

## **Inclusive post-disaster reconstruction: Building back safe and accessible for all**

**16** minimum requirements for building accessible shelters



**Cover photo: Accessible path connecting  
the shelter to the sanitary facilities.**

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# Introduction

Design for All is design for human diversity, social inclusion and equality.<sup>1</sup>

## Why is incorporation of universal design and accessibility principles into post disaster response so important?

An estimated one billion people (or about 15% of the world's population) are living with disability, 80% of these in lower income countries.<sup>2,3</sup>

In the event of a disaster they are among the most at-risk members of society. During disaster response, persons with a disabilities are often excluded from accessing emergency support and essential services such as food distribution, medical care, shelter and water, sanitation and hygiene (WASH) facilities.

The UN Convention on the Rights of Persons with Disabilities (CRPD) requires that disaster preparedness and response initiatives are inclusive of, and accessible to, persons with disabilities. The SPHERE guidelines make explicit reference to accessibility and to persons with disabilities as a vulnerable group. Key actions for disability inclusion are outlined in the SPHERE handbook.<sup>4</sup>

A barrier-free environment helps to ensure full and equal participation in society by all, regardless of age, gender or ability, with dignity and with as much independence as possible. Universally designed shelters benefit not only persons with disabilities but other people with reduced mobility, such as elderly people, pregnant women, young children or people who are temporarily impaired. Consequently, they benefit whole families and communities

The inclusion of universal design and accessibility principles into post disaster response work contributes towards a barrier free environment and an inclusive society: A society accessible for persons with disabilities is one accessible to all.

## The purpose of the 16 minimum requirements

Disasters provide an opportunity to build back better, safer and more accessible for all. They also offer the possibility to incorporate universal design principles into new construction, which is the most cost-effective way to improve the accessibility of built environments.<sup>5</sup>

With this publication, CBM aims to provide guidance for the design and the building of accessible individual housing and shelters in a post-disaster context. The publication includes 16 minimum requirements with information on ways of implementing accessibility and **Design for All**, as well as technical recommendations and practical solutions.

It targets construction professionals, occupational therapists, users, decision



makers and other relevant actors involved in post disaster reconstruction activities. This publication offers a quick checklist to easily embed universal design and accessibility principles into the design of homes in a post disaster situation.

## **How to use these guidelines?**

This publication is divided into 16 minimum requirements. For each minimum requirement, technical recommendations as well as practical solutions are provided.

These 16 minimum requirements address the four components of the chain of movement from a user perspective:

- How to reach an area, site or structure
- How to enter the structure and its parts
- How to circulate inside the structure
- How to use the structure and its facilities

These 16 minimum requirements should not be seen as a constraint but as an opportunity to develop local innovative solutions and build sustainable universal design practices.

Like all technical guidance, these guidelines will need to be adapted to the specific situation by taking into account local and cultural nuances, as well as avoiding excessive financial costs. Their implementation will require investment and participation from all users, including persons with disabilities.

## **Feedback**

Promoting and implementing universal design is an ongoing process. This publication will also be updated with good practices and local innovative solutions from time to time. CBM would like to encourage feedback and input of users and implementing persons in regard to good practices and lessons learned, to ensure the continuous improvement and adaptation of these guidelines.

To share comments, feedback and best practices, see contact info at end of document.

<sup>1</sup> European Institute for Design and Disability Stockholm declaration, 2004.

<sup>2</sup> World Health Organization (2011) - World Report on Disability 2011 (p.27). WHO.

<sup>3</sup> World Health Organization (2005) "Disability, including prevention, management and rehabilitation". Report by the Secretariat. April 14 2005.

<sup>4</sup> The Sphere Project, Humanitarian Charter and Minimum Standards in humanitarian Response, 2011, available at: <http://www.sphereproject.org>.

<sup>5</sup> Robert Metts, Disability and development background paper prepared for the disability and development research agenda meeting, November 16, 2004, World Bank Headquarters, Washington D.C.

# 16 minimum requirements

## Site selection and site planning:

- 1** The site of the shelter is flat, accessible, and cleared from rubble and debris.

## Outdoor circulation:

- 2** Pathways leading to the main entrance of the shelter and/or latrines are accessible and cleared from obstacles.

