

# Pedestrian crossings: design guideline for TGSi application in South Africa



Frano Combrinck  
Technician  
GIBB Engineering & Science  
fcombrinck@gibb.co.za

## BACKGROUND

The correct implementation, application and construction of pedestrian ramps in South Africa have created much confusion and controversy over the past six to seven years; not to mention the correct inclusion of tactile ground surface indicators (TGSIs), or 'blister paving' as some call it.

When GIBB Engineering & Science examined the following local documents and/or sources, it was found that the guidelines/standards were inconsistent, outdated and contradicting; hence the

- 1 that exists among engineers,
- and architects about the correct
- plement tactile dropped kerbs:
- 1e Streetscape Design Manual
- 1e Standard

Construction Details

- Inspection of infrastructure currently implemented on the ground
- Johannesburg Roads Agency (Pty) Ltd: Standard Details for Roads and Storm Water, November 2004
- SANS 784:2008, Design for access and mobility – tactile indicators, recently adopted by South Africa
- Equality and Prevention of Unfair Discrimination Act of 2000
- SANS 10246:1993, Accessibility of Buildings to Disabled
- Various BRT Design Guidelines
- SANS 10400: 1990, The Application of National Building Regulations – Part S: Facilities for Persons with Disabilities, supersedes SANS 10246
- DoT Pedestrian and Bicycle Facility Guidelines: 2003, currently being used for the planning and design of the BRT systems being implemented in South Africa.

## APPROACH

GIBB's research into the design of pedestrian ramps, and the application

of TGSIs at intersections, resulted in the company developing a standard technical drawings book, titled *Tactile Ground Surface Indicators & Pedestrian Crossings*. This guideline, which is in line with international best practice and standards, includes construction details and design standards for sustainable pedestrian crossings at intersections in South Africa, and is therefore applicable to local conditions. The designs were completed in consultation with the Department of Transport (DoT), the South African Bureau of Standards (SABS), universal access consultants and some disability alliance groups.

During the investigating process it became obvious how outdated the current SANS 784:2008 (Design for access and mobility – tactile indicators) is regarding tactile indicators, pedestrian crossings and kerb ramps. This is cause for concern, as some municipalities have already started implementing the standard into their designs. SANS 784 is in fact an Australian and New Zealand standard

which was adopted by South Africa in 2008 (but which is actually a 2002 standard on disability discrimination).

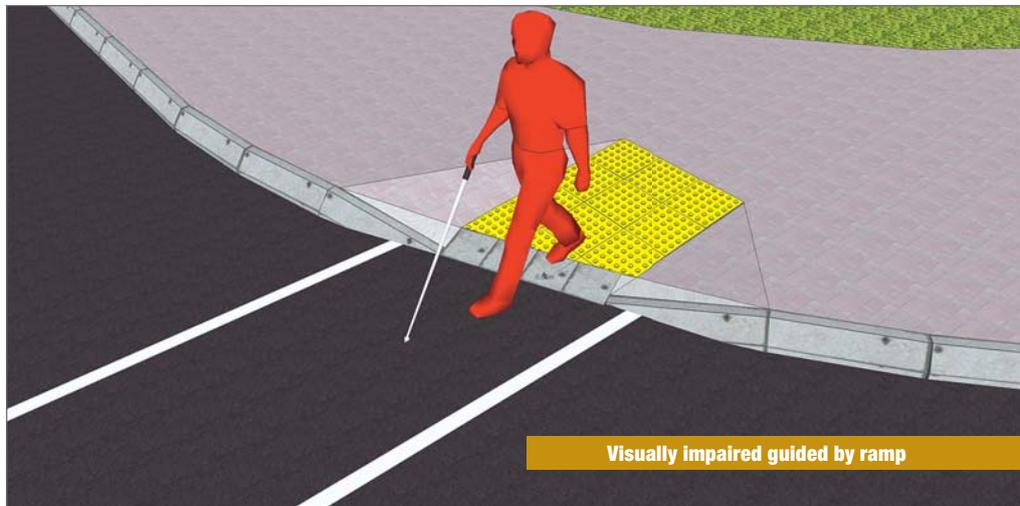
During its investigations the GIBB team used the local South African reports and guidelines previously mentioned to develop contemporary standards, together with the following international guidelines:

