

**CHAPTER 5**  
**RECOMMENDATIONS AND PROPOSALS**

## CHAPTER 5: Recommendations and proposals

### 5.1 Solutions for Problems:

To reach the solutions to all the problems, that may face the disabled activists with different disabilities, cases were divided **into** three Category according to the results of the field study. The levels of performance range from basic requirements through to best practice in livable home design. The levels are as follows:

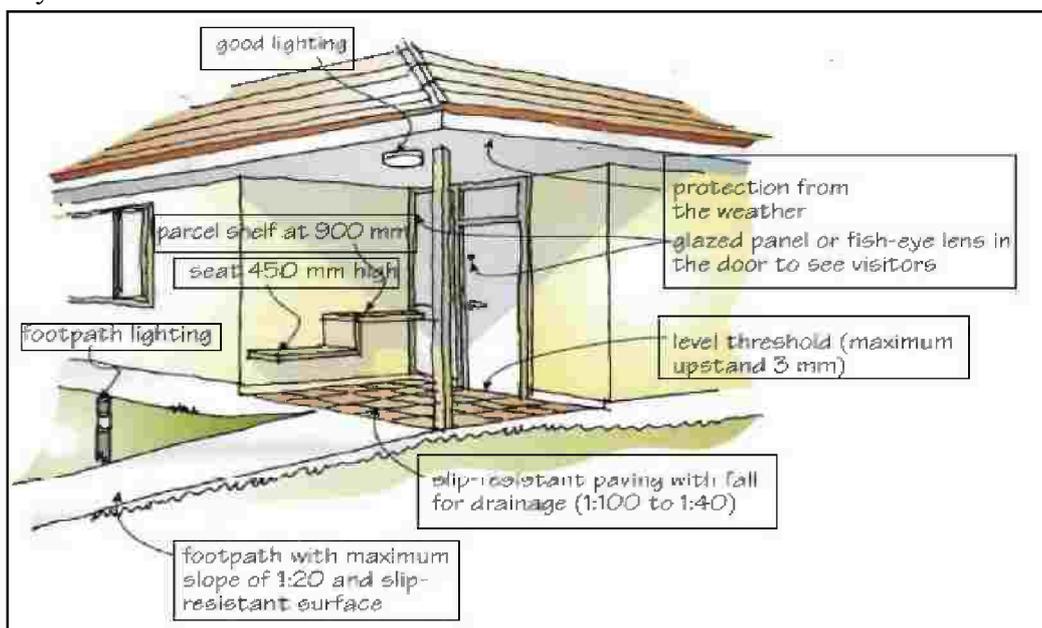
**Table 5-1 The levels of performance**

Types of disability	Category
Amputate the fingers of the hand	Category (1)
Right hand amputation	
Hand Paralysis	
Left hand amputation	
Amputation of the foot	Category (2)
Foot Paralysis	
Feet Amputation	
Paraplegia	Category (3)
Quadriplegia	
Cerebral palsy	
Upper Diplegia (Paralysis of the upper limbs)	

**Notice:** All cases that were processed commensurate with the **Category(3)** they fit with disabilities **Category(2)** and **Category(1)**

#### 5.1.1 Entrance:

A user-friendly entrance is more than a level threshold. The utility of an entry is improved if it provides both protections from the weather for people on the outside and a measure of security for those indoors.



**Figure 5-1 Elements of an accessible entrance**

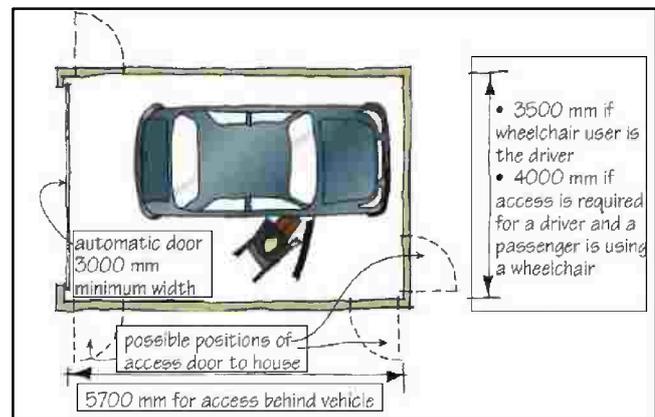
**A. The ideal entrance provides:**

- Shelter space for easy manoeuvring
- Good lighting
- A seat and a place for parcels or shopping
- A device such as a buzzer to announce visitors
- The minimum fall necessary to shed water
- A clearly visible house or apartment number
- Visibility from within the house through a window or fish-eye lens
- Colour contrasting to enhance the visibility of the door against surrounding walls.

It is often a good idea to place the main entry in a recess or under a patio or veranda roof to provide shelter from the weather and to clearly identify the front door.

**B. Garages:**

Wheelchair-users must have a spacious garage. The amount of space needed in a garage to fit both vehicle and wheelchair comfortably varies with the type of wheelchair and whether the wheelchair is transported on top of the car or inside the car when the user is commuting. In general, there should be 2.5m of clear height above the floor of a car bay and the route to a car bay to allow for a wheelchair to be transported on top of a car.



**Figure 5-2 A minimal garage layout**

A wheelchair-user who enters the vehicle via a side door needs a width of at least 3.5m in which to park the car and have room on one side to enter and exit. The minimum dimensions for a single garage are shown in figure. If the wheelchair-user enters the vehicle via a rear door with a ramp, the carport or garage will need to provide at least 8m of clear length in which to park and gain access.

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 2 Recommendations of entrance**

Entrance					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements		- With a level landing area of 1350mm x 1350mm. - With minimum clear door opening width of 850mm.		As for Category (2) except replace: - With a level landing area 1500mm x 1500mm. - with a minimum clear door opening width of 900mm.	

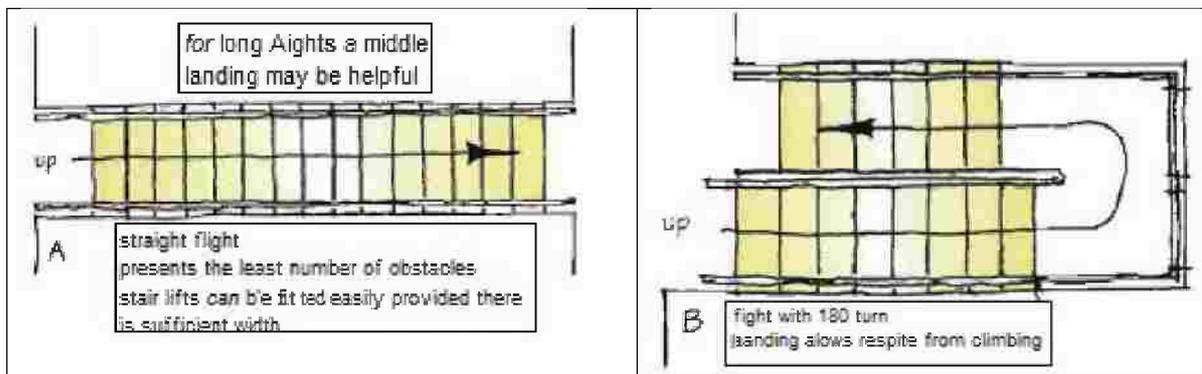
### 5.1.2 Stairs :

A universally accessible home would not include stairs, as even one step can constitute a barrier to an elderly person or someone in a wheelchair. However, if stairs are needed in the renovation of an existing house, or for other reasons, there are certain proportions and layouts that are safer and more accessible than others. It is a good idea to design the stair with the width and structure to fit a stairlift if needed.

