PEDESTRIAN INFORMATION SIGNS: A CASE STUDY IN ACCESSIBLE INFORMATION FOR SIGNALISED CROSSINGS IN CAPE TOWN, SOUTH AFRICA

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ABSTRACT

The primary focus of information design products is the communication of a specific message to the end user in a way that is clear, accessible and easy to understand. Appropriate design has the advantage of preventing poor user experiences and lost opportunities. A well designed information sign will also meet the needs of the general environment or population, rather than just the needs of a special-interest group. The true spirit of “universal design” is recognised when a good design transcends the needs of a specific group and instead becomes a design which meets the requirements of all user groups. World class information signs will therefore allow for the convenience and safety of all users.

Increased awareness of pedestrian and public transport user needs are translated into the implementation of advanced technological designs, instruments and facilities in urban environments. Audible, tactile pedestrian push button instruments are an example of this type of technological advances found at signalised intersections in recent years. With the implementation of such new or different technology, additional user information may minimise the safety risk created when signalised pedestrian crossings are misinterpreted or used inappropriately by road users. International precedents in this field indicate the benefit of providing additional user information in the form of pedestrian safety signs to compliment new or updated pedestrian bush button instruments.

This papers describes a project commissioned by the City of Cape Town for the conceptualisation, design development and production of an accessible pedestrian information sign to be implemented at signalised pedestrian crossings in Cape Town. The objective of this project is to increase pedestrian and road user awareness and understanding of the way in which the pedestrian bush button instrument should be used.

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1. INTRODUCTION

Pedestrian signals, used to indicate the corresponding pedestrian movement at an intersection, are often misinterpreted. Although the general understanding of the opportunity or caution indicated by the pedestrian signal displaying a steady green (walking) man or a steady (standing) red man is usually correct, it is the common misinterpretation of the intent of the flashing signal showing a red man which causes unsafe pedestrian crossing situations. This misinterpretation occurs with all road users, including motorists, but the resulting conflicting movements are particularly unsafe for the often more vulnerable pedestrians.

It can be argued that the immediate availability of information on the intended use of the pedestrian signal instrument or the associated phasing could result in a more effective use of the available technology and more awareness of separate road user needs and pedestrian safety.

This paper intends to summarise and explain the design conceptualisation and development of accessible pedestrian safety information signs for the City of Cape Town. As with all initiatives and applications of an accessible nature, further roll-out to a wider area or user environment increases the benefits to end users. It is, therefore, the intention of the authors that similar initiatives elsewhere in South Africa should benefit from the design development experience and apply the same protocols when implementing pedestrian safety information at crossings where the same push button instruments have been installed.

2. BACKGROUND AND MOTIVATION

The CoCT addressed a problem statement which included complaints received by users and the observed pedestrian behaviour relative to the interpretation and understanding of pedestrian signals. Initially these complaints were directed at insufficient pedestrian green time. However, upon further investigation by the City of Cape Town it was concluded that there was a lack of understanding that the flashing red signal contributed to the overall crossing time allocation. The observed pedestrian behaviour supported this conclusion with pedestrians turning back upon commencement, or speeding up to complete the crossings. In addition, the pedestrian signal call button was not activated but instead pedestrians were observed waiting for the pedestrian signal to change to a green aspect.

The direct impact of this is an increased hazard to pedestrians using the intersections with pedestrian signals. A further degree of risk is experienced due to the median bus lane traffic introduced to a number of intersections with the advent of IRT, as well as a safety concern for tourists that use a pedestrian signal system which differs from that of Cape Town. The City of Cape Town developed a brief to the consultants which originated in the demand for an educational or information tool which may mitigate the danger associated with the misinterpretation and incorrect use of pedestrian signals.

3. INTERNATIONAL EXAMPLES

A large variety of differently designed pedestrian push button assemblies have been installed in recent decades in most urban areas worldwide, and literature reviews provide numerous examples of corresponding pedestrian information panels. This project reviewed a number of these information panels, gaining an understanding of the similarities and differences associated with each, and also providing guidance on the unique requirements of the specific devices and technologies applicable to the push button device design implemented in Cape Town.

3.1. Australia

In the Australian context, Figures 3.1 & 3.2, show different ways in which the push button device can be positioned relative to the information sign and two methods in which the same pedestrian instructions can be conveyed through a change in sign design. With reference to chronological order, it is unclear which design was superseded.