## The main entrance:

- 3** The entrance is possible to reach for persons with different types of disability, with possibility to install a ramp.
- 4** Handrails are installed to provide support and security.

## Indoor circulation:

- 5** Openings are at least 90 cm wide, in order for a wheelchair to pass through.
- 6** Entrances have contrasting colour to make it easier for persons with visual impairment to identify them.
- 7** Doors and windows are accessible and easy to open and close for persons with disabilities.
- 8** Space inside the shelter is wide enough to allow a wheelchair user to circulate and complete a full turn.

## Facilities:

- 9** Electrical lighting has been provided to increase accessibility and safety.
- 10** Other measures to increase the safety of the shelter have been considered, such as fastening furniture, or avoiding sharp edges in hygiene areas.

## Furniture:

- 11** Work surfaces are accessible, with seats or possibility to rest nearby.

## Washrooms:

- 12** Persons with disabilities have access to sanitary facilities in proximity to their shelter.
- 13** The space outside or inside the toilet is wide enough to allow a person in a wheelchair to complete a full turn.
- 14** Toilets are equipped with a seat at a height of 45-50cm and a grab bar to facilitate the transfer.
- 15** Door is easy to open and close for persons with disabilities.

## General comfort:

- 16** The shelter provides thermal comfort (not too hot in hot climates and not too cold in cool climates), considering that persons with disabilities often spend more time indoors.

# Technical guidelines and solutions

## 1 The site of the shelter is flat, accessible, and cleared from rubble and debris

- Use flat sites with minimal level changes for better mobility
- Clear the site and the access to the site from rubble and debris
- Ensure flat and uniform surfaces with surface water drainage in place

### KEY POINT TO CONSIDER:

>> If entrances are placed at locations where the floor level is close to the ground, accessibility would be easier and less expensive to achieve. Sometimes, plans could just be rotated or flipped to bring entrances closer to grade, avoiding the need to provide stairs or ramps.



Figure 1: Accessibility site plan design

## 2 Pathways leading to main entrance of the shelter and/or latrines are accessible and cleared from obstacles

- Pathway is connected to the shelter. It is the most habitual, direct and the shortest access route.
- The ground is firm (compacted material, concrete), non-slippery, without obstacle for the wheel, the foot or the cane.
- The pathway should be 120cm wide in order for a wheelchair to circulate. If an obstacle cannot be avoided, pathway width can be reduced to a minimum of 90cm on a short distance.
- Protrusion hazards (overhead hazards) above the path are located at a height of at least 220cm above the ground

**KEY POINT TO CONSIDER:**

>> Small steps or ground level changes must be avoided. If not, rounded edges and chamfer are applied.

>> Wheel guard prevents the wheelchair from leaving the path and serves as a guide for blind users.