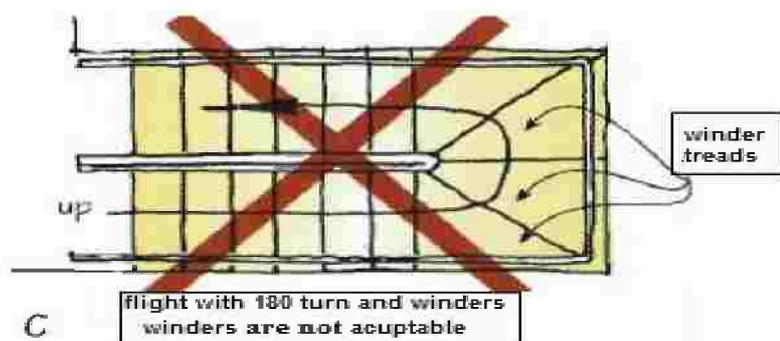
Generally, simple stairs are the safest and easiest to use. A single flight of straight stairs, as shown in figure 5.2 A, or straight flights of stairs connected by a flat landing such as that shown in figure 5.3 B are ideal. Geometrical stairs can also be accessible. Spiral stairs and stairs with winder treads, illustrated in figure 5.4 C, and should be avoided.

The staircase will be safest if it:

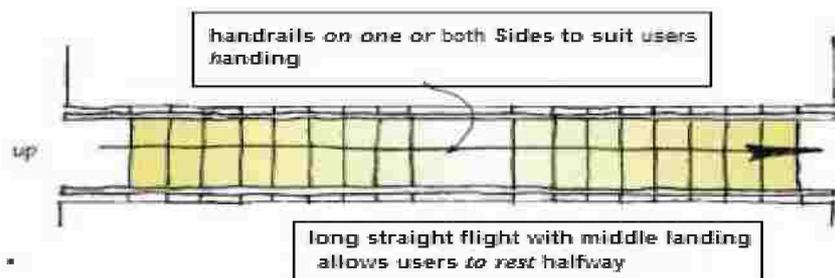
- Is well lit, without glare.
- provides a landing at the top and the bottom for the user to steady themselves before changing direction.
- has no doors that obstruct the top or bottom landings.
- consists of more than one step.



**Figure 5.3**  
types of stairs (A,B,C)



**Figure 5.4**  
A long stairs



**A. Stair Components :**

1. **Flight:** A flight is the length of stair that has a continuous slope measured along the nosing line of treads. The length of a flight is limited to 18 risers to restrict the distance a person could fall down a stair.
2. **Nosing:** The leading edge of a tread that usually overhangs the riser below.
3. **Tread** :The flat surface of a stair on which a person places their foot.
4. **Going** :The horizontal dimension from the front to the back of a tread less any overhanging nosing from the next tread above.
5. **Riser** :The height between the walking surfaces of consecutive treads.

**Table5-3 Stair dimensions**

Riser(R) mm		Going (G)		SLOP VALUE 2R+G	
Max	Min	Max	Min	Max	Min
190	115	335	240	700	550

Figures 5.5 and 5.5 illustrate the dimensions of a preferred stair. The dimensions do not replace those outlined in building regulations.

Each step will be safest if it has a:

- comfortably sized tread.
- slip resistant tread or nosing solid and non-transparent vertical back, or rise, so that nothing can get caught in between each step.
- nosing in a colour that contrasts with the

rest of the tread and does not project more than 25mm, as illustrated in figure 5.6.

- treads and risers of consistent dimension throughout a flight.

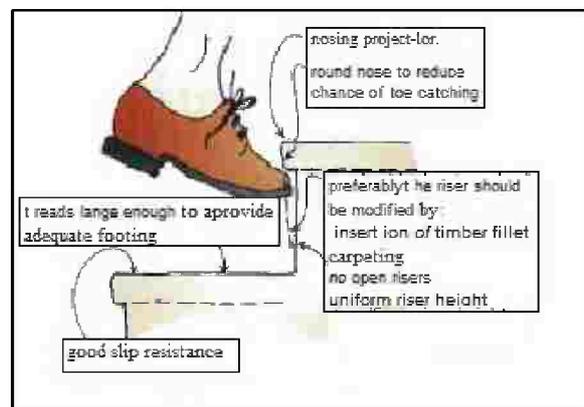
Stairs should be at least 850mm wide but around 1000mm is easier to negotiate. Stairs greater than 1200mm wide can accommodate a stairlift as illustrated in figure 5.7.

Landings should be the same width as the stair and at least 850mm in length. Headroom must be at least 2000mm measured from the line of the nosing as shown in figure 5.8.

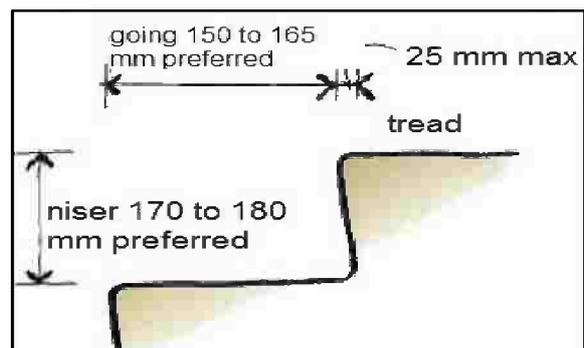
Stairs must be fitted with a handrail on one side and for people with a preferred hand, handrails may be needed on both sides. Handrails need to be placed so that:

they do not reduce the clear width of the stair They are between 865mm and 1000mm apart, and at a height that suits the intended user they are easy to grip they extend 300mm beyond the end of the flight of stairs.

Balustrades are necessary whenever there is a change of level exceeding 1000mm.



**Figure 5-5 Principles of step design**



**Figure 5-6 Step dimensions**

This requirement applies to raised decks, stairwells and other changes in level. Specifies the dimensions of balustrades and when they must be used. A balustrade will need to be atleast 865mm high when associated with a stair and 1000mm high in other locations, as shown in figure 5.11. It must not contain holes or gaps greater than 125mm in diameter.