Adhesive stickers showing a white background populated with red, green and black pictograms and text were used in both examples, but the information content and display can be considered very different between the two panels. The information sign in Figures 3.1 & 3.2 contain concise text in uppercase letters only paired with appropriately coloured pictograms in rectangular blocks. The display is relatively large and positioned well above the device on the signal pole.

Figure 3.1: Melbourne, Australia
(Australian Crosswalk Buttons)

Figure 3.2: Melbourne, Australia
(Pedestrian Crossing Lights)

Both examples make use of a mix of red, green and black text on a white background. Black and white text and background pairings offer greater visual contrast and legibility than red or green text on a white background. The information signs both show the same order of information, reflecting a specific order within the signal phasing sequence. The information panels or stickers also offer no design reference to the push button device and context is derived from its proximity only.

3.2. United States of America

The more monochromatic design of the American examples reflect the lack of green in the actual pedestrian signal device. It is clear from Figures 3.3 & 3.4 that the corresponding pedestrian signals display the same pictograms. Other design similarities are (I) the introduction of an instruction to activate the pedestrian signal by making use of the button on the device and (II) that the information signs are incorporated into the design of the push button device, thereby re-affirming the intent and context of the information sign.

Figure 3.3: America Type 1

Figure 3.4: America Type 2

(400px Pedestrian_Crossing (Tim) _Button)

Both examples reflect an inconsistent use of upper and lower case text, and the legibility of the signs are both further compromised by the size of the signs and the font used. This means that the information is only targeted to the pedestrians in the immediate proximity of the sign.

A further shared feature of both examples is that, in addition to the text message, each pictogram is paired with a further descriptor word such as “steady” or “flashing”. This also creates a further link between the sign and the function of the signal heads. It is noticeable that the legibility of the information sign is increased when the sign shows a colour contrast to the background colour of the unit on the signal pole.

It is noticeable that the information signs, and correspondingly the pedestrian signals, use pictograms of hands to indicate caution to the pedestrians, while the entire human or man is shown when crossing is permitted. This blending of pictogram content and scale could create confusion if the user is not familiar with this design protocol.

Staying in this context, the US Federal Highway Administration produced a catalogue of so-called “Educational Signs”. This catalogue has a large variety of pedestrian information signs to correspond with the specific details of the different crossing scenarios. Figure 3.5 illustrates the variety of pedestrian safety information signs available that can be used to meet specific crossing needs and ultimately clarify more complex crossings.

An example of the application of these “Educational Signs” would be that the text in the first stage of the signal phasing in Figure 3.5, “start crossing - watch for vehicles” could be substituted with “start crossing to median – watch for vehicles” to cater for the change in crossing condition, where pedestrians must pause on a median island rather than crossing full distance across a busy carriage way.

