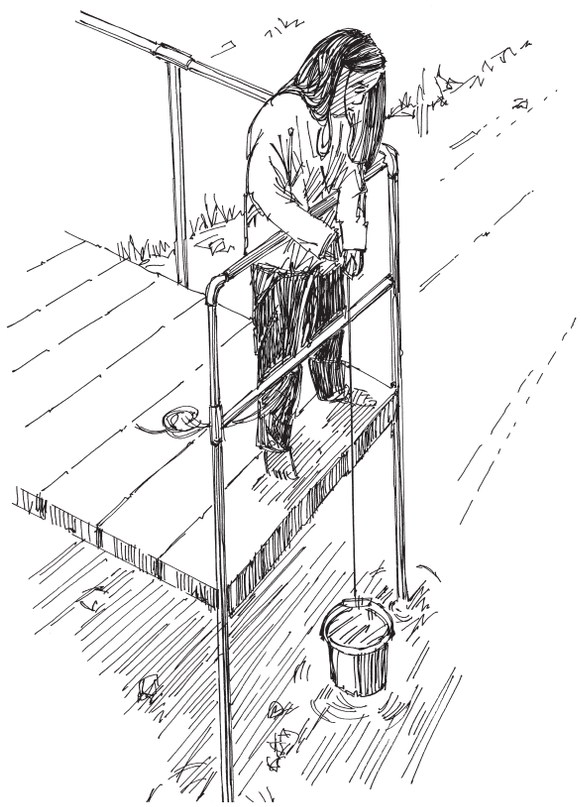
Chapter 5

Accessibility – general issues



This chapter identifies some general issues of access for all people with a range of needs, including disabled people, frail elderly people, pregnant women, parents with young children, people who are injured or sick, including people living with HIV/AIDS. A range of possible solutions is then presented. Some disabled people may have already identified their own solutions, while others may have no idea of what is possible. The ideas in chapters 5 to 7 can provide starting points for discussion, reinforced by case-studies in Chapter 9 that illustrate the benefits of accessible facilities to the whole family.

5.1 Contrasting approaches – inclusive facilities or individual equipment?

The focus of this document is on water and sanitation facilities for household use. As described in Section 3.2 on page 18, toilets are commonly installed by individual families according to their available resources, for use by a specific group of people. In this situation, only the current and short-term needs of the household are likely to be considered in the design or choice of facility.

Nevertheless, many households all over the world use communal facilities, especially water points, which are used by a larger number of people with a much wider range of needs. In this situation, where communal facilities are being designed and built from scratch, it is more appropriate to apply the principles of **inclusive design**, rather than to choose a design based on the needs of one or two individuals.

Thus two apparently conflicting approaches to improving access can be taken:

1. An inclusive design approach, which aims to create functional environments to accommodate a diverse range of users and can be used equally by everyone, irrespective of age, gender or disability (1). This is the approach used in the UK and Europe, reinforced by Disability Rights legislation.
2. An individual approach, which provides an aid or equipment for the use of a disabled person based on their individual needs, to enable them to access an existing facility or environment.

A combination of the two approaches is often needed (Figure 2.6).

The authors propose that inclusive design be the ultimate goal of WATSAN providers, but also acknowledge that a pragmatic approach is needed to cope with the current reality of disabled people's lives. This document therefore incorporates ideas from both approaches.

5.2 Principles of inclusive design

The principles of inclusive design are to provide:

- Ease of use by as many people as possible without undue effort, special treatment or separation;
- Freedom of choice and access to mainstream activities, to allow people to participate equally in all activities. Users should be able to choose whether to use a support person or not, and whether to use the same or separate facilities;
- Diversity and difference: facilities should provide for a range of user needs;
- Safety;
- Legibility and predictability: facilities should be organised and laid out in a

logical and ordered way, that is easy for the user to 'read' or understand.

Comprehensive recommendations for inclusive design of public facilities will not be repeated here, as they are available in other publications (see Appendix A1.1, page 255). It is also recognised that these may not always be immediately applicable in rural and peri-urban areas of low-income countries, where infrastructure is poor, and resources are scarce.

A range of access solutions is presented in the following chapters. These vary from high-cost, durable solutions, which draw on the principles of inclusive design, to low-cost short-term solutions, which may be based on the needs of an individual. The choice of solution will depend on whether the facility is communal or domestic, on available resources, and on the situation and aspirations of disabled people and their families.

5.3 User dimensions

Trying to accommodate all disabled people's needs is not always straightforward. Where a facility is for the use of one family, or a limited group of households, it is important to talk to all users to identify the range of needs and preferred solutions (see the section 8.3 on working with disabled people and their families on page 147).

The design and space requirements will depend on the kind of support users need for mobility (Figures 5.1 and 5.2). Dimensions of users and their equipment will vary from one person to another and from one country to another (Table 5.1).

If a variety of people with different needs use the facility, design for the biggest dimensions. The space suggestions in this document are for guidance only, and are not intended to be inclusive design recommendations.

For suggested dimensions see Table 5.1.