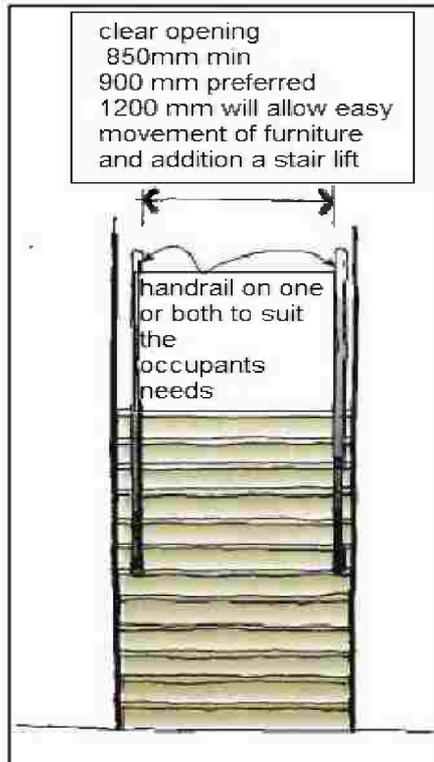


Figure 5-7 Width of a stair

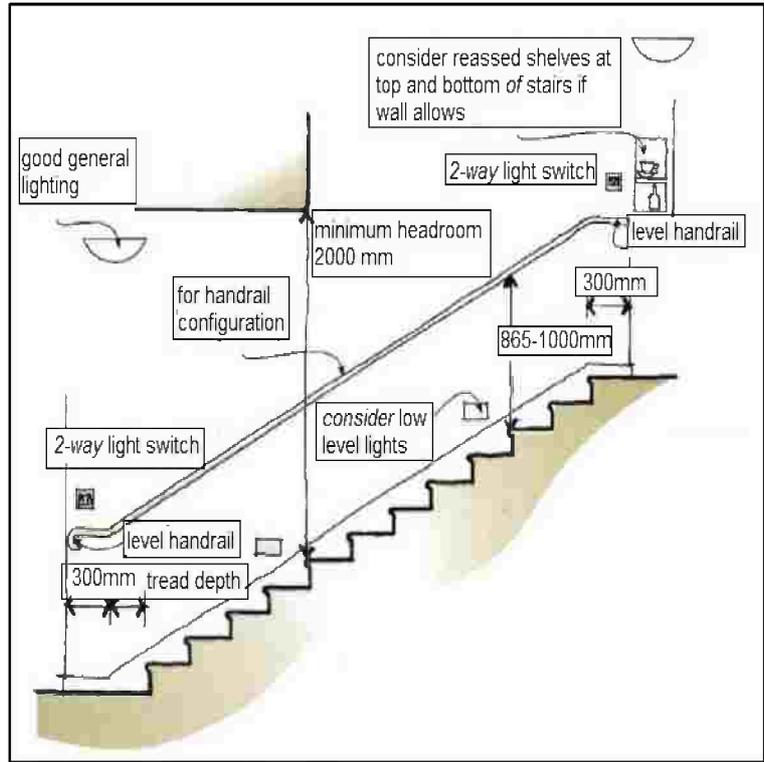


Figure 5-8 A straight of stairs

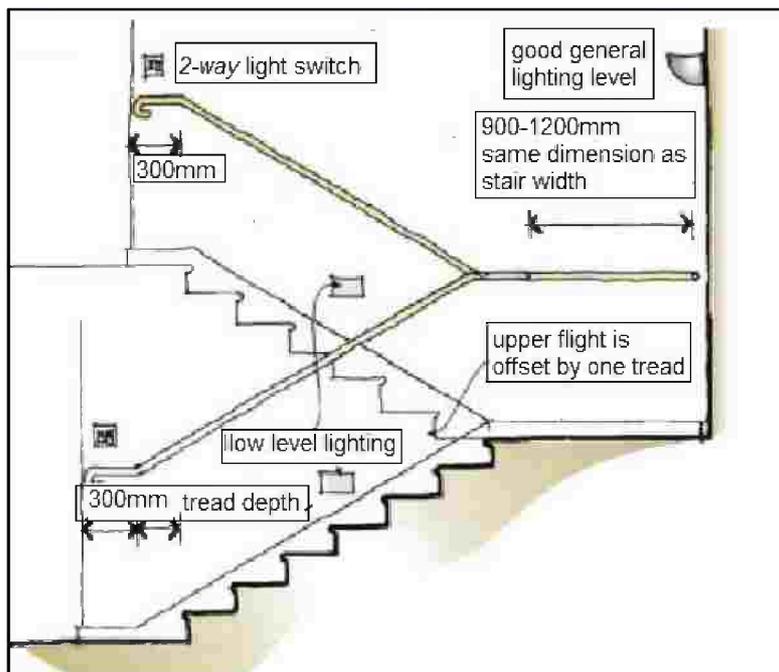


Figure 5-9 Stairs with a lighting

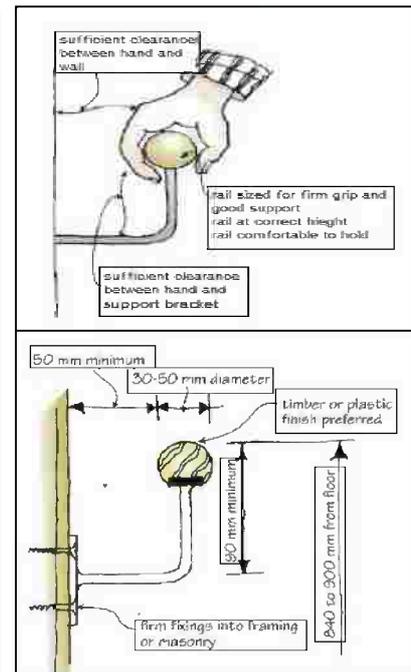


Figure 5-10 Comfortable handrail design

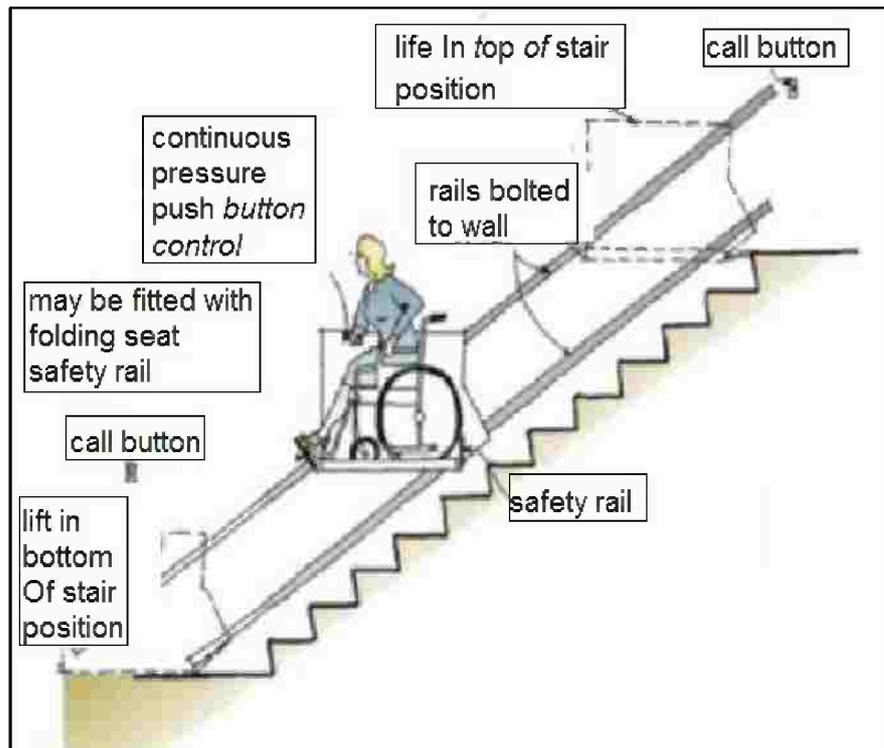


Figure 5-11 Features of a wheelchair platform lift

Table 5- 4 Recommendations of stairs

Stairs					
Category(1)	Y	Category(2)	Y	Category(3)	Y
Stairways in dwellings must feature: - a continuous handrail on one side of the stairway where there is a rise of more than 1m.		- As for the Category (1) with the following additional features: - a minimum clear width of 1000mm - be straight in design - be positioned adjoining a load bearing wall. - Handrails on both sides of the stairway are preferred.		As for the Category (2) with the following additional features: - Continuous handrails on both sides of the stairway. - Minimum landing areas of 1200mm x 1200mm at the top and base of the stairway. - The steps must provide a slip resistant finish and suitable non-slip tread. - Performance Statement where installed, stairways are designed to reduce the likelihood of injury and also enable future adaptation.	

### 5.1.3 Bathrooms:

For its area, the bathroom is often the most expensive room in a house to construct and furnish. It is also one of the most important rooms to get right. The functional value of a house is greatly diminished if the occupants cannot comfortably use the bathroom and toilet. A successful bathroom will be designed to enable access to fixtures and facilities even as the users' needs change over time.

Bathrooms involve complex issues and should not be constructed without reference to the Standards.

A bathroom built with universal access in mind will benefit all users. Allowing enough room for a person in a wheelchair to manoeuvre adds to the comfort of all users. Installing a shower with a level entry means clearer access for everyone and makes it possible for a person in a wheelchair to use the shower if the need arises. As bathrooms and toilets are expensive to renovate, it is worth considering how they may be adapted to provide support for future users and their needs.

Designing an adaptable or accessible bathroom makes sense and keeps options open.

When customizing a bathroom design to the preferences and needs of a particular person it is important to ascertain that person's level of mobility. The answers to the following questions may be a suitable starting point:

Does the person use a commode, walking frame, wheelchair or other mobility aid? If so, how much maneuvering space will be needed? Is the person able to lift and transfer their weight? If so, do they need an aid or support to move between bathroom fittings? Can they transfer between supports in one direction better than in the other?

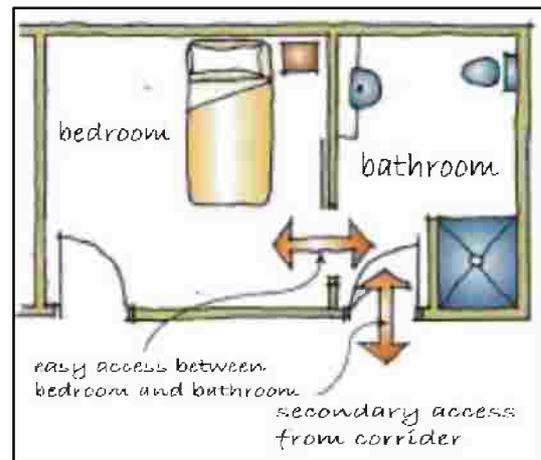
- Can the person operate standard controls such as a hand-held shower, mixer tap and toilet flush, or will some adaptations be needed? Are the person's requirements likely to change with time?

This study offers advice on how to build a universally accessible bathroom and how to enable access for people with particular mobility limitations