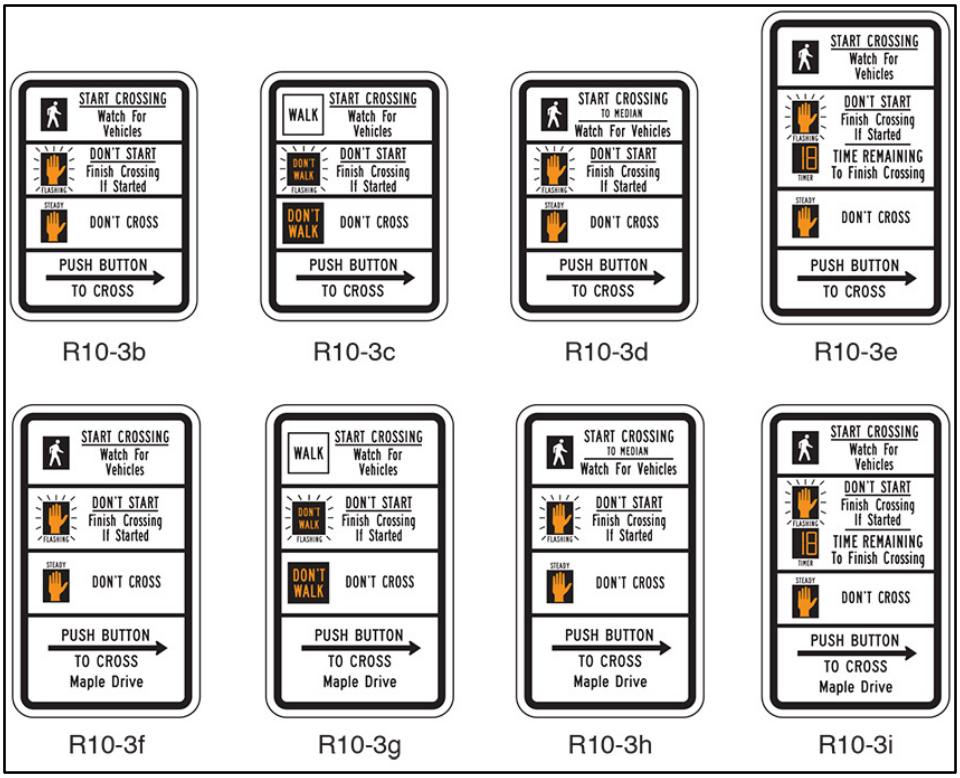

Figure 3.5: Federal Highway Catalogue (Figure 26)

3.3. Canada

Figure 3.6: Canada
(Buxo)

An example of the Canadian version of information panel design is shown in Figure 3.6. This information sign design incorporates a yellow background which matches the push button device housing of the device. The added colour contrast of the white and black text on the yellow background increases legibility.

Strong emphasis is placed on the direction of travel and key pedestrian instructions or indicators. The key instructions are further supported by smaller, less distinct descriptions in contrasting black on white lower case font. The use of both upper and lower case font creates a hierarchy of information, but also clutters the panel. Similar to the American examples, the size of the pictograms and the text font of this example limits the legibility at any distance further than that of a pedestrian in direct proximity of the signal pole.

Although not exhaustive, the international examples indicated in this section provided several design informants to the team working on the City of Cape Town pedestrian safety information sign project.

4. THE PEDESTRIAN PUSH BUTTON

It follows that the information content on the pedestrian safety information panels relates directly to the pedestrian signal content and the functionality of the device.

Figure 4.1: Cape Town Pedestrian Push Button Unit

Figure 4.1 shows the audible tactile pedestrian push button device which is currently implemented on yellow signal poles in Cape Town, South Africa. The basic elements of the device are a silver push button, a separate section displaying a silver tactile directional arrow with a dark blue background, and a black plastic housing or plastic case in an extended oval shape. The device is paired with an electronic control mechanism which activates an audible clicker when the signal phasing show a green pedestrian signal.

The device is installed at a general height of 800 –900mm from the finished ground surface at signalised intersections which accommodate pedestrian crossings throughout the City of Cape Town.

5. THE CAPE TOWN CASE STUDY

The conceptual design for the project for the City of Cape Town was based on the shape, size and content of the pedestrian push button unit to emphasise the direct relationship between the device and the information sign. The visual link between the push button device, the pedestrian signal head and the information sign was further emphasised in the use of rounded shapes for the frame and the contents of the information sign.

5.1. Sign Mounting on Traffic Signal Poles

A critical informant to the design of the information panel rested on the manner in which the panels would be fixed or mounted on the traffic signal poles. The information signs in the Cape Town context would be retrofitted to the signal poles where pedestrian signal devices have already been installed. This constraint meant the project team had the option of (I) adhesive panels applied directly to the poles, or (II) adhesive panels placed within moulded plastic housing units which would then be clamped to the poles. Table 5.1 summarises the pertinent informants in the decision-making process.

Table 5.1: Design informants on mounting the information signs to the signal poles.

(I) Adhesive Panel	(II) Framed Housing
Affordable to produce and easy to install.	Provides a formal and quality feel, potentially reducing vandalism through product appreciation.
Short lifetime & can be easily damaged during routine maintenance (i.e. sanding and repainting of signal poles).	Production costs and application costs will most likely be higher, but the product lifetime should increase.
	Consistency – the panel design mimics the shape and feel of the existing push button device.

Due to the large volume of information signs required for application at all signalised pedestrian crossings in Cape Town, the affordability and ease of installation of the adhesive panels governed the design and implementation of the signs.

5.2. Information panel size

The design philosophy was based on maximum legibility. A more prominent display of information could also be legible to other road users, in particular motorists. The panel design is intended to match the width of the push button unit and the size of the white display discs were maximised within this frame size. The amount and size of the content, included in the sign, stretched the length of the sign beyond that of the push button unit, without detracting from the similarity in the design shape of the two corresponding items to be placed on the signal poles.