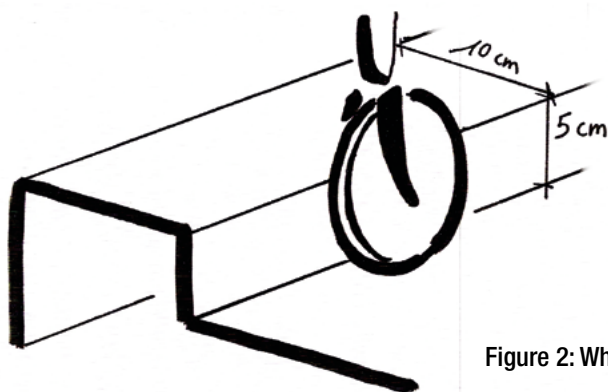


Figure 2: Wheel guard preventing wheelchair from leaving the path

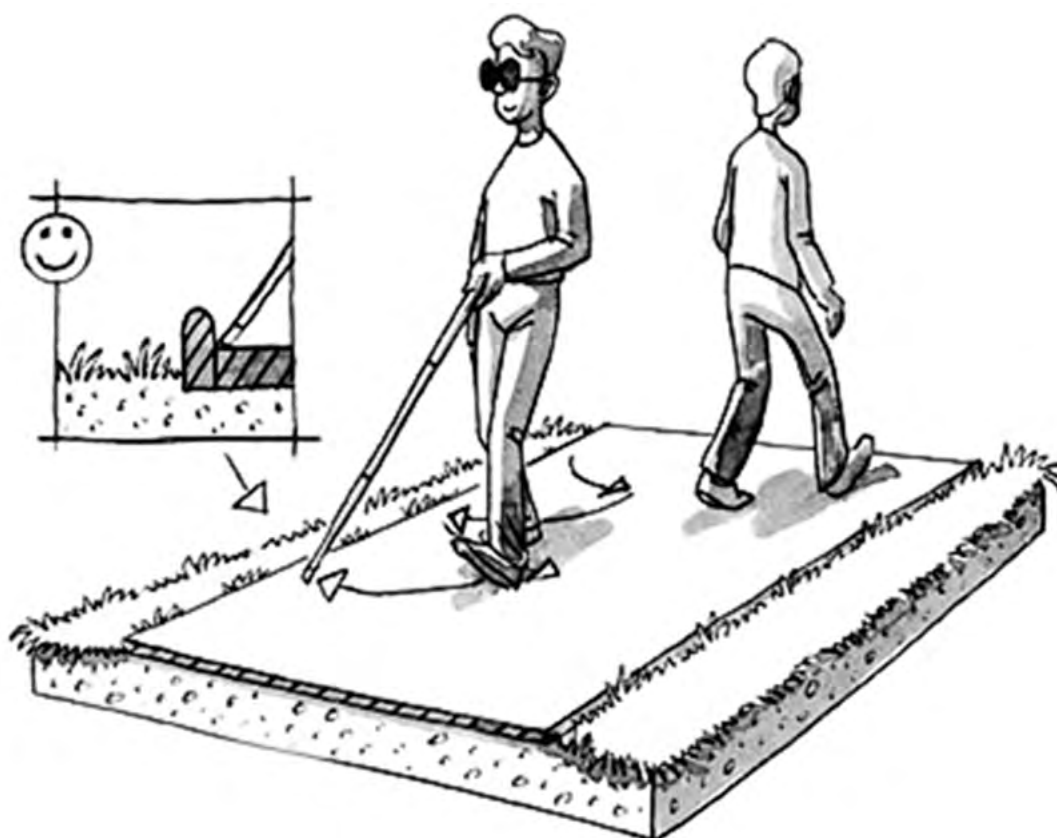


Figure 3: Wheel guard serving as a guide for blind users



### 3 The entrance is possible to reach for persons with different types of disability, with possibility to install a ramp

If there is a difference between ground level inside and outside the shelter, provide a ramp (wood or cement) to make the door entrance accessible:

- The recommended gradient is 1:20 (5%). The run (length) should not exceed 10.00m if the gradient is 1:20.
- If technically unavoidable, the gradient may be increased to a maximum of 8% (1:12). The run should not exceed 6.00m if the gradient is 1:12.
- Landing areas are provided at the top and the bottom of the ramp with a minimum floor space of 140cm x 140cm.
- Handrails will be provided on both sides of the ramp at 70cm and 90cm from the ramp level.



Photo 1: Accessible shelter with access ramp (gradient 1:20)

#### Different types of access ramps:

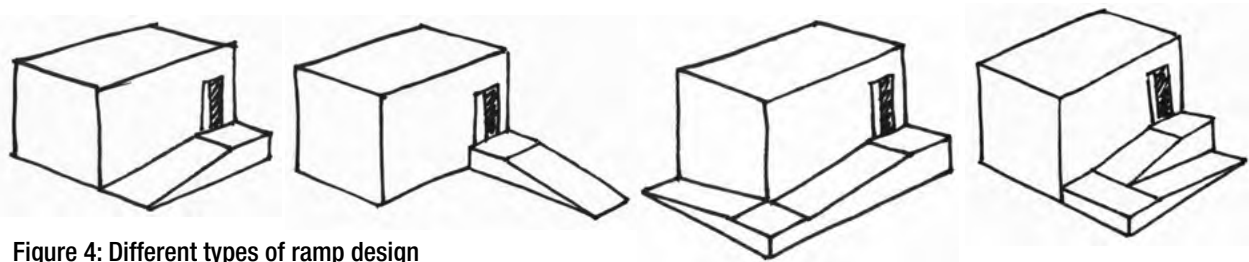


Figure 4: Different types of ramp design

### KEY POINT TO CONSIDER:

Providing both stairs and a ramp at changes in level will allow people to choose the option that best suits their needs, resulting in a flexible and more universally accessible design.