#### A. Location and size:

Size is always an important factor in the usability of a bathroom. Within reason, bigger is usually better since it allows room for movement around the fittings and fixtures. It is not, however, the only measure of a successful bathroom. A smaller bathroom can be designed to provide suitable facilities and enough room to move.

The bathroom needs to be accessible from other parts of the house. It is most convenient to have access between the bedroom and the toilet facilities with a layout similar to that illustrated (figure 5.12)



**Figure 5-12** The best locate for bathroom

If the house has more than one floor level, it may be appropriate to have a bathroom, or at least a toilet, on each level.

It is sometimes desirable to extend the use of an en-suite bathroom by adding a second door to make it accessible from a corridor or room other than the adjoining bedroom. This can be useful if the en-suite is the only bathroom in the house or if another bathroom is not easily accessed from the neighboring rooms.

**B. New or renovation:**

A renovation that seeks to convert an inaccessible bathroom into a universally accessible one can be an ambitious project. As well as working within the confines of existing walls, doors and windows, the new bathroom fittings may be constrained by existing plumbing.

<p><b>Figure 5-13 layout Befoure rehabilitation</b></p>	<p><b>Figure 5-14 toilet and bathroom converted into a more accessible dual function room</b></p>	<p><b>Figure 5-15 facilities converted into one bathroom with a wet-area shower</b></p>

Designing a bathroom and toilet to be adaptable will facilitate later renovations to make them accessible. Figures 5.13, 5.14 and 5.15 show how a separate bathroom and toilet can be built to allow for future renovations that will join them into a single accessible bathroom and toilet. This strategy could be applied to the design of a new house so that initially separate rooms can be readily integrated if the need arose.

**C. The toilet:**

The standard toilet room is approximately 900mm wide by 1500mm long, which can be too small to provide access to some people with disabilities. The elderly and others who can walk may be able to use a standard toilet, although some may need grabrails for support as shown in figure 5.16 hinging the door to open outwards can make the space more useable and easier to access.

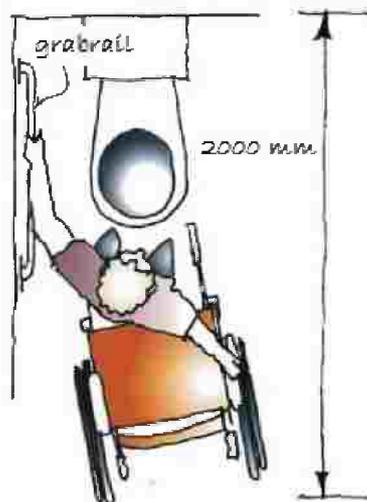
People who use wheelchairs will require more space in which to transfer between their wheelchair and the toilet.

There are many transfer methods but the most common are side transfer, as shown in figure 5.17 and front transfer as shown in figure 5.18. Some people need to be assisted. A room that is sufficiently large to allow a wheelchair to be manoeuvred should also be large enough to accommodate an assistant.

Some people who use wheelchairs prefer to have a washbasin at hand to use from the toilet before transferring back to the wheelchair.

**D. Storage and disposal:**

All toilets should have easily accessible storage close at hand in which to keep tampons, incontinence pads or other sanitary products if required as well as spare rolls of toilet paper. It is also useful to have a small rubbish bin located close to the toilet in which to place empty toilet rolls, sanitary wrappers and any other refuse.