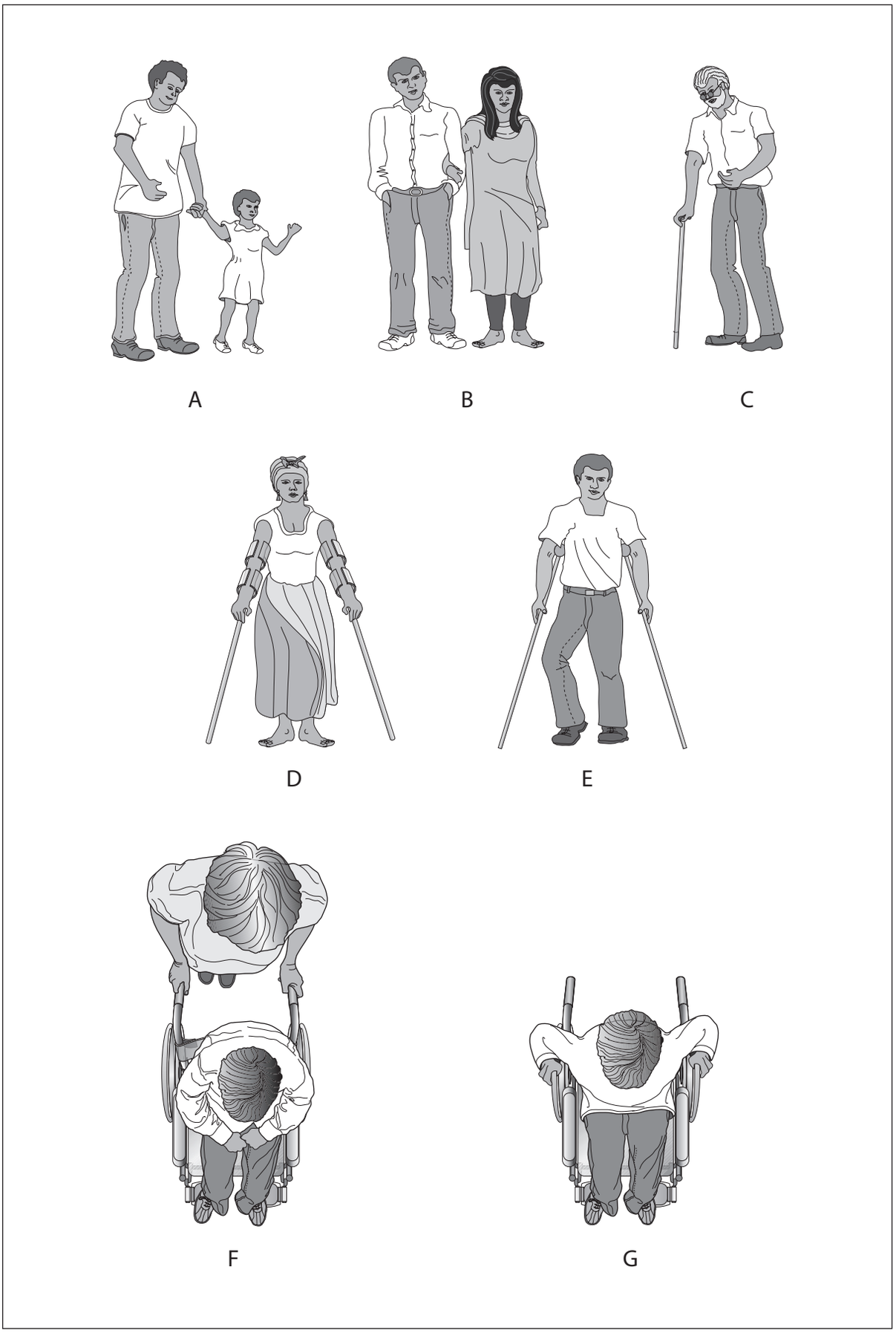


Figure 5.1. Disabled people and aids and support for mobility.

Adapted from UNESCAP (2)

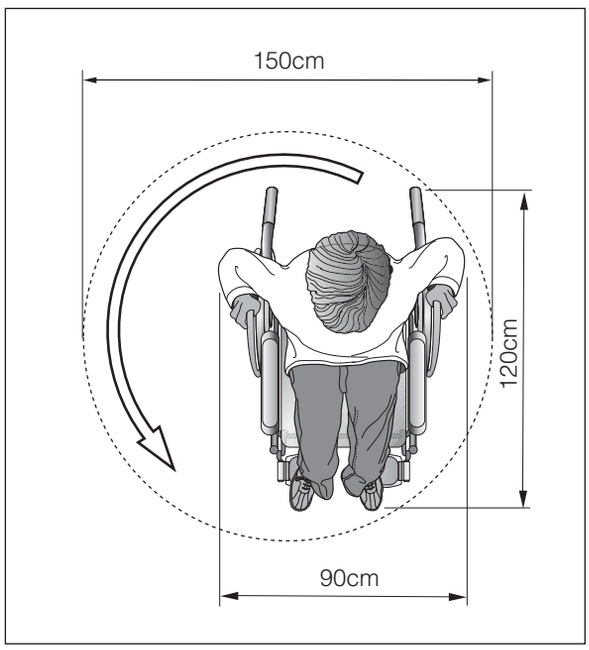


Figure 5.2. Space allowance for wheelchair users.

Wheelchair dimensions
Dimensions of wheelchairs depend on the design, and will affect the width of paths and doorways needed, the internal dimensions of bathrooms and toilets, and the location of handrails, etc.

5.4 Aspects of accessibility

Getting there

It does not matter how well the facility is adapted if the disabled user cannot get to it in the first place.

Proximity (how near it is)
A major factor in being able to reach a facility is how near it is. One of the simplest ways to achieve this is to locate a facility as near as

Table 5.1 Dimensions of disabled people and their support for mobility

		Dimensions (in cm)				
		Bangladesh	*India*	*UN/ ESCAP*	*Uganda*	*UK*
A	Width of adult + child walking side by side					110
B	Width of 2 adults walking side by side					120
C	Width of adult walking with a stick					75
D & E	Width of person walking with crutches			92		90
F	Length of wheelchair + helper					175
G	Length of wheelchair and user	112	130	120	110	114
G	Width of wheelchair + self-propelling user	90	88		87	90

Letters in the left-hand column refer to the drawings in Figure 5.1.
Data from this research and various sources (1, 2, 3, 4, 5, 6, 7).

possible to the disabled or elderly user. This can be done in a number of ways, depending on local factors such as available space, technology, culture and preference:

- Providing piped water into or next to the house;
- Installing a rainwater tank or storage jar near the house;
- Installing a household well in the compound of the disabled person's home;
- Installing a communal well near the disabled person's home;
- Providing a toilet inside or close to the disabled person's house.

Specific benefits of proximity include:

- Water can be drawn as it is needed, so the need for storage is reduced, and the difficulties in accessing stored water avoided;
- Carrying time is reduced, therefore smaller quantities of water are drawn each time, e.g. up to 5 litres. Carrying small quantities is possible for many disabled people who cannot carry larger quantities.

An alternative way of reducing the distance between water source and place of use is to take the water-related activity to the water source. Bathing and washing clothes at the water source, for example, will reduce the quantity of water that needs transporting and storing.

For a list of further resources on transport and mobility, see Appendix A1.1, under Transport on page 256.

For a list of further resources on rainwater harvesting, see Appendix A1.2, under Techincal Information on page 257-8.

Box 5.1. Proximity alone is not enough

For one Ugandan wheelchair user, proximity is not enough to enable him to fetch water. His nearest handpump is too difficult to get to in his wheelchair, along a narrow, steep and bumpy path. He prefers to travel a whole mile to a different pump along a wider, smoother path which is accessible to his wheelchair *(Case-study 9.23, page 223)*.

If the facility cannot be nearby, many people can be helped by the provision of a place to rest on the way. The maximum distance that frail or elderly people can walk without a rest depends on many factors, including the slope and evenness of the ground. Some maximum walking distances are given in Table 5.2.

Width of path, slope or step
In addition to proximity, the width, smoothness and gradient of the approach path are important (Box 5.1).

The width of the path will depend on who will use it and what support they use (see Figures 5.1 and 5.2). A public path should ideally be 180cm wide to accommodate all types of non-vehicular traffic without passing places. The absolute minimum width is 120cm wide, with places provided to allow people to pass each other (6). At a household level, the path width should take account of the widest user. For example, using the dimensions in Table 5.1, a wheelchair user needs a path of at least 90cm wide. But if an elderly grandmother in the same household needs the support of a family member when walking, the path should be wide enough for two people side by side, i.e. 120cm wide.

Path gradient
Where the path is not level, steps or a slope will be needed. The steepness of the slope (gradient) is important. The aim should be

Table 5.2 Maximum walking distances (2)

Group	Recommended distance limit without a rest
People who are blind or with a visual impairment.	150m
Wheelchair users.	150m
People with mobility impairment who do not require or use a walking aid.	100m
People with mobility impairment who use a walking aid.	50m