When provided, stairs must follow the following requirements:

- >> Handrails will be provided on both sides of the ramp at 70cm and 90cm from the step level.
- >> The edges of steps and stairs shall be marked in a contrasting colour texture to make them easily visible.
- >> Steps shall have a height of 15cm and a depth 30cm.

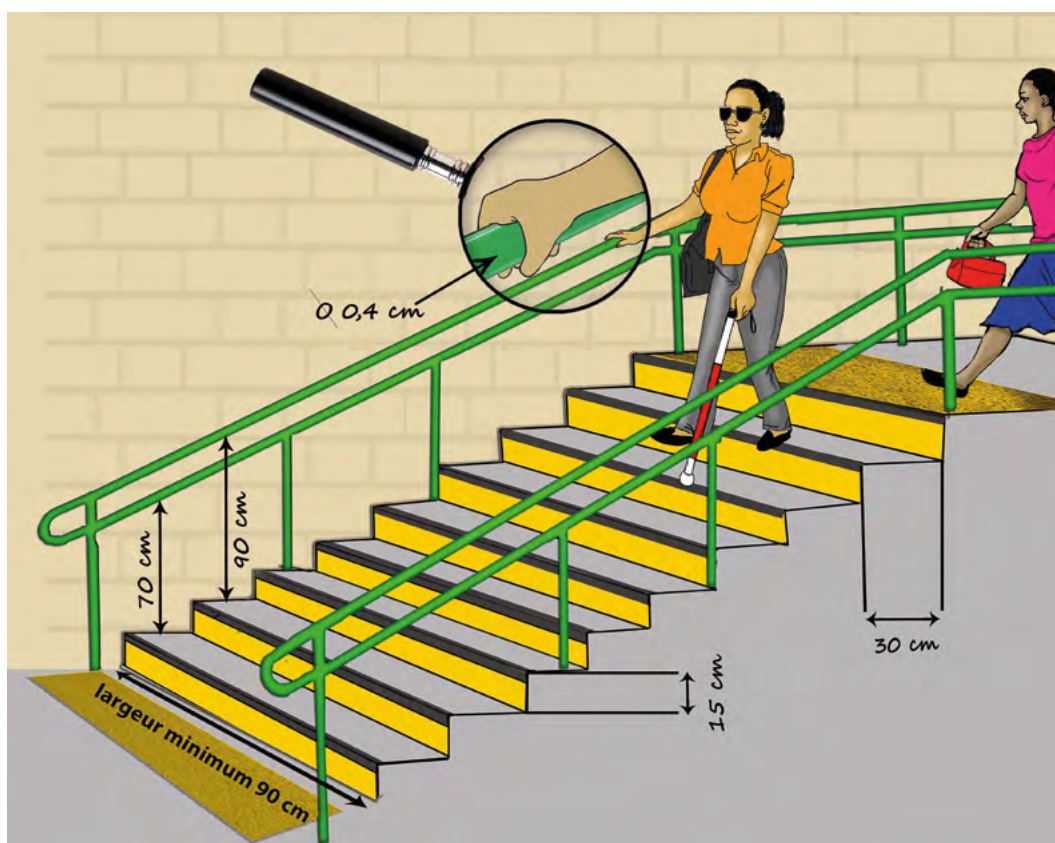


Figure 5: Requirements for designing accessible staircase

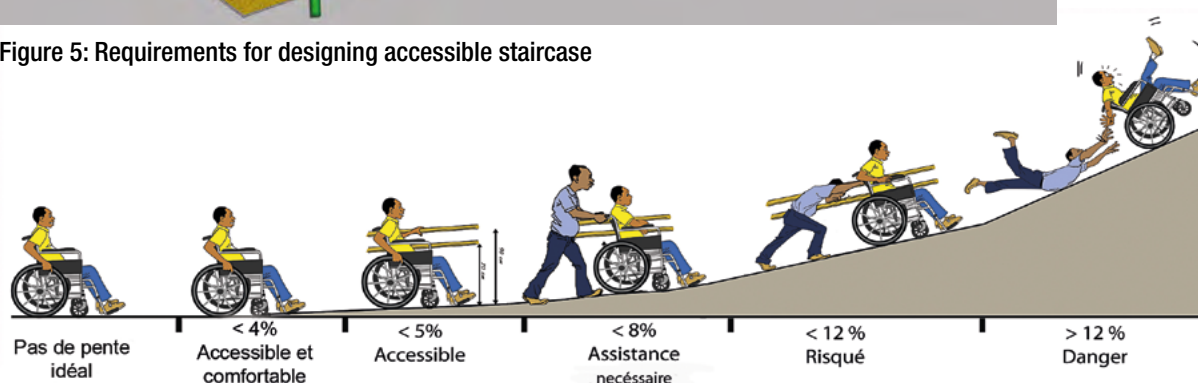


Figure 6: Wheelchair ramp slope (in percentage)

## 4 Handrails are installed to provide support and security

### KEY POINT TO CONSIDER:

- >> Handrails shall be installed both on stairs and ramps at a height of 70cm and 90cm
- >> Handrails shall be easy to grab: diameter 4cm