 <p>A diagram showing a person in a wheelchair positioned in front of a toilet. A grab rail is mounted on the wall above the toilet. A vertical dimension line indicates a height of 2000 mm from the floor to the top of the toilet bowl.</p>	 <p>A diagram showing a person in a wheelchair transferring to a toilet bowl from the side. The toilet seat height is labeled as 400 mm to 460 mm. The overall width of the toilet fixture is labeled as 1600 mm maximum. A grip rail is shown on the side of the toilet.</p>	 <p>A diagram showing a person in a wheelchair positioned next to a toilet and a wash-hand basin. A grab rail is mounted on the wall above the toilet. The wash-hand basin is located close to the toilet.</p>
<p><b>Figure 5-16</b> Front transfer to toilet bowl</p>	<p><b>Figure 5-17</b> Side transfer to toilet bowl</p>	<p><b>Figure 5-18</b> Hand basin in non-standard wrappers and any other refuse. location close to toilet</p>

**E. Bathroom Fittings –Toilets:**

There are many different toilet and suites available. Some are designed specifically for people disabilities. The right choice will depend on the needs of the users.

Some people prefer a higher seat than standard to make it easier for them to sit and stand again after using the toilet. Wheelchair-users will usually prefer a toilet seat that is the same height as their wheelchair seat, about 460mm to 480mm, to make it easier to transfer between the two. Some toilet pans are designed for this purpose.

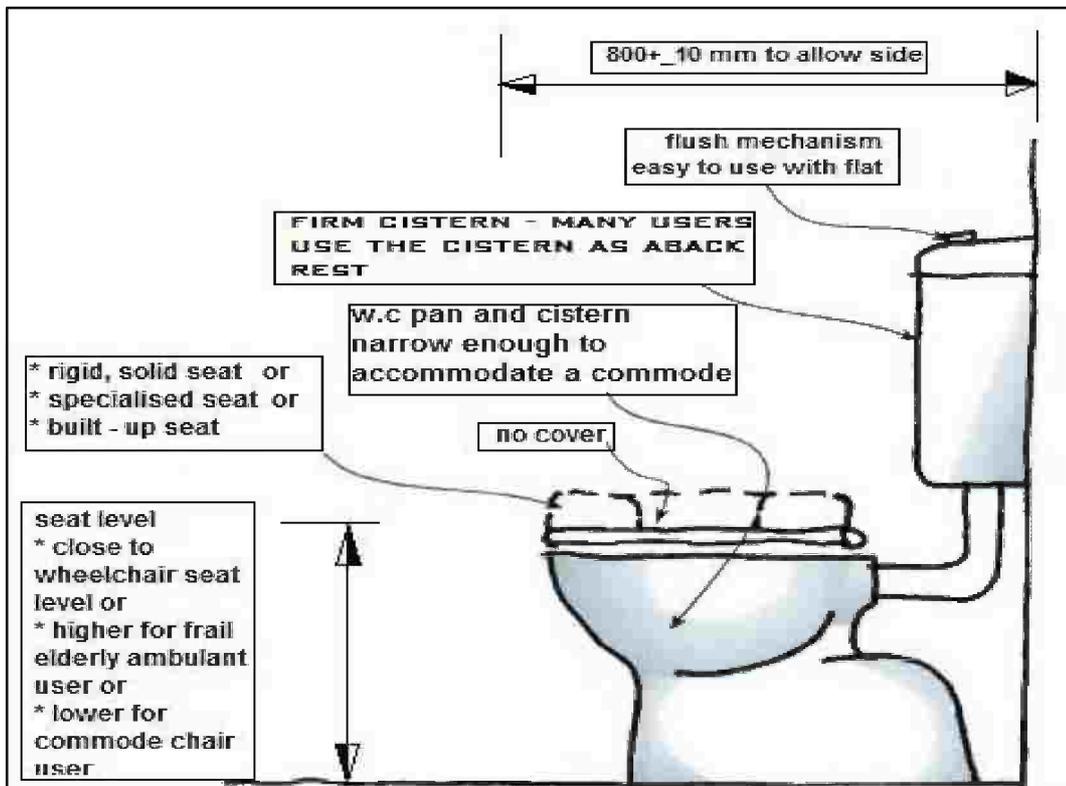
Some people rely on the open lid for back support. Certain seats are designed to be used in this way. The toilet pan needs to be positioned so that the lid opens against the cistern, the wall or a rail to enable it to support the user's weight.

Flush controls should be at a height the intended user can reach and should be easily operated. Some models have raised controls so that people with limited strength in their fingers or hands can still operate them.

A wall-mounted toilet that is clear of the floor may make it easier to clean the bathroom or toilet floor.

**F. Bathroom fittings –Bidets:**

A bidet can be a useful hygiene aid. If a bidet is installed it should be placed alongside the toilet pan and should be accessed with the same ease as a toilet. It may need to be set at a particular height, with appropriate clearances and with grab rails if necessary.



**Figure 5-19 Desirable features in a toilet**

**G. Bathroom fittings - Washbasins, vanity units and taps**

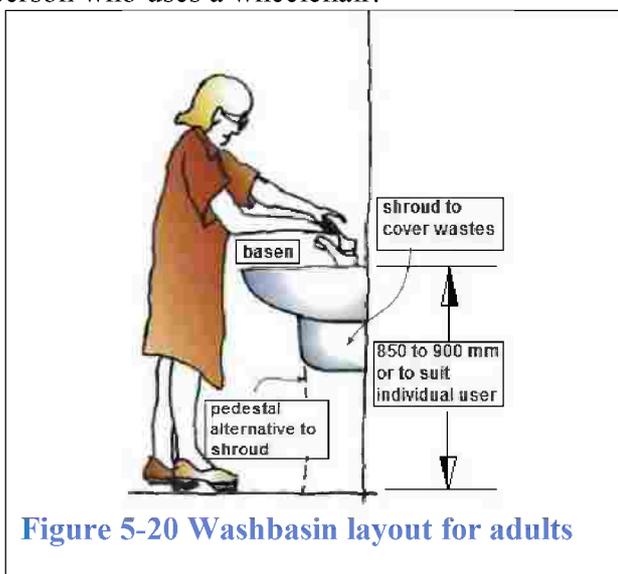
The standard height for a basin is between 850mm and 900mm, as shown in figure 5.20.

This height is well suited to standing adults. The basin may be attached to the wall, mounted on a pedestal or located in a vanity top.