Adapted from Werner, 1987

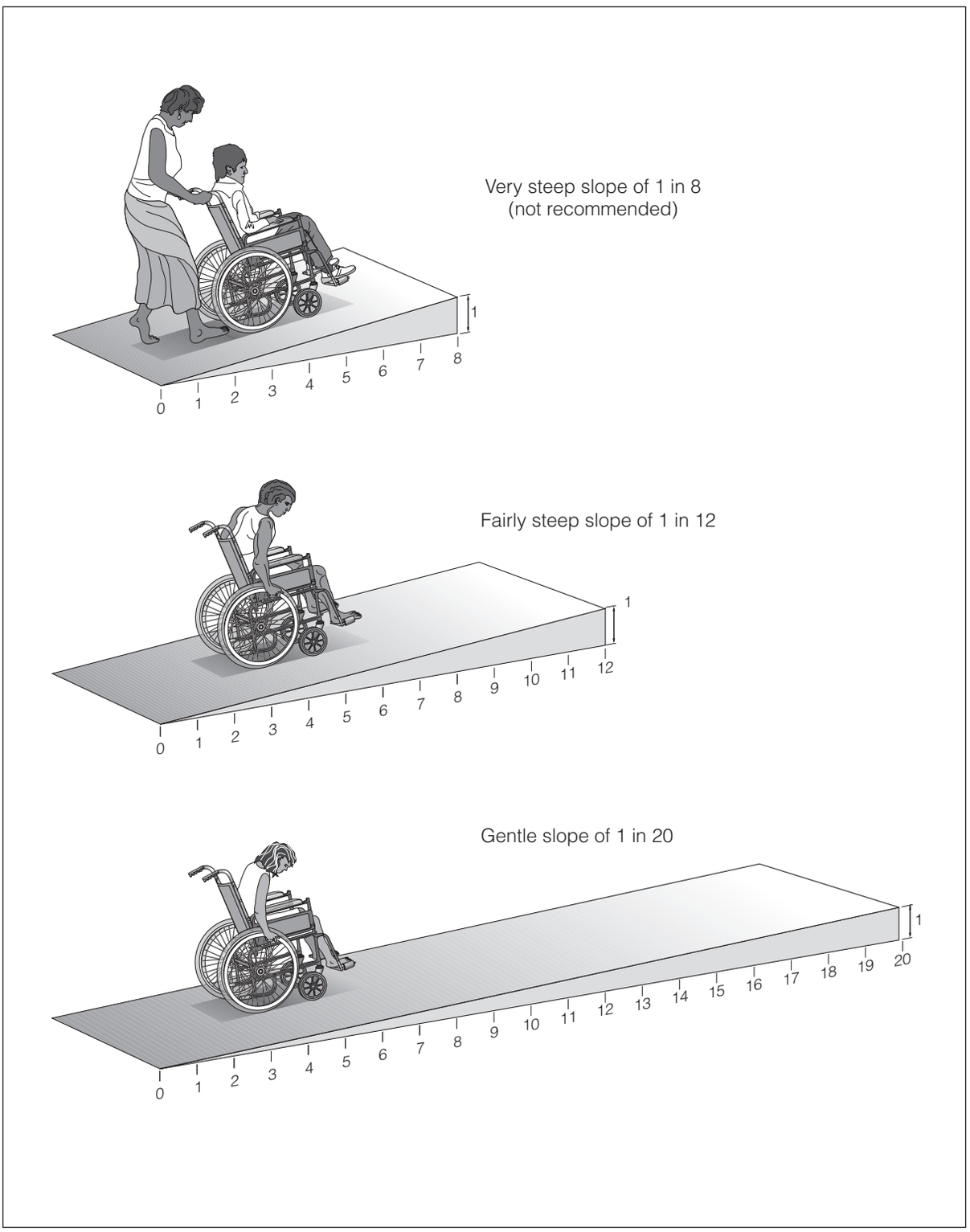


Figure 5.3. Slope gradients.

for independent mobility, i.e. for the disabled person to reach their destination without help. Slopes should be as gentle as possible – a gradient of 1 in 15 or gentler is ideal. Steep slopes (more than 1:12) may be dangerous for many wheelchair users, who lack the strength to push themselves up a slope, and have difficulty in slowing down or stopping when descending. A steep gradient can cause the wheelchair to tip backwards when ascending.

Where space permits, both steps and a ramp should be provided. If only one option is possible, this should be a ramp.

If the slope is long, a level platform is needed at regular intervals where the user can rest (see Figures 5.4 and 5.5).

In some situations, for example where space is limited, it may be necessary to use a short steep slope of 1 in 10 or steeper. In this case the slope should be no longer than 1 metre. This is not a recommended option. A steep slope is only useful for very strong users, or if there is always someone available to push the wheelchair. Table 5.3 suggests maximum gradients for slopes.

Table 5.3 Slopes and recommended lengths for independent mobility

Type	Gradient	Maximum length of slope	Comments
Very gentle slope	1:20 (5%)	10m	Ideal gradient.
Gentle slope	1:15 (6.6%)	5m	Possible for average wheelchair users. 1:15 or gentler is the recommended slope for public buildings.
Fairly steep slope	1:12 (8%)	3m	Possible for riders with strong arms. Maximum recommended gradient for independent mobility.
Very steep slope	1:10 or less (12% or more)	1m	Not recommended for independent mobility. May be dangerous, as wheelchair may tip backwards.

Adapted from Werner, 1987

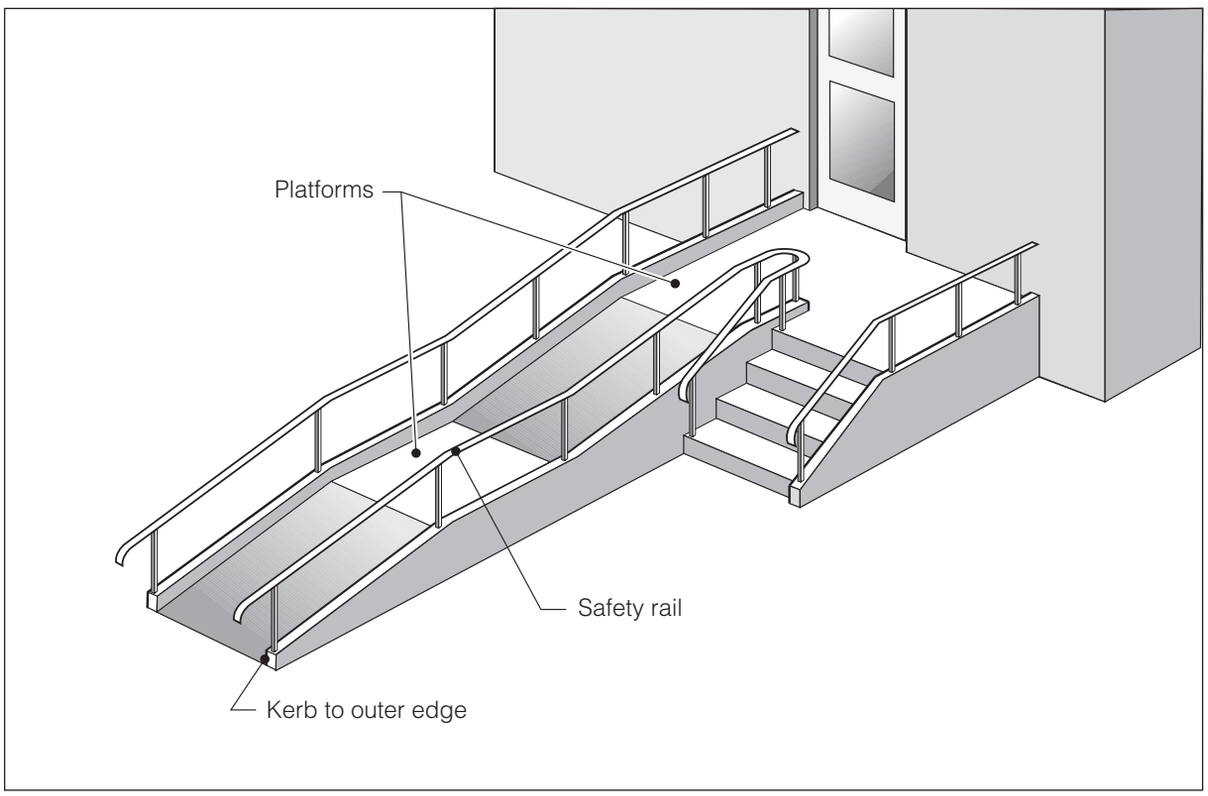


Figure 5.4. Ramp with mid-level resting platform.