- >> Handrails shall be solid enough to support bodyweight

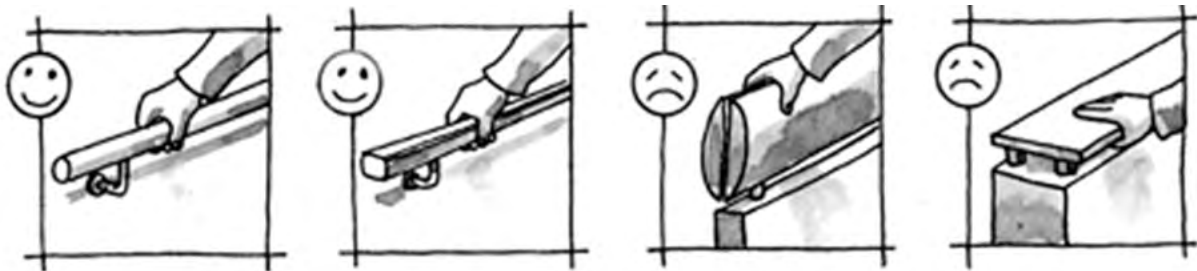


Figure 7: Requirements for handrails and grab bars design

## 5 Openings are at least 90cm wide, in order for a wheelchair to pass through

### KEY POINT TO CONSIDER:

- >> The clear width of the doors should be 90cm in order to allow the easy passage of wheelchairs

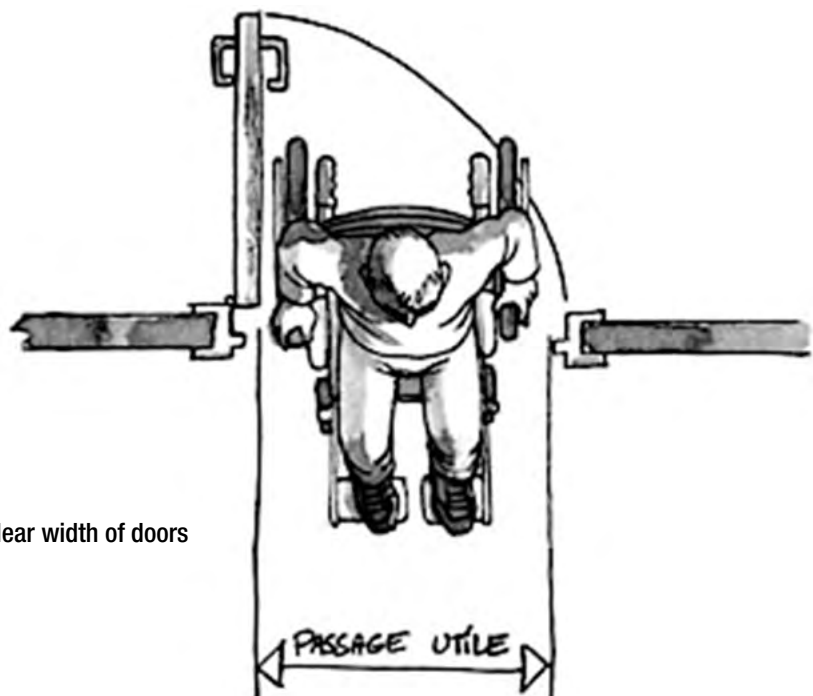


Figure 8: Clear width of doors

## **6** Entrances have contrasting colour to make it easier for persons with visual impairment to identify them

### **KEY POINT TO CONSIDER:**

**>>** The colour of the doors should contrast with the wall. If the colour of the door is not contrasting with wall, door frames can be painted with a contrasting colour (e.g. yellow).