- UK Gov DETR Guidance on the use of Tactile Paving Surfaces, 1998
- UK Disability Discrimination, Act 1995, Inclusive Mobility Guidelines
- International Best Practice in Universal Design – a global review, March 2006 (Canada Human Rights Commission)
- Camden Streetscape Design Manual, March 2005
- Transport for London Streetscape Design Manual, 2009
- Enhanced Accessibility for People with Disabilities living in Urban Areas, Department for International Development (includes South African Federal Council on Disability Proposals)
- Equal Opportunities (Persons with Disabilities Act)
- A Europe Accessible for All – Report 2010 by EU Commission, Aug 2003
- Inclusive Design of Bus Rapid Transit (BRT) – Latin American Experience, Notes of World Bank, May 2005
- Mobility for All, Accessible Transportation around the World – a guide to making transportation accessible for persons with disabilities and elders in countries around the world
- Technical and operational challenges to inclusive Bus Rapid Transit: a guide for practitioners, World Bank, September 2010
- Department of Transport (DoT) Pedestrian and Bicycle Facility Guideline, August 2003
- Design Guideline to Improve Accessibility to Commuter Rail in South Africa, Draft 2008
- World Bank, Bus Rapid Transit Accessibility Guidelines, January 2007.

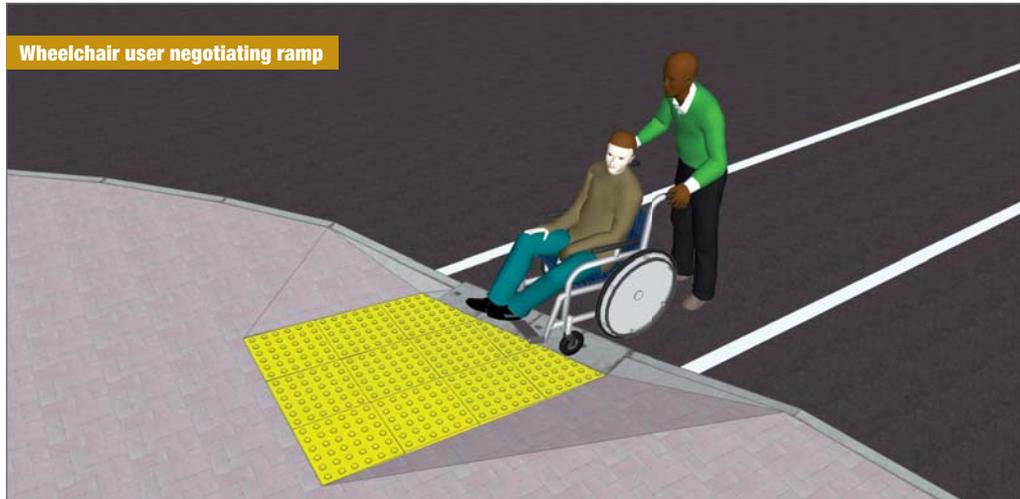
Most of the above documents also incorporate many other guidelines and standards, as well as consultations with institutions and work groups representing various disabilities. European guidelines and guidelines from Mozambique, Malawi, India, Asia, North and South America, China and Ecuador were all included in the guidelines investigated to date. None of these documents show



**BRT station with pedestrian crossings**



**Visually impaired guided by ramp**



**Wheelchair user negotiating ramp**

what is currently suggested as the design of tactile pedestrian crossings, as per the SANS 784.

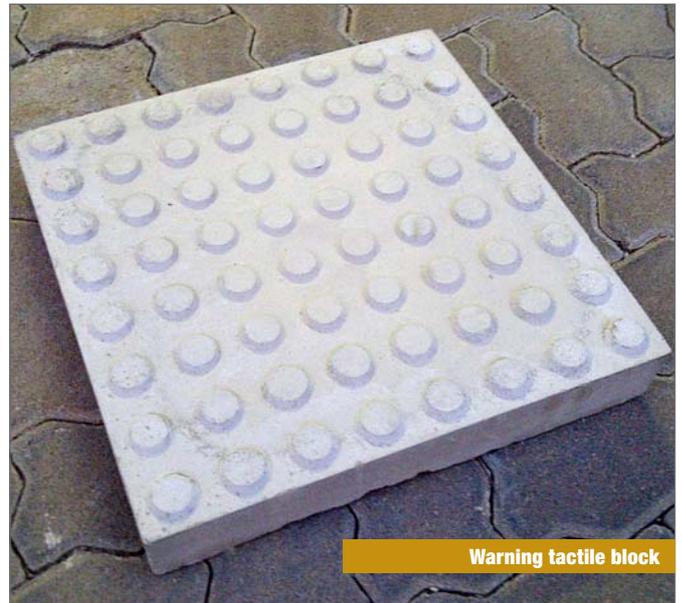
As a result of the GIBB team's motivation, SABS 784 is being reviewed again. The GIBB team was also invited to serve on the SABS subcommittee for updating SANS 10400-S (Facilities for Persons with Disabilities) which was approved and published in June 2011.