Adapted from Werner, 1987

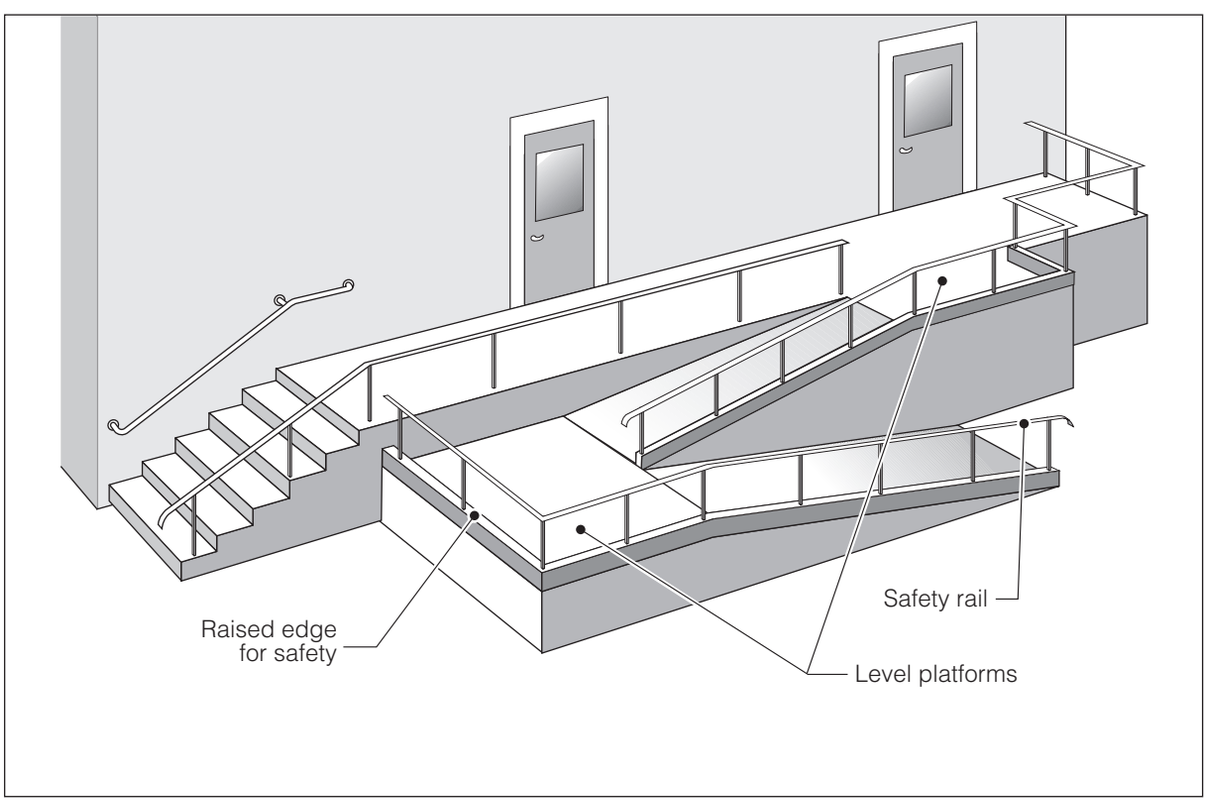


Figure 5.5. Alternative layout for ramp, with mid-level resting platform.

Based on 6, 7

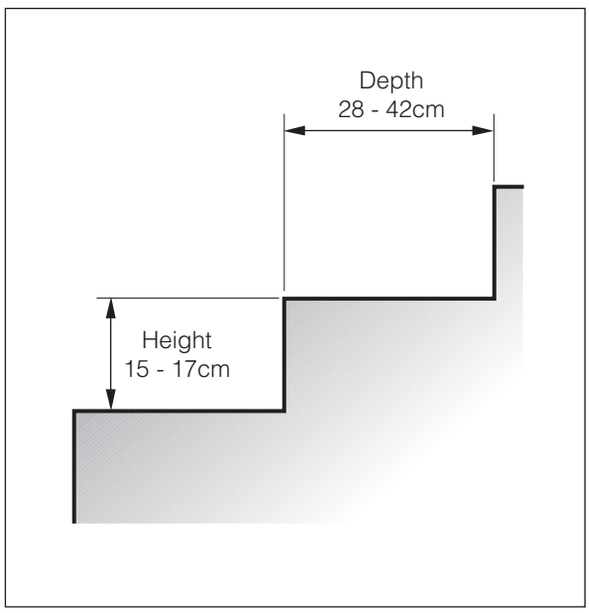


Figure 5.6. Suggested step dimensions.

Steps

Do not assume that a ramp suits everyone. Some disabled and older people, pregnant women and mothers with young children who are able to walk, may prefer to use steps rather than a long or steep slope. Where there is enough space, a choice of both steps and ramp should be provided, especially in communal facilities. A handrail should always be provided with steps.

All the steps in a flight should be of similar height and depth, with a maximum of 12 steps if the depth is 35cm or less; if more than 35cm, a maximum of 18 steps (Figure 5.6).

If the steps will be used by a person or people who crawl, it is recommended to reduce the step height to 10 – 15cm.

For people with difficulty seeing, the edge of each step should be highlighted with coloured paint or tape.

Surface of paths and steps

A firm, even, non-slip surface benefits everyone, not only wheelchair and crutch users. It reduces accidents, and is particularly helpful for people with poor balance or co-ordination such as frail elderly people, blind people and children. The surface can be made of wood, earth, bricks or concrete.

Concrete is most durable, but costly. Locally available materials such as brick or stone are cheaper than concrete, and when laid as a path can provide a firm surface, and prevent it becoming muddy and slippery in the rainy season. Bricks or stones should be evenly laid: an uneven or unstable surface is difficult for a wheelchair user, and can cause other users to trip and injure themselves.

An earth path has no material cost, and can be made smooth, but will become muddy and slippery when wet. It may get washed away by rain and need to be replaced regularly.

A slippery surface can be dangerous for a person using crutches, which can easily skid

Examples of approach paths

Figure 5.7. Narrow brick path.

Description	Path made of clay bricks laid in a double row. No mortar or earth used to fix them in place.
Dimensions	Width: ~ 40cm;
Gradient	level.
User	Person who uses a stick to walk.
Key features	Provides a flat, firm surface, so the user does not have to walk in mud in rainy season. Materials available free at nearby brick factory.
Drawbacks and comments	The bricks could be made more stable and therefore safer by fixing them in place with sand, cement mortar or earth pointing. A wider path (at least 85cm) would allow the user's stick to land on the firm path, providing a more stable support, instead of on the slippery ground beside the path.

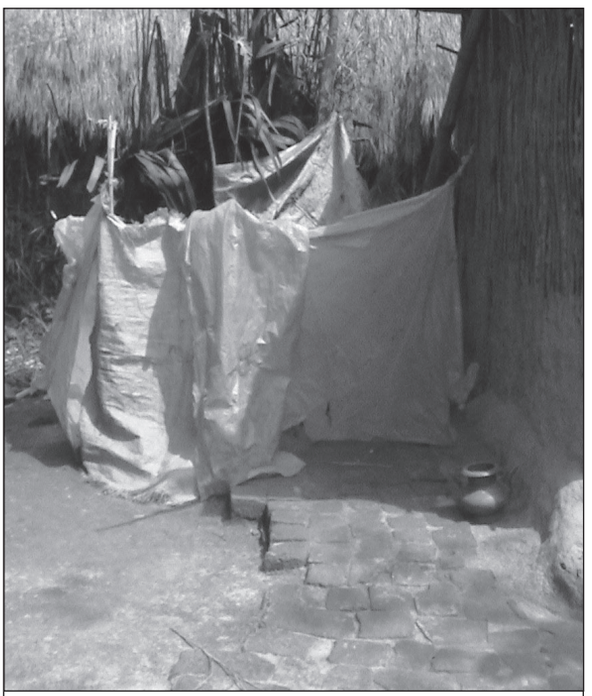


Figure 5.8. Brick path with earth and sand pointing leading to a bathing area.