Photo 2: Colour contrasting of door frames

## **7** Doors and windows are accessible and easy to open and close for persons with disabilities

- Door thresholds are < 12mm
- Door handles are located at a height of 90cm above the ground and should either be D-lever or vertical handles (easy to grab)
- Height of the base of the windows < 80cm
- Windows shall be equipped with lever handles or similar system that easy to use

## **8** Space inside the shelter is wide enough to allow a wheelchair user to circulate and complete a full turn

- Wheelchair users need a clear surface of 150cm x 150cm to complete a full turn
- The floor is solid, non-slippery and non-reflective



## 9 Electrical lighting has been provided to increase accessibility and safety

- Switches or controls must be located at a height of 90cm above the ground and must be easy to use

## 10 Other measures to increase the safety of the shelter have been considered, such as fastening furniture, or avoiding sharp edges in hygiene areas

- Pay a specific attention to protrusion hazards, particularly hazards above the head

## 11 Work surfaces are accessible, with seats or possibility to rest nearby

- Table height: 85cm
- Height of space under table: 70cm
- Seat height: 45cm
- Bed height: 50cm
- Leave a space of 90cm wide on the side of the bed to allow a transfer.

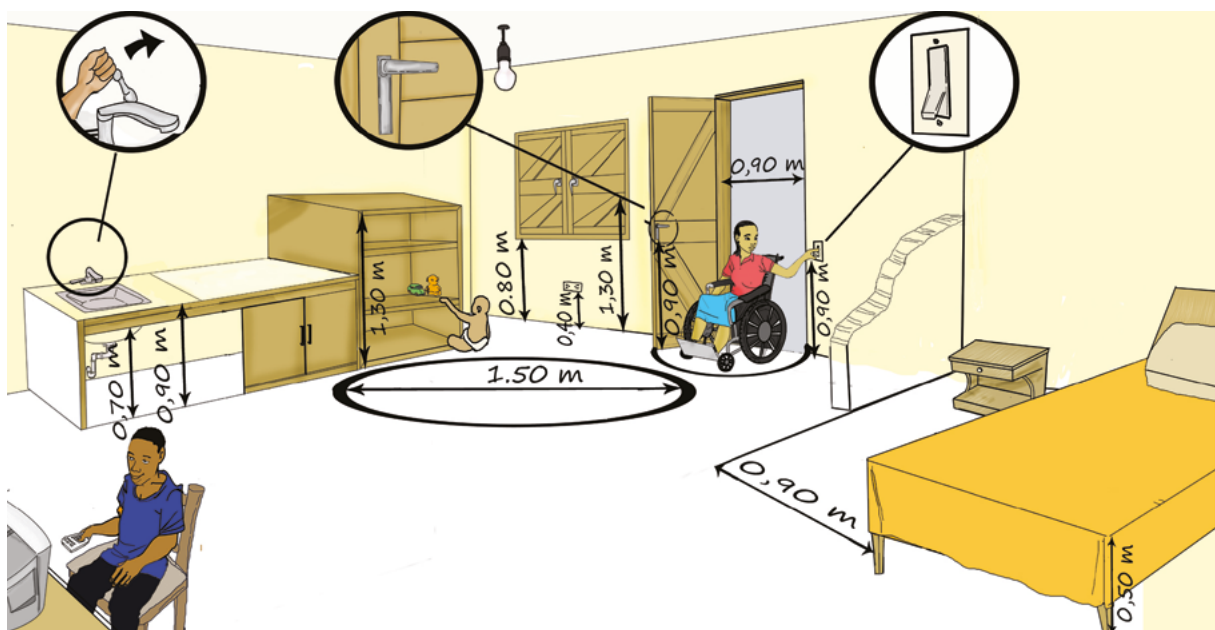


Figure 9: Overview on accessibility requirements inside the home



## 12 Persons with disabilities have access to sanitary facilities in proximity to their shelter

- Pathway is connected to the sanitary facilities. It is the most habitual, direct and the shortest.
- The ground is firm (compacted material, concrete), non-slippery, without obstacle for the wheel, the foot or the cane.
- The pathway should be 120cm wide in order for a wheelchair to circulate. If an obstacle cannot be avoided, pathway width can be reduced to a minimum of 90cm on a short distance.
- Protrusion hazards (overhead hazards) above the path are located at a height of 220cm above the ground.