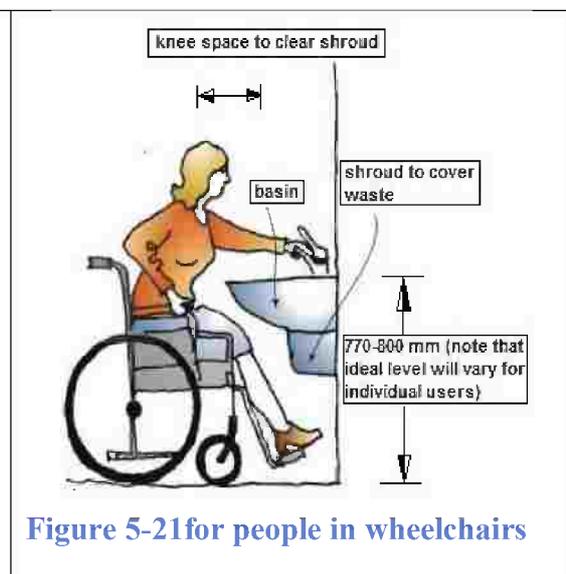
People in wheelchairs need the basin at a lower level and need knee space below it so that they can wheel right up.

Semi-recessed basins that project beyond the edge of the vanity are suitable for both standing persons and

People in wheelchairs. They provide knee space under the protruding part of the basin, as shown in figure 5.21, which also illustrates a vanity unit with a removable storage module under the basin. The module can be removed if the bathroom is to be adapted for use by a person who uses a wheelchair.

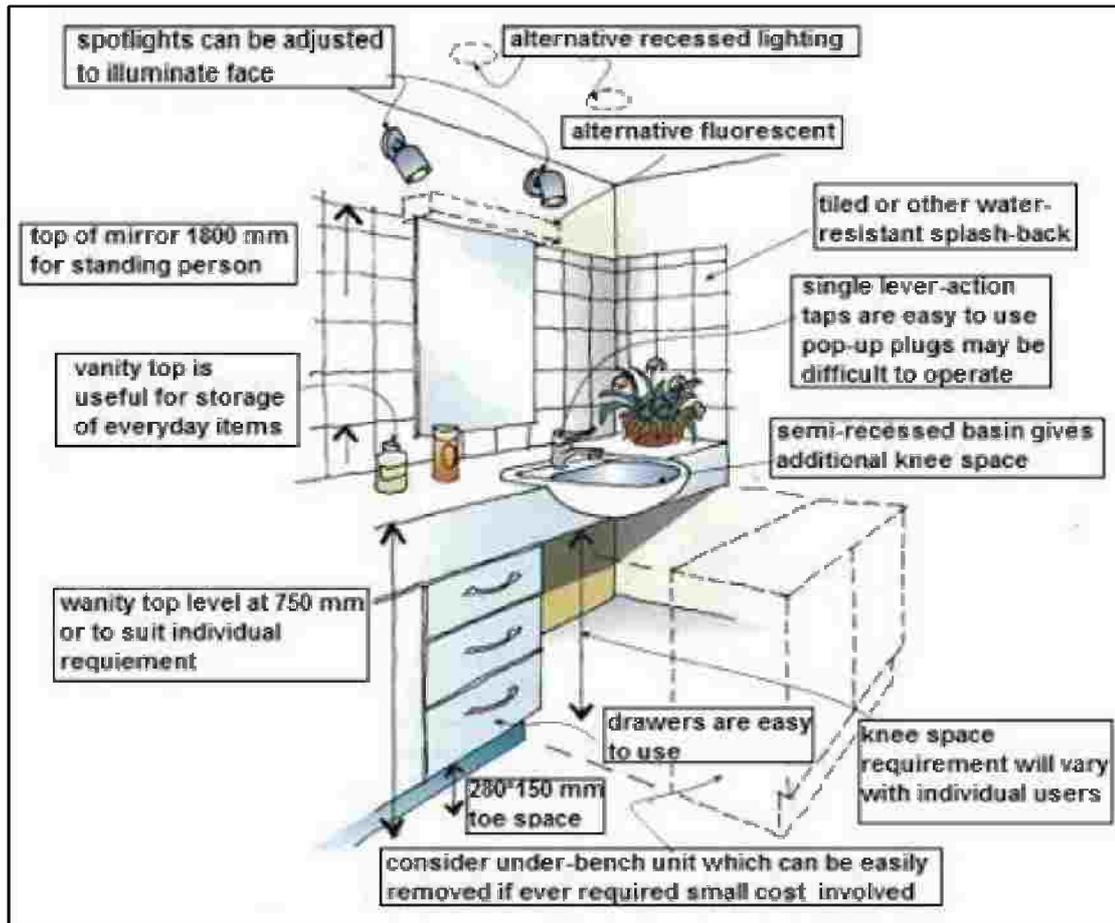


**Figure 5-20 Washbasin layout for adults**



**Figure 5-21 for people in wheelchairs**

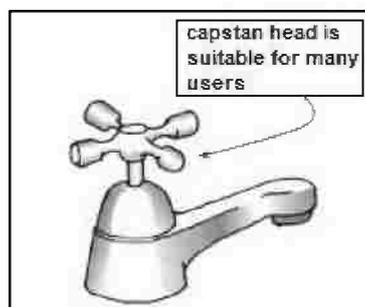
Basins must be securely fixed because people will use them to support themselves. The storage space in a vanity unit usually consists of a combination of cupboards and drawers. People with limited reach may prefer less cupboard space and more drawers, since the contents of drawers are easier to reach. If medicines or cleaning agents are to be stored within the vanity and the household includes a young child, childproof locks should be fitted.



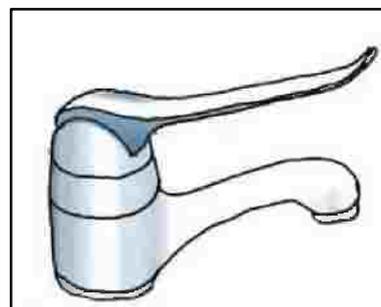
**Figure 5-22 Removable vanity modules make knee-space available**

It is essential that taps are easy to use. Many people with a weak grip have difficulty using standard taps. A round, knob shaped tap handle is particularly difficult to use. Four-pronged capstan handles, shown in figure 5.23, are more easily used but for many people a lever handle mixer taps that shown in figure 5.24 is the easiest.

Some people prefer separate taps avoiding the two directional operation of mixer taps. Hot and cold taps should be clearly marked with the hot tap on the left hand side and the cold on the right.



**Figure 5-23 Some people prefer capstan head taps**



**Figure 5-24 Mixer taps suit many people**

## H. Bathroom fittings –Baths:

A soothing bath can be wonderfully relaxing providing it's not too difficult to get in and out. Baths are convenient for families with children, however they can be difficult for the elderly and people with certain disabilities.

Generally, it is wise to avoid placing a shower above a bath, and it may be best to omit a bath altogether.

Where a flexible shower hose is installed over a bath a backflow prevention device must be fitted to the water supply pipe.

If a combination bath and shower is installed, fittings can be added that make it possible for the elderly and those with limited mobility to use it. The combination bath and shower in figure 5.25 is suitable for those who have the use of their legs but may require grab rails on which to steady themselves. Wheelchair-users will find ideas in the combination bath and shower.

A selection of the following fittings, may make it safer and easier for some people to use the combination bath and shower:

- a vertical grip post fixed from the floor and ceiling to allow users to turn through 900 and support themselves while stepping in and out of the bath.
- a horizontal "L" shaped grabrail that wraps around the corner above the bath and can be held while showering.
- a mixer tap that can be reached while seated in the bath.
- a shower with an adjustable height slide.