Description	Clay brick path laid with earth pointing between the bricks for stability.
Dimensions	Width: ~ 1 metre.
Gradient	1 in 20 for 5 metres, then 1 in 10 for 1 metre.
User	Man with a low trolley for mobility.
Key features	Provides a firm surface so the user does not have to go through mud in the rainy season. Wide enough for the wheels of the trolley.
Drawbacks and comments	The surface of the bricks is uneven, which could cause problems for the trolley. Rain could wash the earth away, causing the bricks to become loose and more uneven. A 1 in 10 slope would be unsuitable for many wheelchair users. This could be avoided by making the entire slope slightly steeper, i.e. 1 in 17 for 6m.

Examples of approach ramps

Figure 5.9. Concrete ramp from house to bathing area and toilet.

Description	Concrete ramp with kerb both sides; level platform midway and at top in front of the toilet door.
Dimensions	Ramp W: 75cm (to suit child's wheelchair). Ramp kerb: H: 6cm x W: 6cm. Flat platform: 134cm x 100cm.
Gradient	1 in 15, level platform midway.
User	Child using a wheelchair independently.
Key features	Smooth, firm, durable surface. Gradient gentle enough for child to propel himself up slope, and to make a controlled descent. Kerb on each side prevents wheelchair falling off. Flat platform in front of toilet door enables user to open door without risk of rolling backwards.
Drawbacks and comments	High cost. For little extra cost, the ramp and flat platform could have been made wider, making it suitable for when the child has an adult sized wheelchair, i.e. 90cm. (Recommended width of ramp for communal use: 150cm.)

Figure 5.10. Wide concrete ramp with handrails both sides.

Description	Wide concrete ramp with handrails on both sides, leading to communal toilets.
Dimensions	Ramp W: 2 metres. Handrails: 5cm dia g.i. pipe; H: 90 – 100cm.
Key features	Wide ramp allows two wheelchair users to pass each other easily, essential where there are a number of users. Handrail provides support to users with poor balance, also prevents wheelchairs running over the edge.
Suitable for	Institutional setting. Child and adult wheelchair users, children with poor balance.
Drawbacks and comments	High cost.

Examples of approach ramps (continued)

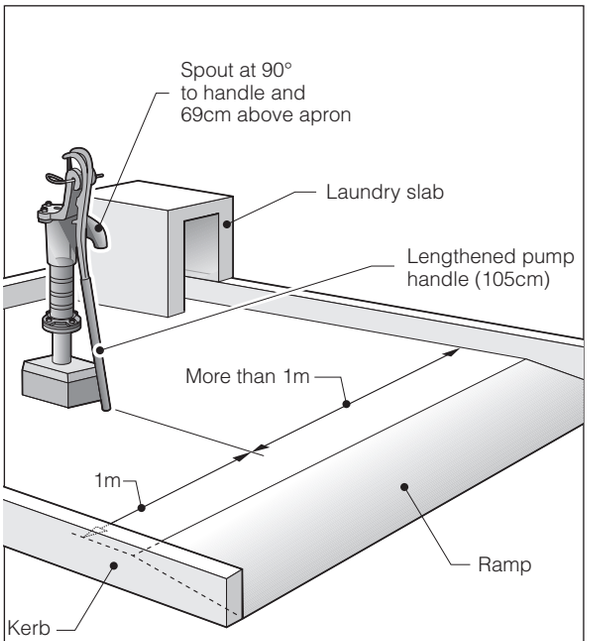


Figure 5.11. Ramp access to a handpump apron.

Description	Wide concrete ramp leading onto a wide concrete apron around a handpump. The drainage slope is in the opposite direction to the approach ramp.
Dimensions	More than 1 metre wide.
Key features	The concrete ramp onto the apron makes wheelchair access easy. The ramp stays dry, because the water drains in the opposite direction.
Suitable for	All, especially wheelchair users. Institutional setting.
Drawbacks	The large area of concrete is expensive.

HITS, Uganda

Figure 5.12. Movable wooden ramp.

Description	Movable wooden ramp for wheelchair access to facilities with steps. Raised kerb on both sides.
Dimensions	W: 80cm; L: 3 metres.
Key features	Flexible - can be placed wherever needed. Cheaper than concrete. Kerb on each side prevents wheelchair rolling over the edge.
Suitable for	Wheelchair users with helpers available only. Temporary use. Crossing open drains or ditches.
Drawbacks	Less durable than concrete. User needs helpers to move ramp as needed.

Figure 5.13. Two fixed wooden posts act as landmarks for a blind woman to find her way to and from the water tank or toilet. For a user with some vision, posts could be painted/marked a bright colour.
(Case-study 9.21, page 219)

Figure 5.14. Low threshold for flood prevention, rounded for easy wheelchair access.
(Case-study 9.4, page 169)

on a slippery floor and cause the user to fall. The surface should be slightly rough to reduce this risk. The path should finish level with the floor of the facility to which it leads, so that there is no step between the two.

In the case of a slope or ramp, regular maintenance is important. If the ramp is made of earth, it will need to be replaced when it is washed away by rain. Where the slope is made of concrete or other durable materials, the point where the slope meets the surrounding earth should be as smooth and level as possible. This also needs to be replaced regularly. If the surrounding grass grows long, it should be cut.

Protected sides
Where there is a drop to one or both sides of a slope or path, a kerb is needed to prevent people falling over the edge. This is a low wall along the edge of the path or ramp, 7.5 – 10cm high. The addition of a safety rail warns the user where the edge of the ramp is, and provides support.

Support
For those with poor balance or co-ordination, or who crawl, some form of support is helpful, especially for a ramp or steps. This could be a rail of galvanised iron (g.i.) pipe, wood, bamboo or rope, or similar locally available materials. For more details, see the section on Types of support rails on page 102.

Issues for blind and visually impaired people
Blind and visually impaired people need to be able to find their way around using their remaining vision, or by touch, using a stick, white cane, or their hands, to feel for familiar objects.

To help them do this, they need familiar **'landmarks'** – permanent structures wherever possible, such as gate-posts, trees or large rocks. These existing features cost nothing. Additional landmarks can also be put in place, such as vertical poles or horizontal guide-rails,

Adapted from UNESCAP, 1995

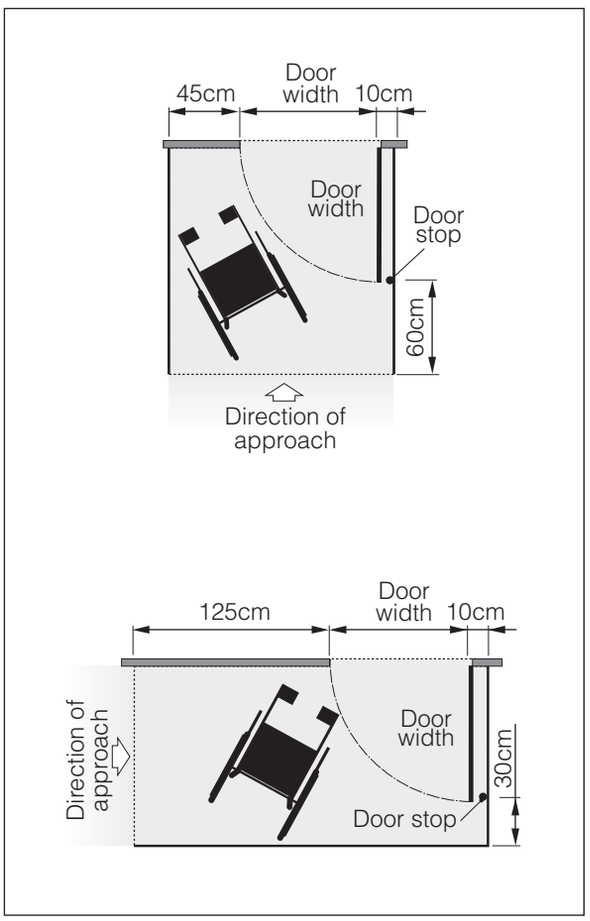


Figure 5.15. Minimum dimensions of flat platform for opening a door.

which should be fixed so that they cannot easily be moved accidentally (Figure 5.13).