**TACTILE GROUND SURFACE INDICATORS (TGSIs)**

Tactiles are blocks with small extrusions or raised tactile nodules with an embossed profile that translates into information and guidance to the visually impaired, underfoot or by using a cane, when combined with other environmental information on the safe crossing of the road. In South Africa, TGSIs mainly serve



**Guiding tactile block**



**Warning tactile block**



**Narrow footway 1:12 gradient kerb ramp with tactiles**



**Cane user**



**Guide dog user**

the following two purposes and should therefore be consistently installed as per the guidelines:

- To direct people with a visual impairment (tactile or directional guidance)

- To warn people with a visual impairment of the presence of a potential hazard (warning tactiles). Warning tactiles placed on a ramp with a gradient of not more than 1:12 alert

the pedestrian to the presence of the crossing, and orientate the person in the correct direction for safe crossing of the road along the shortest path. Underfoot detection, as well as the surface contrast between the tactiles and the surrounding footway, is key.

The SANS 784 tactile nodule dimensions, shapes and sizes have been researched extensively and are accepted by people with other impairments, such as mobility impaired wheelchair users, or users of pushcarts or prams who also have to use the pedestrian ramps. Nodule sizes and shapes are optimised to provide the least amount of discomfort for the maximum amount of guidance efficiency. Discomfort is experienced with the current dome-shaped design used in South Africa, due to a jolt as the wheels of pushcarts or wheelchairs travel over the nodules. Also, for certain kinds of arthritic conditions, the underfoot discomfort is marked.

The degree of visual impairment may vary considerably from one person to the next, depending on the particular disability and/or eye condition. To design facilities that will provide a universal standard of access, it is crucial to understand how visually impaired people move around and the techniques they use. A visually impaired person can either move around with another person acting as a guide, or on his/her own while using some kind of mobility aide, usually a long cane or a guide dog.

A long cane is used to scan the ground in front of the person to locate potential obstructions and to determine distinct changes in level, such as a kerb

up-stand or a step. The location and possible identification of obstructing features allow the pedestrian to decide how to proceed.

A guide dog is trained to lead its owner around obstructions and to stop at distinct changes of level, for example a kerb up-stand, a flight of steps, or a hole in the ground. Guide dogs are generally unable to respond to changes in texture or colour underfoot. If a guide dog stops at a particular feature, for example a kerb edge, its owner has to decide how and when to proceed.

A visually impaired person walking independently without the benefit of a mobility aid, such as a long cane or a guide dog, may only recognise the edge of the footway by stepping off a conventional kerb. Important information about the environment should therefore be conveyed by the use of non-visual features, such as audible and tactile features. Visually impaired people are heavily dependent on information received via their other senses, particularly the sense of touch.

Whatever mobility aid is being used, a kerb up-stand is an essential indicator of the edge of the footway. However, in recognition of the needs of other pedestrians, it is accepted that it is necessary to have level or ramped crossing points. In such locations, tactile paving compensates for the absence of a kerb.

### **CONTROLLED AND UNCONTROLLED CROSSINGS**

The GIBB book of drawings mentioned above provides detailed information on a range of layouts and scenarios that could be encountered in the field. In the application of tactile layout design philosophies, the document distinguishes between controlled and uncontrolled pedestrian crossings in urban and residential settings, and can therefore be used as a guideline document by designers.

The main difference between the tactile layout of controlled and uncontrolled crossings is that the controlled crossing has a guidance section of tactiles at the back that will guide a visually impaired

person to the crossing, and the side approach of the guidance tail to the warning tactile also tells the visually impaired person from which side the oncoming traffic can be expected when entering the road. Uncontrolled crossings do not have a guidance tail and are placed in such a position that they will fall within the path of a pedestrian walking along the sidewalk.