Photo 3: Accessible path connecting the shelter to the sanitary facilities. © CBM and Help e.V, Haiti

## 13 The space outside or inside the toilet is wide enough to allow a person in a wheelchair to complete a full turn

- Wheelchair users need a clear surface of 150cm x 150cm to complete a full turn. The clear surface must be provided either inside or outside the cabin.

### KEY POINT TO CONSIDER:

>> There are many ways of designing accessible washrooms depending of the context, the technical possibilities, the culture, etc.

**14** Toilets are equipped with a seat at a height of 45-50cm and a grab bar to facilitate the transfer

- Grab bars shall be installed at a height of 80cm above the ground
- Grab bars shall be strong enough to support body weight



Photo 7: Raised toilet seat with concrete base



Photos 4, 5 and 6: Various examples of grab bars installed by the toilet



Hazel Jones and Bob Reed, 2005

Technical sketches for designing accessible comfort rooms

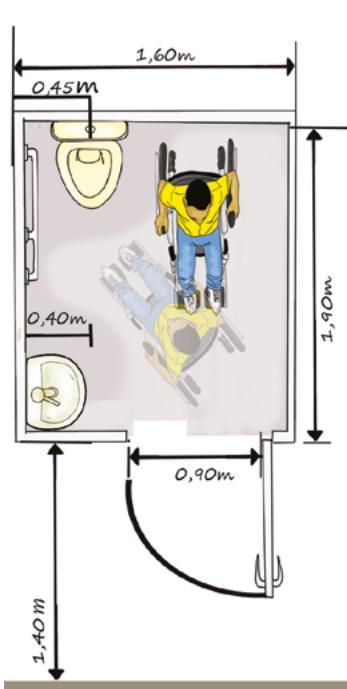


Figure 10: Minimum dimension of a toilet cabin

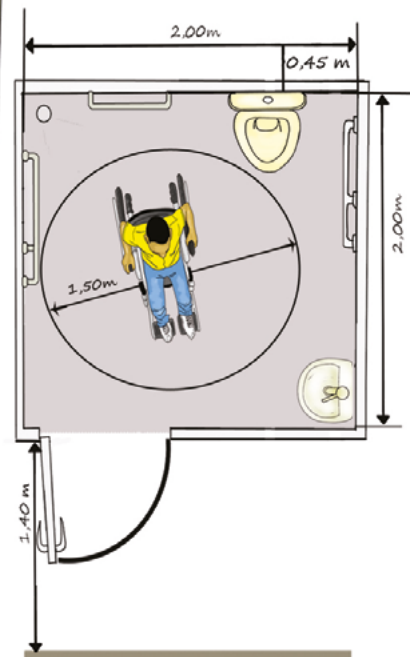
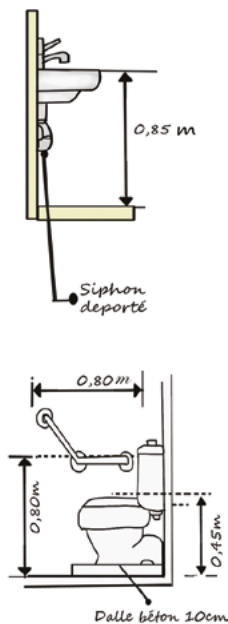
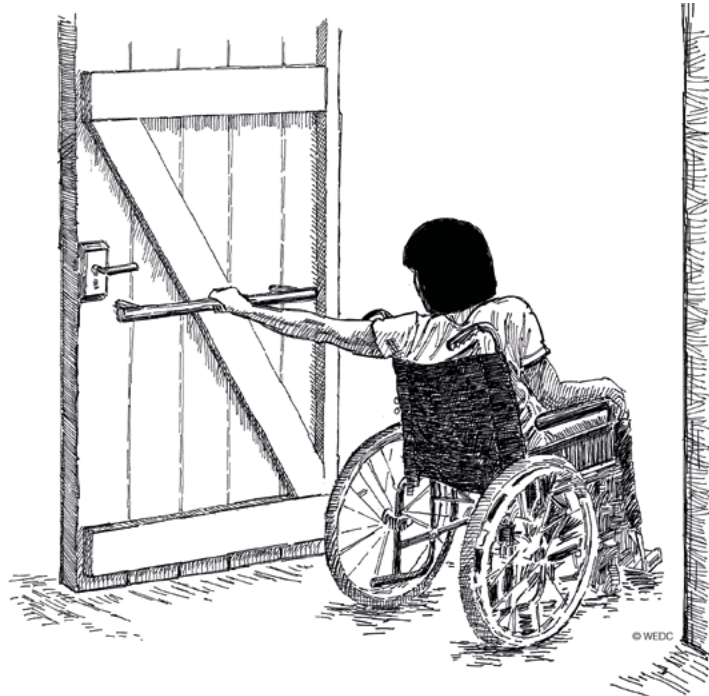