Most people who may be referred to as 'blind' do have some usable vision. They find it helpful if contrasting paint, fabric or waterproof sticky tape are used to mark handles, entrances, the edges of steps and ramps, or to warn of hazards to avoid.

A safety-rail is recommended on paths where a wrong step could result in a fall, such as next to a pond, or on a steep river bank. If the rail is also used for support, it must be strong enough to bear the users' weight (see pages 126 to 133 on support-rails). It must be high enough (80 – 100cm) so that it does not become a trip hazard.

Rails are helpful to other users in the community, such as children and elderly people. Guide- or safety-rails at the right height for adults, however, will be too high and too thick for children to use safely and comfortably. An additional lower rail (H: ~75cm) with a smaller diameter can be provided, which will also be useful for wheelchair users. A rail that obstructs other users should be avoided.

Entrances – getting in

A level platform is needed immediately outside any door so that users can open the door without their wheelchair rolling backwards, or stand on crutches without losing their balance.

For a wheelchair user, where the door opens outwards, the flat area should provide enough space for a wheelchair user to manoeuvre to open the door. The minimum dimensions will change, depending on the direction of approach (Figure 5.15). A crutch user is likely to need a similar amount of space.
A handrail next to the door is useful for a person who is unsteady on their feet while opening the door. This can be attached to the outside wall if the wall is strong enough, or fixed to the ground (see page 102, Support rails).

Entrance width
The entrance should be wide enough for wheelchair access: 80cm is a recommended minimum width. For most crutch users, a widened door is convenient, but not essential.

Threshold
The transition from outside to inside should be as level as possible for easy access (Figure 5.17). Where a kerb is necessary, such as for flood prevention, this should be as smooth and rounded as possible (Figure 5.16).

If the inside is higher than outside, a ramp is recommended for easy wheelchair entry.
If there has to be a step, a handrail is helpful for crutch users, for people crawling, and those with poor balance or co-ordination. For other users, see page 51 on Steps.

Signs
In a communal setting there may be a row of toilets or bathrooms, not all of which are accessible to disabled users. A brightly coloured visual sign on the door, such as the international disability symbol, can show which is the accessible facility. This can be helpful to all users, including those with a visual impairment. It can also have the function of raising awareness of the community about accessibility.

Issues for blind and visually impaired people
For many people with visual impairments, highlighting the edge of a step or entrance is helpful. This can be done with brightly coloured paint or waterproof tape to improve the contrast.

The entrance needs to be signalled in a way that the blind person can see or feel. A common way of doing this is by a change of floor texture, from concrete to brick, or from earth to stones. A blind person can feel the difference with their feet or with a cane.

For further resources about blind and visually impaired people, see Appendix A1.9, on page 265.

Examples of entrances

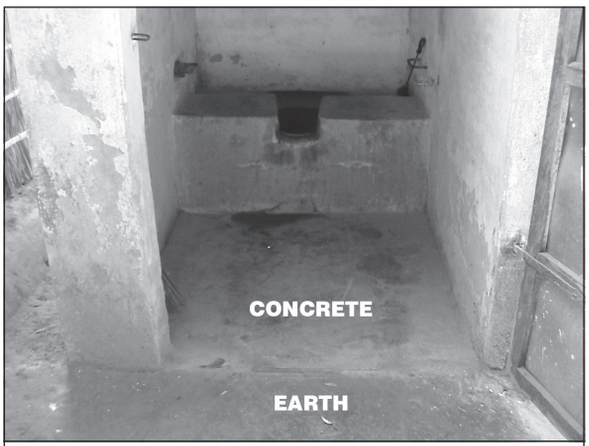


Figure 5.16. Toilet entrance.
(Case-study 9.1, page 154)

Description	Smooth concrete floor and threshold, with toilet floor only 1-2cm above the surrounding yard.
Dimensions	Entrance width: 90cm.
Key features	A level area of packed earth in front of the latrine for wheelchair stability while the user opens the door. The earth in front of the toilet is level with the floor inside, making wheelchair access easy. The user annually replaces the earth washed away by the rain. This takes about 1 hour.

Figure 5.17. Wheelchair user opening a door on a flat area.
(Case-study 9.15, page 201)

Description	Flat platform area at the top of a ramp (see Figure 5.9) for wheelchair stability while opening the door.
Dimensions	100cm x 134cm. Height of kerb around platform: 6cm; width: 6cm.
Key features	Platform is level with the toilet floor, making wheelchair access easy. Platform has space for the wheelchair to move around the door. Kerb around the platform prevents wheelchair falling over the edge.
Drawbacks	High cost. Only a minimum flat area is provided. For a larger wheelchair, the area will need to be widened. It would be cheaper to make it wider at the outset, e.g. 150cm x 150cm.

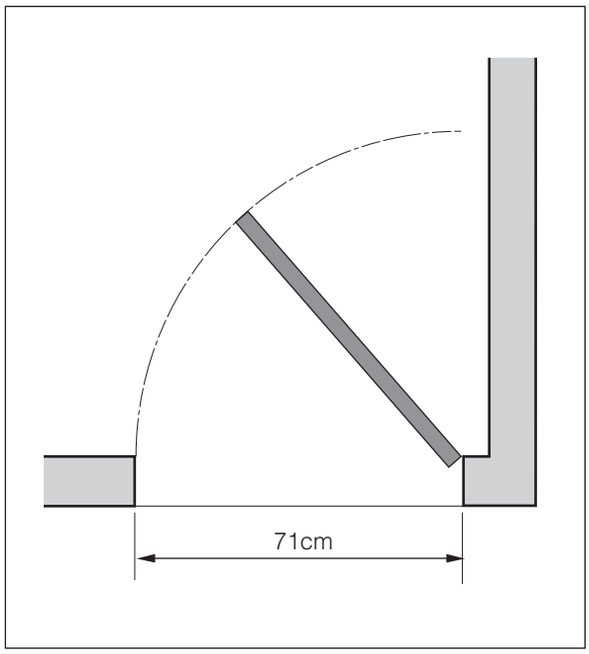


Figure 5.18. Inward opening door that opens flat against a side-wall.