### **FURTHER DEVELOPMENT REQUIRED**

As mentioned above, the DoT is also in the process of updating their Guidelines on Pedestrian and Cycle Facilities, and would like to include the detailed work on pedestrian crossings developed by GIBB in the National Standards and Guidelines. The DoT is interested in rolling out the GIBB book of drawings throughout South Africa as the standard to follow.

Further research and development on TGSIs is, however, required in terms of the following:

- Finalisation of the detail drawings
- Simplification of some complex terms used in the drawing notes

- Further discussions and workshops with relevant stakeholders and interested and affected parties, government departments and disability alliances and committees
  - Further development of the layout of the document and scenarios of crossings
  - Further research and inclusion of details regarding colour and luminance contrast between the TGSIs and the surrounding footway surface
  - Skid resistance of TGSIs and the impact of wet and dry weather conditions on luminance and slip resistance
  - Sight distances and the location of vehicle stop lines on intersections
  - Geometric design of the intersection and stormwater drainage
  - Reduction of ponding on pedestrian crossings
  - Investigating the use of Intelligent Transport Systems (ITS) for signalling, push-buttons, audible signalling, location of signals and buttons around an intersection and at midblock crossings, etc
  - The application of a white thermoplastic strip on the 300 mm buffer
  - Development of a guidance document for standard drawings
  - Inclusion of terminology and definitions
  - Further clarification of controlled, uncontrolled and rural intersection treatment
  - More clarity on the extent of guiding tactiles approaching intersections and crossing points
  - Illumination of pedestrian crossings
  - More clarity on dealing with shared pedestrian and cycle crossings.
- The effective and successful use of a tactile paving surface depends on visually

impaired pedestrians understanding the different meanings assigned to the different tactiles and layouts. It is important that visually impaired people be made aware of the presence or the facilities in their area.

It must also be borne in mind that, despite striving for universal standards and guidelines, every scenario, intersection and pedestrian crossing is different. Sound engineering judgement and understanding of the concepts and principles involved are therefore required to achieve the best and safest layout possible in any particular location. Also, without good workmanship by the construction team, the best layout and design can be ruined.

### CONCLUSION

Although non-motorised transport (NMT) is recognised as a valuable component of transportation systems, it has historically not been included in traditional transport planning, with walkways and cycle paths generally implemented as an afterthought, and sometimes not at all. There is often also little infrastructure to accommodate the needs of the physically challenged (the elderly, people in wheelchairs, the blind, the deaf and young children) and this is being addressed by applying the principles of universal access.

It is crucial that detailed NMT planning and design should be incorporated in the BRT and other public transportation projects going forward, to improve passenger accessibility and project sustainability.

The current design process and the resulting constructed pedestrian crossings (and those under construction) in

BRT and NMT projects in South Africa show that designers are not interpreting guidelines in a uniform manner, hence the confusion regarding the correct way of designing and implementing tactile drop kerbs and ramps.

It is clear that engineers, designers and architects often interpret guidelines and standards differently, and in terms of the older SABS guidelines which are not consistent with what is now being said in the SANS 784, the DoT's documentation on pedestrian and cycle facilities, and international guidelines on universal access.

There is an urgent need to finalise the set of standard drawings and the accompanying guidelines, in order to standardise the application of TGSIs in South Africa, particularly as many intersections and pedestrian crossovers are currently being designed and built according to different interpretations of the guidelines and standards. It is crucial to have one document that is easy to use and that is not prone to wrong interpretation. The GIBB standard drawings and guideline document acknowledges the SANS 784 and SANS 10400, and other related and updated documentation and standards, as well as current international standards and best practice.

During the development of these standards, GIBB consulted with the DoT, thereby also alerting them to the latest universal design standards. The DoT is consequently in the process of updating their guidelines on pedestrian and cycle facilities, and would like to include GIBB's detailed work on pedestrian crossings in the national standards and guidelines.

The proposed guideline has not been officially adopted by any authority in South Africa yet, but is being considered by the DoT, the City of Tshwane, and SABS. As the application of global best practice is captured in the guideline document, adoption thereof by the DoT, the provinces and the municipalities is recommended to ensure consistent application of TGSIs.

### ACKNOWLEDGEMENT

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Thinus Venter	GIBB CAD Technician
Natasha Welken	GIBB CAD Technician

### NOTE

The list of references is available from the editor. □



Source:

[http://www.saice.org.za/downloads/monthly\\_publications/2012/2012-Civil-Engineering-November/#/0](http://www.saice.org.za/downloads/monthly_publications/2012/2012-Civil-Engineering-November/#/0)