5.3. Adding colour and text

Once the shape of the information panel was conceptualised, the team focused on the colour and style of the content. The strong visual link between the information panel and the push button device achieved with the shape of the design was further emphasised by matching the background colour of the information sign with the bold blue of the background behind the directional arrow on the push button device. The bold blue colour is considered sufficiently dark to form a legible and contrasting background to the white text.

As with the international precedents, the pictograms on the information sign referencing the pictograms on the pedestrian signal aspects are shown in the same, corresponding colours. Figure 6.1 displays a simplistic design of the pictograms replicating the shape and colour, thereby enhancing the relationship between the object of reference and the information sign.

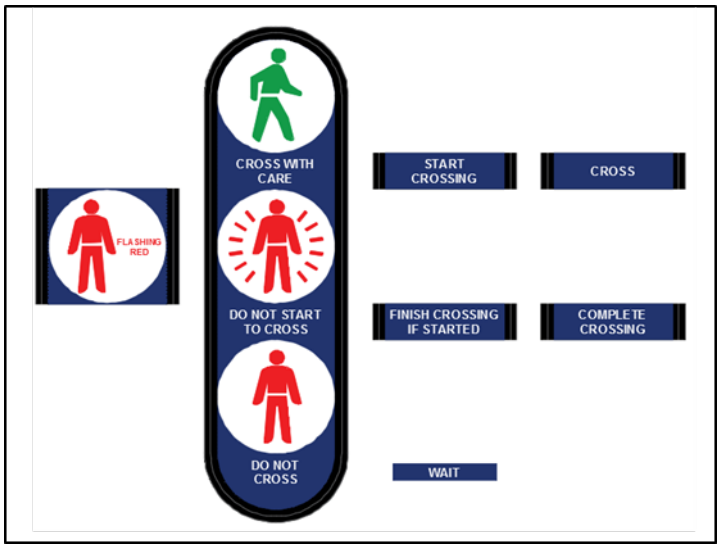

Figure 6.1: Initial design iterations on the agreed colour palette

Visual contrast was achieved by placing the red and green pictograms on a white background within the darker frame created by the bold blue and black background shape of the formation sign. The design team further maximised this visual contrast and legibility by inserting a fine black outline around each pictogram.

The traffic signal phasing employed by the City of Cape Town generally accommodates parallel rather than serial pedestrian crossing movements. The design team therefore motivated text cautioning pedestrians to “Cross with care” in addition to the steady green pictogram. This is intended to remind pedestrians to be vigilant of vehicles turning across the pedestrian lines, specifically when a steady green aspect is displayed.

The text “Do not start to cross” provides the most pertinent instruction to pedestrians when encountering a flashing red signal. Further reassurance is provided by adding the secondary message “but finish crossing if started”, thereby informing pedestrians that sufficient time is available to complete the crossing by maintaining a standard walking pace. This clarification dispels the confusion some pedestrians display when

faced with a flashing red pedestrian signal, and should prevent pedestrians from risking abrupt movements, which could be dangerous.

6. IMPROVING LEGIBILITY

Both text content and presentation were fundamental design considerations, and intrinsically linked to the accessibility of the information signs.

6.1. Text Case & Font Style

International best practice suggests that the use of sentence case, i.e. both upper and lower case text, maximises legibility for all users, including individuals with visual or cognitive impairments. Similarly, the use of a Sans Serif font is generally prescribed in the design of accessible signs due to the clear definition of each letter or symbol. The further progression from accessible signs to tactile wayfinding signs supports this standard, clearly defined letters offers improved tactile legibility. Furthermore, the use of a bold letter case is discouraged as this generally reduces the spacing between letters, hereby compromising tactile definition and legibility. Pedestrian and public transport tactile information signs designed for the MyCiTi system in Cape Town already employs Helvetica.
The design team retained this design protocol on the pedestrian information signs, as the consistent use of this particular Sans Serif font will further enhance the accessibility within the general public environment.

6.2. Tactile differentiation

Local circumstances must be considered when adapting international best practice for local implementation. Although Braille is widely used on accessible signage in developing countries, this is less appropriate in the South African context where the education in and use of Braille within visually impaired communities is far less, in comparative terms. In recent example of pedestrian and passenger wayfinding projects implemented in Cape Town, new printing technology was introduced to apply pictograms, text and contrasting colours in various levels of tactile differentiation. This technique increased the accessibility of the signs, as it offered end users with visual impairments the opportunity to gain information on the content of the signs through touch. This method of accessible communication gained particular momentum in Cape Town since the 2010 Soccer World Cup related projects, and was given credibility through specific engagement with end users by way of iterative testing and feedback sessions.