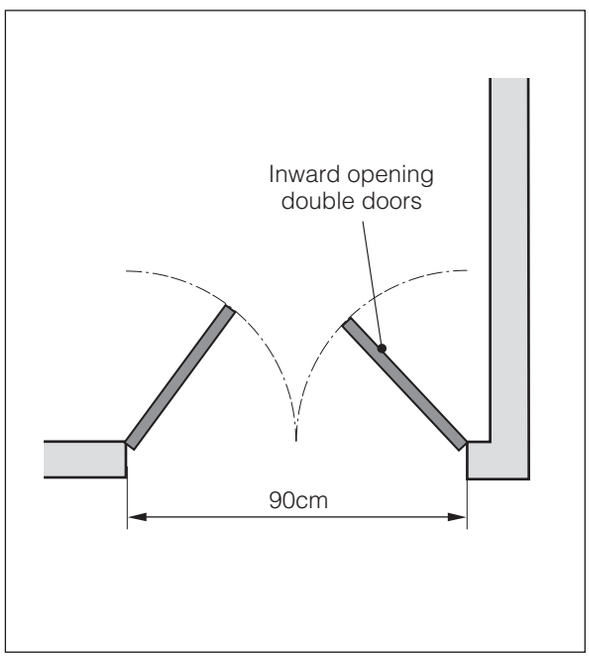


Figure 5.19. Double doors take up less room when opened.

Doors and their features

A door that opens outwards leaves more space for a wheelchair to move around inside. Outward opening doors may be hazardous if they open onto a footpath, as they may hit another user. They therefore need to be positioned so as not to obstruct footpaths or corridors.

Where the door opens inwards, extra space may need to be provided for a wheelchair to move around – this can be more costly if the floor is concrete. To maximise available space, the door hinge should be placed so that the door opens flat against a side-wall (Figure 5.18).

A two-way hinge has the advantage of allowing the door to be pushed or pulled from either inside or outside (Figure 5.20). It is generally easier to push than to pull a door open.

Double doors, each of which is half the width of the opening, are less obstructive but a more costly option (Figure 5.19). They are difficult for a wheelchair user to open.

A sacking or plastic curtain instead of a solid door allows more flexibility in the space required. For example, the user's legs can stick out under the curtain. However it is not recommended because of concerns about privacy and security for the user (see the section on and privacy and security issues on page 60).

An outward opening door can be more difficult to close from the inside. A rail or rope on the inside of the door is helpful. Large bolts and/or handles on both inside and outside are good for easy grip.

If the rail extends the full width of the door, it allows the user to close the door without having to stretch too far (Figure 5.21).

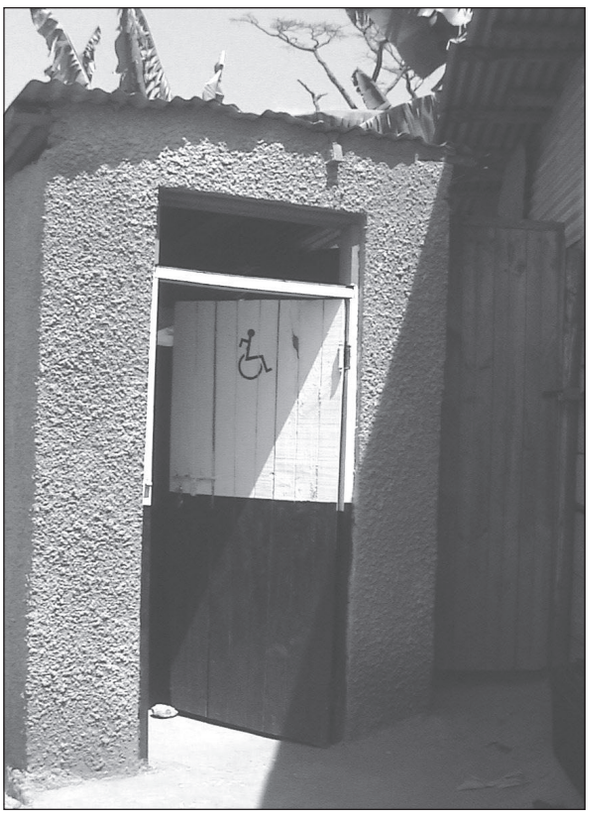


Figure 5.20. Toilet door with a two-way hinge allows this door to open outwards and inwards. Note the international disability symbol on the door.
(Case-study 9.25, page 229)

A self-closing door may be helpful to some people. By installing the door frame slightly inward leaning makes the door swing shut by itself.

A door-stop is recommended to prevent the door opening more than 90 degrees, otherwise it is more difficult to close (Figure 5.15).

Privacy and security
Privacy and security are a high priority for many people when using the toilet or bathing, especially for women. Lack of security can lead to anxiety about latrine use. This may lead to urine retention, and subsequently to medical problems.

Holes for light and ventilation must be high up, so that outsiders cannot see inside. Doors must be high (and low) enough to prevent outsiders looking over or under them. A secure door fastening is needed, which should ideally be a large, easy-to-grasp bolt, but may be as simple as a string or chain that hooks over a nail on the inside of the door.

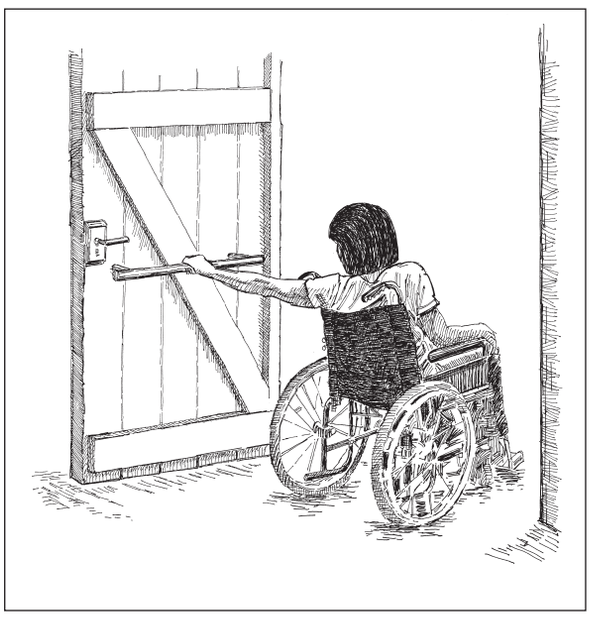
A curtain is a widely used low-cost replacement for a door, which does not restrict space inside, and does not need closing. It is not an ideal solution, especially if facilities are communal, as it is not as secure.

In some circumstances it may be necessary to enable the door to be opened from outside in an emergency, for example in a school or hospital. One solution is to have a small window near the fastening to allow someone outside to put their hand through to undo the bolt (Figure 5.23). This has the disadvantage that other users could also open the door from the outside, and could look in.

Internal dimensions and layout

Disabled people usually need more space to move around inside a facility than non-disabled people. How much they need will vary. Where a number of disabled people with

See Appendix A 1.1 page 255 for a list of publications on inclusive design.



Adapted from Handicap International (8)

Figure 5.21. Door-rail extending the full width of the door.

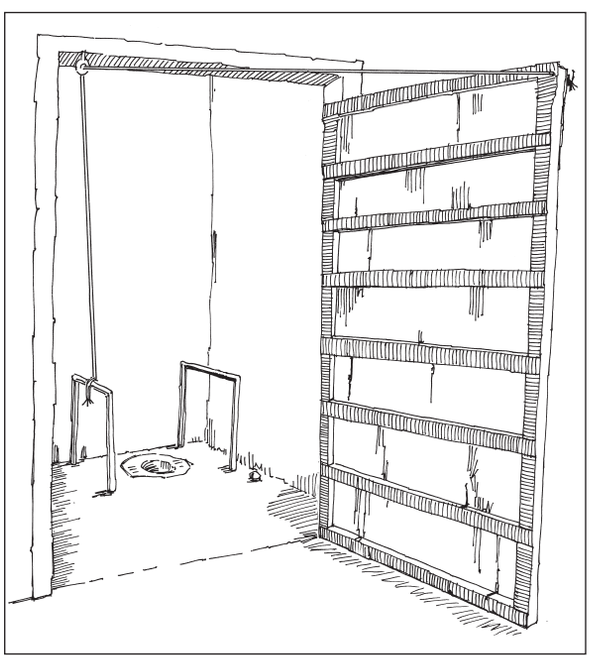


Figure 5.22. String attached to the door threads through a hook. User pulls the string to close the door and ties the end to the handrail. *(Case-study 9.16, page 207)*

different needs use a facility, the preferred option is to provide more space, rather than less (see Section 5.3).