Figure 11: Minimum dimension of a toilet cabin including shower space

## 15 Door is easy to open and close for persons with disabilities

- Door handles are located at a height of 90cm above the ground and should either be D-lever or vertical handles (easy to grab)
- A horizontal grab at a height of 80cm above the ground can be added to the doors in order to facilitate the closing



Rod Shaw © WEDC Loughborough University

Figure 12: Wheelchair user closing a door with a handrail

## 16 The shelter provides thermal comfort (not too hot in hot climates, and not too cold in cool climates), considering that persons with disabilities often spend more time indoors

- Along with thermal comfort, additional features such as window screens against mosquitos must be provided.

## Credits and acknowledgments

**Figure 1: Accessibility site plan design**, Technical Guidelines on Universal Accessibility developed by BSEIPH, CBM and Handicap International and funded by ECHO under Handicap International's Food Security project in Haiti, December 2012, Illustrator: AyitiKomik.

**Figure 2: Wheel guard preventing wheelchair from tripping** – Benjamin Dard, CBM.

**Figure 3: Wheel guard serving as a guide for blind users**, Inter-ministerial circular 2007-53, November 30th, 2007, Illustrator: Pierre-Antoine Thierry, [www.titwane.fr](http://www.titwane.fr)

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**Figure 5: Requirements for designing accessible staircase**, Technical Guidelines on Universal Accessibility developed by BSEIPH, CBM and Handicap International and funded by ECHO under Handicap International's Food Security project in Haiti, December 2012, Illustrator: AyitiKomik.

**Figure 6: Wheelchair ramp slope (in percentage)**, Technical Guidelines on Universal Accessibility developed by BSEIPH, CBM and Handicap International and funded by ECHO under Handicap International's Food Security project in Haiti, December 2012, Illustrator: AyitiKomik.

**Figure 7: Requirements for handrails and grab bars design**, Inter-ministerial circular 2007-53, November 30th, 2007, Illustrator: Pierre-Antoine Thierry, [www.titwane.fr](http://www.titwane.fr)

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**Figure 9: Overview on accessibility requirements inside the home**, Technical Guidelines on Universal Accessibility developed by BSEIPH, CBM and Handicap International and funded by ECHO under Handicap International's Food Security project in Haiti, December 2012, Illustrator: AyitiKomik.

**Figure 10: Minimum dimension of a toilet cabin**, Technical Guidelines on Universal Accessibility developed by BSEIPH, CBM and Handicap International and funded by ECHO under Handicap International's Food Security project in Haiti, December 2012, Illustrator: AyitiKomik.

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Available from: <https://wedc-knowledge.lboro.ac.uk/collections/equity-inclusion/>

**Photo 1: Accessible shelter with access ramp (gradient 1:20),** CBM and Help e.V, Haiti, 2011.

**Photo 2: Colour contrasting of door frames,** CBM, Sri Lanka, 2007.

**Photo 3: Accessible path connecting the shelter to the sanitary facilities,** CBM and Help e.V, Haiti, 2011.

**Photos 4-5-6: Various examples of grab bars installed by the toilet,** Jones, H and Reed, R.A. (2005) 'Water and sanitation for Disabled People and Other vulnerable groups', WEDC, Loughborough University: UK.  
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**Photo 7: Raised toilet seat with concrete base,** CBM Haiti, 2012.







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