Tactile information signs are produced using an ultraviolet (UV) flatbed digital print process where silicon-based ink is repeatedly applied to create a product with tactile differentiation. This technology allows for greater flexibility in the design process as any variety of images or colours or tactile levels can be produced. This repetitive printing process delivers a nearly tamper-proof surface. The application on adhesive panels allows the product to be used on a wide variety of surfaces and the weather resistant properties of the silicon-based ink makes this product ideal for exterior use for a period of up to 7 years. The tactile pictograms and text used in the pedestrian information sign application are incorporated in the design in such a manner as to

raise the most pertinent pictograms and text from the background panel, thereby allowing maximum tactile interpretation for end users with visual impairments.

7. DESIGN VARIATIONS

The design variations offered by the type of printing process used in the manufacturing of the tactile adhesive panels afforded the team the opportunity to explore multiple sign face alternatives. Figures 7.1 and 7.2 show some of the design variations considered, including double pictograms where cycle facilitates are paired with pedestrian crossings, and a wide range of text options detailing the pictogram information.

Figure 7.3: Final Sign Design

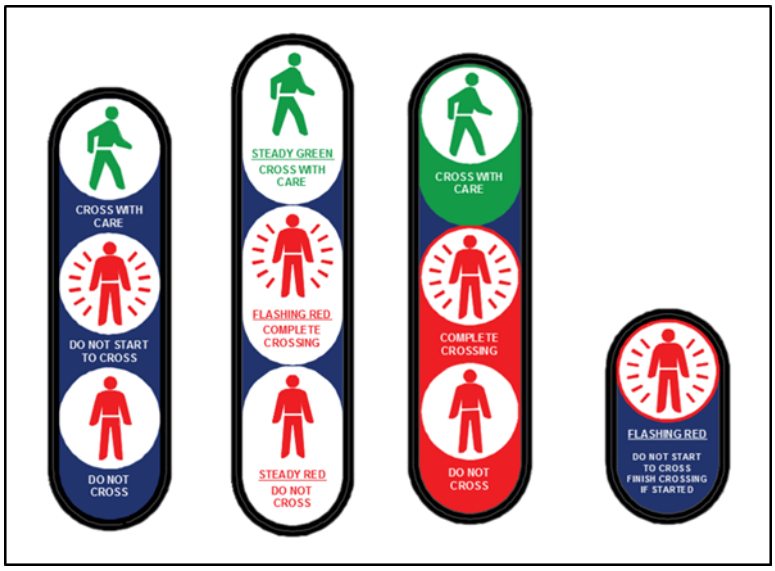

Figure 7.1 Design Variations

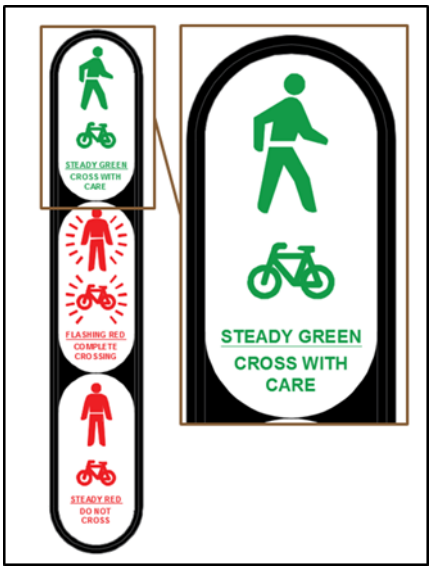

Figure 7.2 Double Pictogram

It became evident that the size of the information panels were directly proportional to the volume and level of information included. The goal of information design is to communicate the required basic message to the end user in a way that is clear, accessible and legible. This is particularly true in a pedestrian environment where rapid understanding of information is key to user safety. This design principle guided the team to selecting the most pertinent information only, thereby ensuring the accessibility of the information signs through maximum legibility and minimal visual and tactile clutter.

Figure 7.3 shows the end user and client approved pedestrian information sign. The design philosophy of minimal visual and tactile clutter, paired with maximum tactile differentiation complimented the utilitarian design of the push button device, without compromising the level of information required.