In designing toilet and bathing spaces, the following issues need to be considered:

- What functions will it be used for: toileting, bathing, washing clothes, other?
- What kind of mobility aid is used, how much room does it need?
- Does there need to be space for a support person to also move around?
- Wheelchair/trolley manoeuvring: is the need to enter and turn, or enter and reverse out (Figure 5.25), or will it be left outside?
- For sideways wheelchair transfer, which side of the toilet is space needed?
- Space for an internal water source for anal cleansing, handwashing and/or cleaning the toilet.
- Space for a toilet seat to be moved to one side of the toilet.
- Shelf or hook for aids or equipment, or anal cleansing materials.

Placing the toilet in one corner leaves more space for a wheelchair, if the user does not need access from two sides. (Figure 5.24).

Floors

The floor should be even and smooth for easy cleaning, but not so smooth as to make it slippery when wet. Any surface can become slippery if it is frequently wet because of poor drainage, and algae are allowed to grow. Every effort must be made to ensure good water drainage away from the user, to minimise this risk.

Concrete or cement mortar are easier to keep clean than an earth floor, but more costly. A slightly roughened finish is advised where crutches will be used. This should not be so rough, however, that a person crawling hurts

Figure 5.23. Large bolt, easy to grasp.
The small window allows the door to be opened from outside.

Figure 5.24. Combined bathroom and toilet.
Note toilet in the corner to maximise space.

their hands or knees. Alternatively, ridges can be created in the concrete to provide a non-slip surface.

The disadvantage of concrete or mortar is that they absorb urine, so painting them makes them moisture resistant and easier to keep clean and hygienic. For more details about surfaces of paths and steps, see Section 5.4, page 51.

The starting point for deciding what features to include is to talk to the users, to find out their needs and preferences (see the sections in Chapter 8 on working with families,on pages 137 and 147).

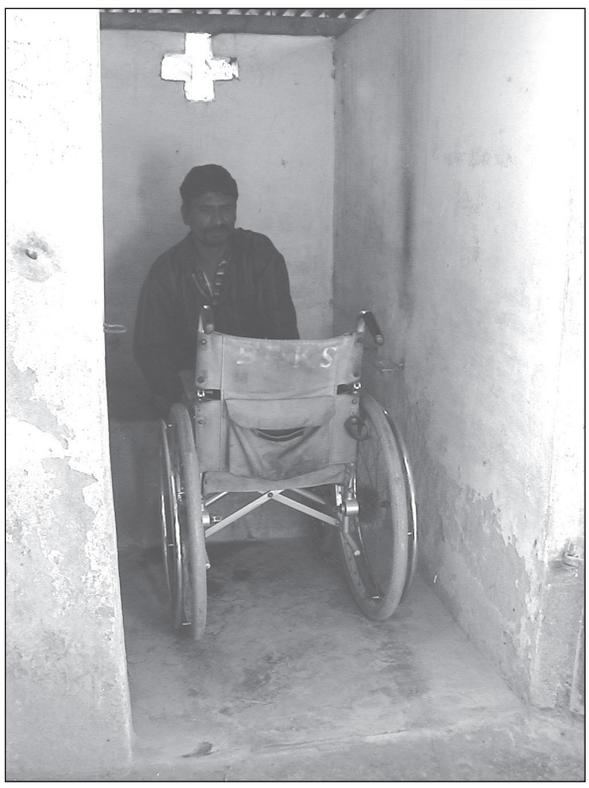


Figure 5.25. Toilet with space for wheelchair user to enter, but not to turn. User must reverse out.
(Case-study 9.1, page 154)

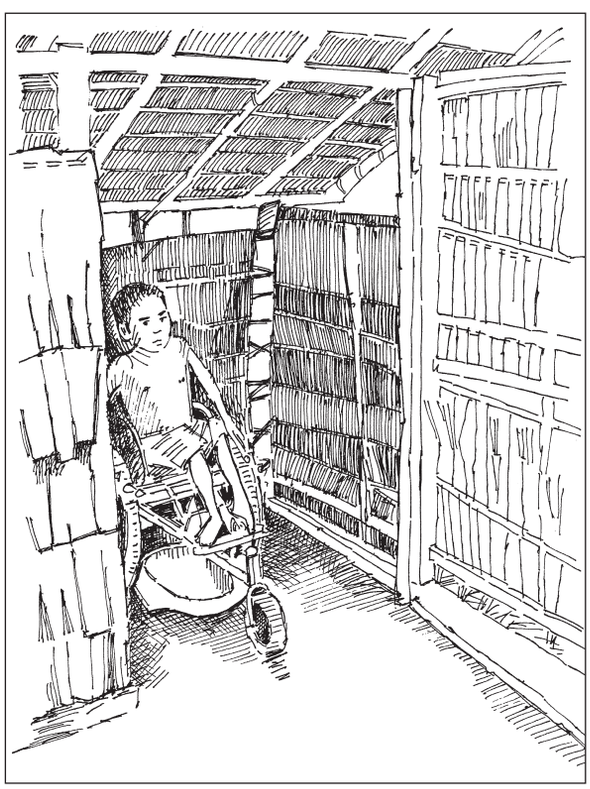


Figure 5.26. Toilet with space to position wheelchair over toilet, but not beside it. The user must reverse in.
(Case-study 9.15, page 201)

References

1. Disability Rights Commission (2003) *Creating an Inclusive Environment - a report on improving the Built Environment*. http://www.drc-gb.org/publicationsandreports/publicationdetails.asp?id=157&section=access

2. UNESCAP (1995) *Promotion of Non-handicapping physical environments for Disabled Persons: Guidelines*. United Nations Economic and Social Commission for Asia and the Pacific: UN: New York. http://www.unescap.org/esid/psis/disability/decade/publications/z15009gl/z1500901.htm

3. Venter, C.J. et al (2004) *Overseas Road Note 21: Enhancing the mobility of disabled people: Guidelines for Practitioners*. Transport Research Laboratory & DFID, UK. http://www.transport-links.org/transport_links/filearea/publications/1_831_ORN%2021.pdf

4. Jones, H.E. and Reed, R.A. (2003) *Water Supply and Sanitation Access and Use by Physically Disabled People*. Report of field-work in Uganda. WEDC, Loughborough University and DFID: UK.

5. Jones, H.E. and Reed, R.A. (2003) *Water supply and sanitation access and use by physically disabled people: report of field-work in Bangladesh*. WEDC, Loughborough University and DFID: UK.

6. Centre for Accessible Environments (2002) *Designing for Accessibility*. CAE and RIBA Enterprises: London.

7. Barker, P. Barrick, J. and Wilson, R. (1995) *Building Sight. A Handbook of building and interior design solutions to include the needs of visually impaired people*. HMSO & Royal National Institute for the Blind: London.

8. Handicap International Belgium. *Booklet on household adaptations for daily living*. PRC, Siem Reap: Cambodia. (drawings and text in Khmer)