Some people may also benefit from having a removable bath board which provides a false base and raises the user to a position in which it is easier to get in and out of the bath. A rubber mat or slip-resistant adhesive strips shown in figure 5.26. will make the bath and shower safer.

While they are not commonly used in private housing, mechanical and hydraulic lifting devices are available to help lift people in and out of the bath.

Some are wheeled and others are mounted on a ceiling track.

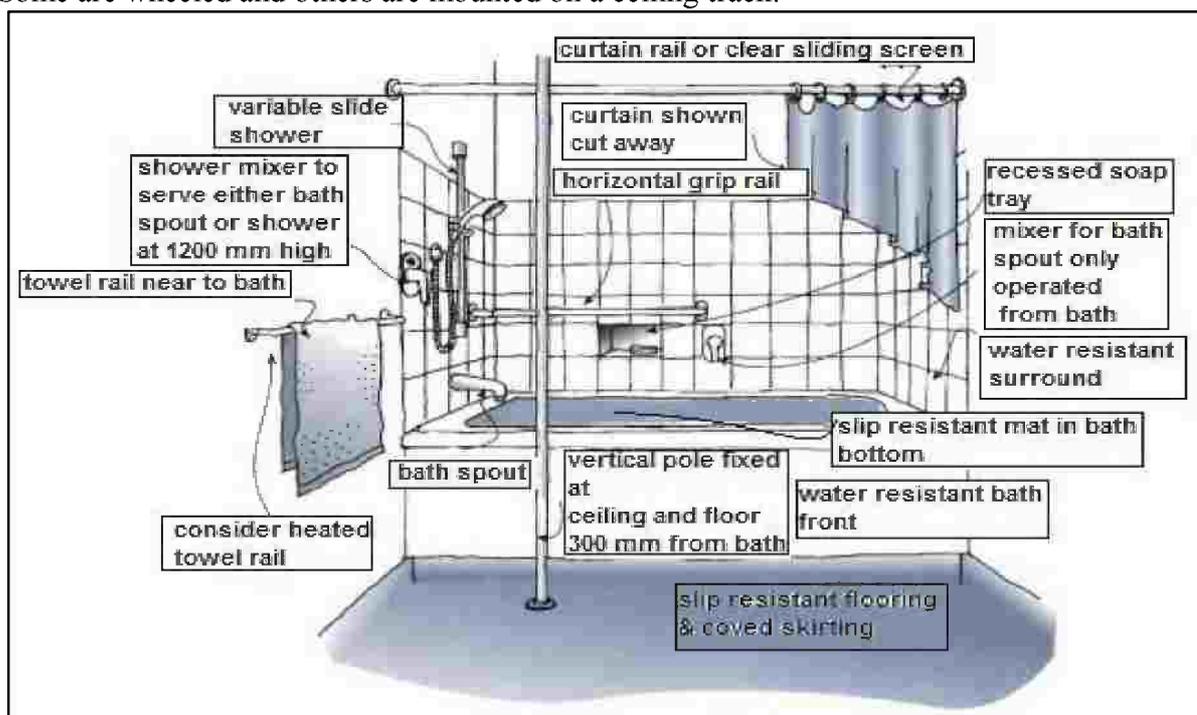


Figure 5-25 A combination bath and shower with additions designed to make it more accessible

Wheelchair-users will benefit from the slightly different arrangement. The main adaptations to assist people in wheelchairs include:

- A comfortable platform at the end of the bath that the user can transfer onto from their wheelchair before lowering themselves into the bath.
- A horizontal grab rail just above the rim for use when lowering into and lifting out of the bath.
- A mixer tap that can be accessed from outside the bath.
- A mixer that can be reached from the bath or the bath platform to operate the shower or the bath spout.

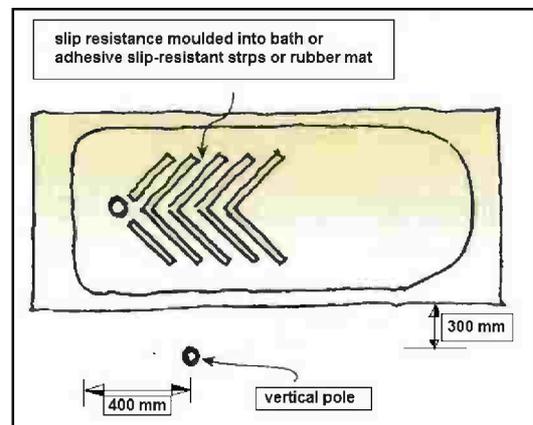


Figure 5-26 Slip-resistant adhesive

- A hand-held flexible shower hose that makes it possible to shower while seated.
- A combination bath and shower may require some form of screen. Curtains are most appropriate since they are less likely to restrict the user's movement than a sliding screen. Weighted shower curtains are available.