The text font is Helvetica and the final sign has dimensions of 104mm width and 305mm height, allowing for an average font size of 6mm. The white background disks are in keeping with the size of the directional arrow unit on the pedestrian push button device, thereby balancing the design of the tactile panel with that of the device. The colour palette incorporates pure white and black as contrasting colours to the standard red and green associated with traffic signal aspects in the South African context.

8. PRODUCT IMPLEMENTATION

The accessibility of the pedestrian information signs are achieved through the design and the appropriate and consistent application thereof in the urban environment.

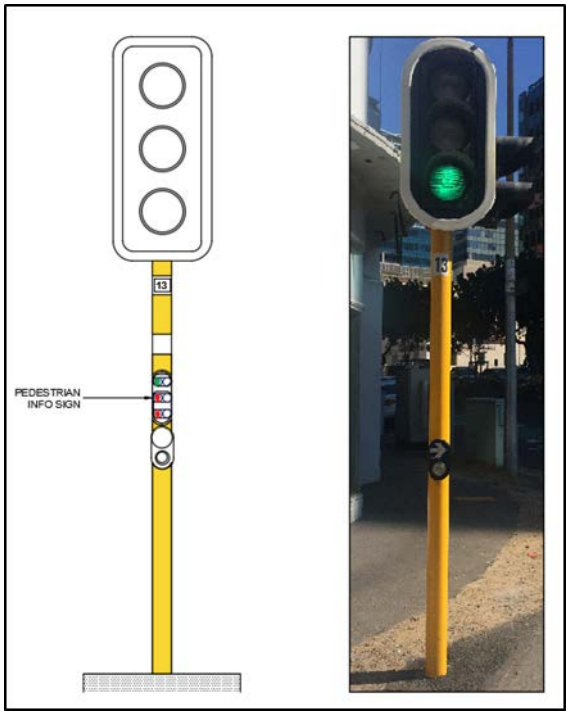

Figure 8.1 Sign Placement

Implementation protocols associated with other examples of accessible tactile signs dictate that information be displayed at a consistent height of 900mm above finished ground level, or as close as possible thereto. Referring to figure 8.1, the push button already occupies this position on the signal pole and it is therefore not possible to apply the pedestrian information signs in the regular position. Due to the detailed attention given to the design similarities between the push button device and the tactile information sign, and the position of the sign, it is sufficiently apparent that the two items are intended to be read together. It should be noted that the available space between the push button and first reflective strip is limited and thus requires careful consideration when the signs are applied to the signal pole.

The predictable placement of the pedestrian information only addresses the cognitive awareness of the specific pedestrian end user, and not the full complement of road users. In Cape Town, most signalised intersections allow for pedestrian crossing phases to occur simultaneously with parallel motor vehicle movements. This introduces a conflict between turning vehicles and crossing pedestrians. In these cases road users are often disrespectful of the right-of-way of pedestrians which reduces the safety of the crossing. To support the intention of creating a safer environment for pedestrians, the general public should be informed and made aware of the existence of the safety information sign and the application thereof at signalised intersections.

By sensitising road users, pedestrians and the wider public to the correct use of traffic signals, specifically in relation to the right-of-way of pedestrians, an improvement in the safety of pedestrian crossings can occur. The objective would be to provide clarity and avoid misinterpretation of signals by means of the information sign, and use a public liaison phase to educate and inform the general public of how this applies in the context of a signalised intersection. This could be achieved through a judicious public information campaign in the printed and popular media, as well as through information literature in civic buildings.

9. CONCLUSION

User safety is the highest priority in situations which involve the interaction between vehicles and pedestrians. The promotion of pedestrian awareness and the correct understanding of the operation of pedestrian signals is based on an international precedent, while being cognisant of local design protocols and the particular pedestrian signal devices implemented in Cape Town.

The tactile pedestrian information signs designed for the City of Cape Town consist of concise text, simple pictograms and prominent colours for easy interpretation. Extending the professional team brief beyond the standard practice for pedestrian information to develop a tactile, accessible information sign focused on legibility, underscores the client’s recognition of the needs of all end users.

Finally, the benefit of the pedestrian safety information signs are reliant on public awareness of the intent and implementation of the signs, as limited awareness could jeopardise the safety of pedestrians acting on the information in situations where motorists are still ignorant of the correct use of, in particular, the flashing red man. The implementation of any information signs in the public environment should be communicated as widely as possible to all potential users and affected parties.

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