail extend at least 300mm past the transition point both at the top and bottom of the ramp. The Universal Standards Guide for person with disabilities specifies that railings (as explained in 2.2.3.1) extend 450mm past the transition at the top and bottom of the ramp.

- Landings between ramps:  
Handrails should be continuous at landings between two ramps meaning, handrails should not be terminated before and after every landing if the landing is an intermediate landing. Handrails are required on both sides of the landings as per the ramp requirement. These requirements are the same in AS1428.1, Department of Public Works and SANS 10400: S. Continuous railings on intermediate landings are a requirement as per the Universal Standards Guide for person with disabilities.

#### 2.3.4.2 Tactiles

Warning tactiles should be used at the top and bottom of ramps, but not at intermediate landings that have continuous handrails on both sides, unless the intermediate landing has an entrance from that level to the landing (AS 1428.4).

No explicit standards were provided regarding the use of tactiles on landings in the Universal Standards or in SANS 10400:S.

## 2.4 Kerb Ramps

### 2.4.1 Definition

To provide easy access from the road onto the pedestrian walkway without being restricted by the kerb.

### 2.4.2 Grade

The longitudinal incline of the kerb ramp (in the direction of pedestrian travel i.e. approximately perpendicular to the kerb line) is referred to as the grade. The grades related to walkways in the various standards are listed below:

**Table 7: Kerb ramp grades comparison**

Country	Grade	Rise	Length	Source
South Africa	1:12	Not specified	Not specified	SANS 10400:S
	1:10 maximum unless the path width is less than 1.2m then maximum is 1:12	Not specified	Not Specified	Department of Public Works
Universal Standards	8%	Not specified	1.25m	Universal Standards Guide for persons with disabilities
Australia	1:8 maximum	190mm Maximum	≤ 1520mm	AS 1428.1

### 2.4.3 Crossfall

The slope of the surface perpendicular to the direction of travel is referred to as crossfall. The crossfall related to kerb ramps in the various standards are listed below.

**Table 8: Kerb ramp crossfall comparison**

Country	Crossfall	Source
South Africa	Not specified 1:20 based on adjoining gutter and road surface counter slope	SANS 10400:S Department of Public Works
Universal Standards	Not specified	Universal Standards Guide for persons with disabilities
Australia	Follows road alignment	AS 1428.1

## 2.4.4 Safety Measures

### 2.4.4.1 Handrails

Kerb ramps required at the crosswalks at intersections, the access from the street to the pedestrian path or any other need to cross a kerb is investigated in this paper. In the context at which this paper investigates the use of kerb ramps, the use of handrails at kerb ramps are not required in SANS 10400, Department of Public Works, Universal Standards Guide for persons with disabilities or AS 1428.1.

### 2.4.4.2 Tactiles

Visible and/or audible and/or tactile warnings shall be used in conjunction with kerb ramps where it enters the line of vehicular traffic or cycle ways (Public Works Guidelines).

Warning tactiles allow people with visual impairments to distinguish an abrupt change in grade such as the sharp transition between the grade of a footpath and a kerb ramp (AS 1428.4). Use of tactile ground surface indicators should be minimized on kerb ramps (AS 1428.4) - rather use at top landing. Warning tactiles should be used at a change in direction. Directional tactiles should be used at mid-block crossings, intersections that incorporate slip lane crossings, at intersections where the point of entry to the road is more than 3000mm from the property line, and across open spaces where there are no other tactile clues (AS 1428.4).

The Universal Standards Guide indicates through typical drawings that tactiles should be included on kerb ramps, however no explicit note is made of this in the text and no guidelines on how to design and install the tactiles on kerb ramps has been given.

## 3. DISCUSSION

While both South Africa and Australia share a commitment to accessibility and safety within pedestrian infrastructure, there are notable differences in the specificity and clarity of the regulations implemented when designing pedestrian infrastructures. Australia distinguishes between footpaths and shared user paths with each having specific standards, including building standards being applied to shared user paths. South Africa generally refers to walkways without similar classification systems, and building standards are not applied to walkways, even in the public domain. A notable difference in the standards is the lack of grade specification for walkways in South Africa – this can result in long stretches of steep grades on walkways which acts as a barrier for disabled users.

The Australian standards are more prescriptive about the use and placement of tactile ground surface indicators, providing explicit guidelines on the orientation and positioning of the indicators. South African standards require the use of tactile ground surface indicators, however the standards are less specific regarding their installation and integration within various infrastructure.

Both Australia and South Africa recognise the importance of accessibility and safety in pedestrian infrastructure, particularly for persons with disabilities. This is achieved by providing for landings, ramps, rest areas and handrails in both standards. The intent behind both sets of standards aligns closely, with common drivers which align with global best practices aimed at improving mobility and comfort for pedestrians.

Overall, both countries have similar standards and requirements, however the implementation and application of standards differs which results in differing levels of safety for the users. This is reflected in the requirement to consult building standards when

designing publicly accessible footpaths and shared user paths in Australia, which seems to be missing in South African design of walkways.

#### **4. CONCLUSION**

Due to the separation of road and building projects in South Africa, there is a tendency to not investigate building standards which may be applicable to road projects. Due to the inter-disciplinary nature of projects in Australia, the design of pedestrian networks is required to consider Australian building standards as well. These differences highlight potential areas for improvement in the South African standards and implementation thereof, including incorporating the insights from Australia's comprehensive approach. It is recommended that road designers in South Africa familiarise themselves with the SANS 10400:S standards in order to provide South African citizens with the highest level of safety possible on pedestrian networks.

It may be to the advantage of both South Africa and Australia to write a standard specific to roadside pedestrian infrastructure considering the specific challenges and situations related to roadside pedestrian infrastructure. This will ensure consistency and prevent design discriminating to vision and motion impaired persons. It will also prevent the subjective interpretation and forcing of the standards, AS 1428.1 and SANS 10400:S, specifically written with building access in mind, to the roadside pedestrian infrastructure.

Additionally, it is recommended that South Africa, at a national level, should be providing standard drawings regarding various pedestrian infrastructure to allow designers to more easily access the knowledge. Meaningful adaptations could enhance pedestrian safety and access, particularly for disabled users.

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