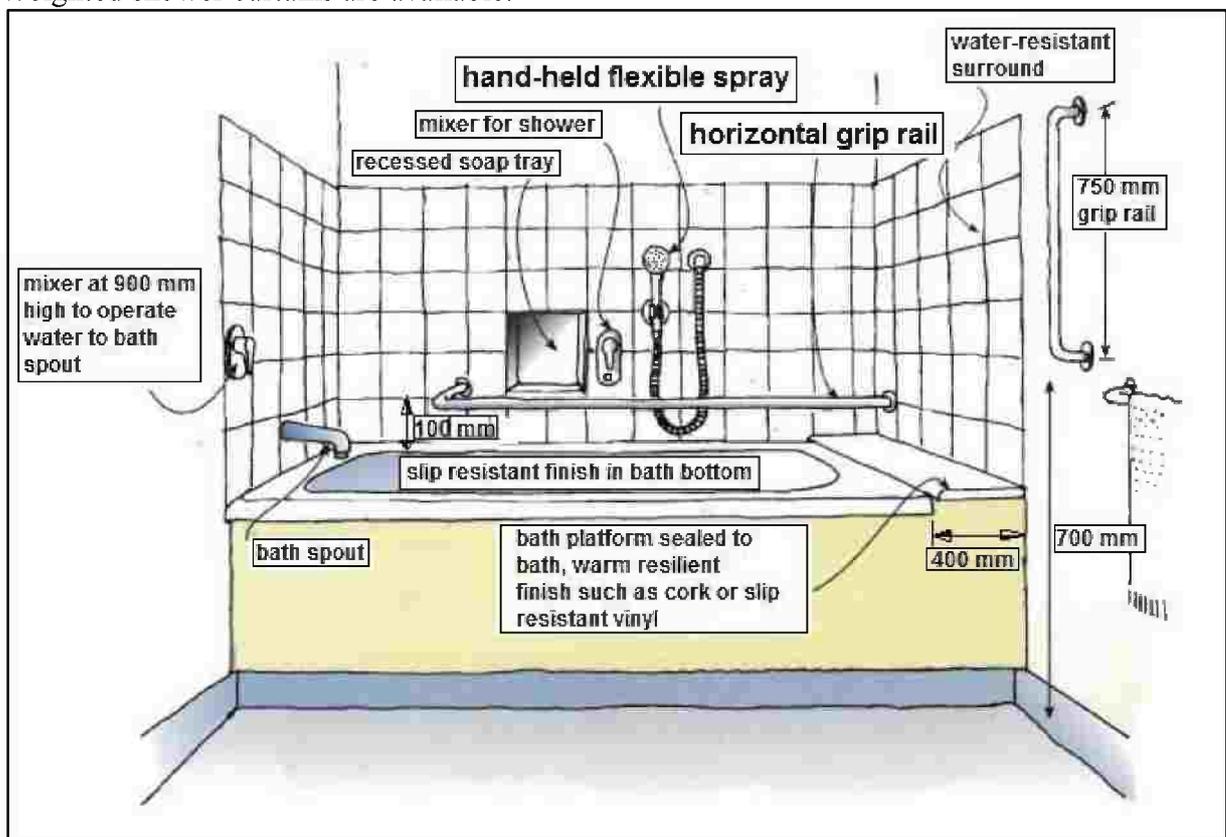


Figure 5-27 Combination bath and shower that may suit some wheelchair-users

**I. Bathroom fittings -Shower cubicles:**

- Showers are safer and easier to access than baths.
- Showers are typically set in cubicles, with a raised lip around the base to prevent water escaping. This type of shower is not suited to all users. The upstand edge or hob can be a trip hazard or a barrier that makes it impossible for some people to enter.
- A standard cubicle is sometimes too small. The best size of shower will vary. Depending on the mobility and needs of the user, 900mm x 900mm may be adequate but 1200mm x 1200mm or larger is often preferred.

- A new or existing shower can be adapted to be safer and more easily used by the provision of grabrails, a slip resistant base and if appropriate, a seat.

If a permanent shower seat is installed in a shower cubicle, it should be:

- On a wall adjacent to and within easy reach of the taps .
- Within reach of the stream of shower water.
- Self-draining of a suitable size and comfortable to use.

#### **J. Wet-area showers:**

In contrast to a shower cubicle or recess, a wet-area shower is just a part of the bathroom that is used as a shower. It has no base other than the bathroom floor and no raised hob to create a trip hazard or access barrier. The bathroom floor is sloped to allow the shower water to drain to an outlet. A wet-area shower does not require a shower screen or curtain, but these can be fitted if desired.

By fitting a screen along one side of the shower area, part of the bathroom can be protected from water spray. Power points and, if necessary, a wheelchair can be protected by this screen.

Wet area showers take up more space than a cubicle, especially if there are no screens to limit the spray and the spread of water before it discharges down the drain. The space is not wasted, however, since the user can stand in the same area to dry or access the vanity or toilet.

Wet area showers have advantages as they:

- Are accessible to all users.
- Have no upstand barriers to entry.
- Provide room in which to stand or sit on a fold-down seat, or to use a showerwheelchair.
- Provide rooms for an assistant are easy to clean with no difficult to reach corners.

When constructing a wet-area shower, the entire floor of the bathroom needs to be constructed to a wet area construction standard as shown in figure 5.28.

#### **K. Grabrails:**

Grabrails can make an enormous difference to people's ability to use sanitary facilities. Most commonly installed in bathrooms and toilets, grabrails can be used throughout the house to make it easier for people to negotiate changes in floor level, to move between sitting and standing and to maintain their balance.

A grabrail needs to be well secured so that when it is grabbed it is strong enough to support the entire weight of the person using it. Grabrails need to be durable and to remain free of corrosion. Rails are usually made from metal such as stainless steel with a textured surface to provide a good grip. They may be finished in chrome plate or powder-coated in a range of colours. There are a variety of grabrails available ready-made but other shapes can be manufactured to suit particular requirements. Some makes of rail can also be cut and assembled to suit particular needs.

The bathroom is the room most likely room to need grabrails fitted over its lifetime, so it may be prudent to line the bathroom walls with 12mm or 18mm plywood at the time of construction. This allows grabrails to be fitted in any position or moved if necessary. It also makes installing them quicker and cheaper.

Grabrails are not the only support available in a bathroom. People who are unsteady or likely to fall will grab the nearest support regardless of what it is. Fittings such as the basin or towel rail should be robust and securely fixed.as shown in figure 5.29.

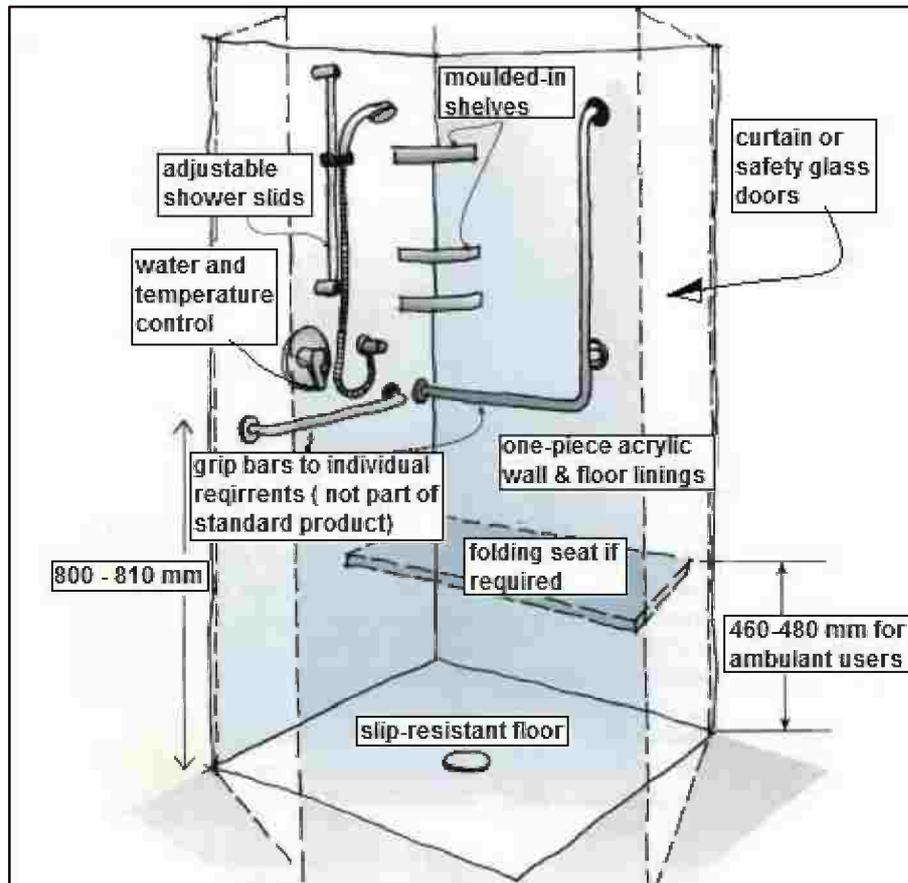


Figure 5-28 Wet area shower with no raised hob

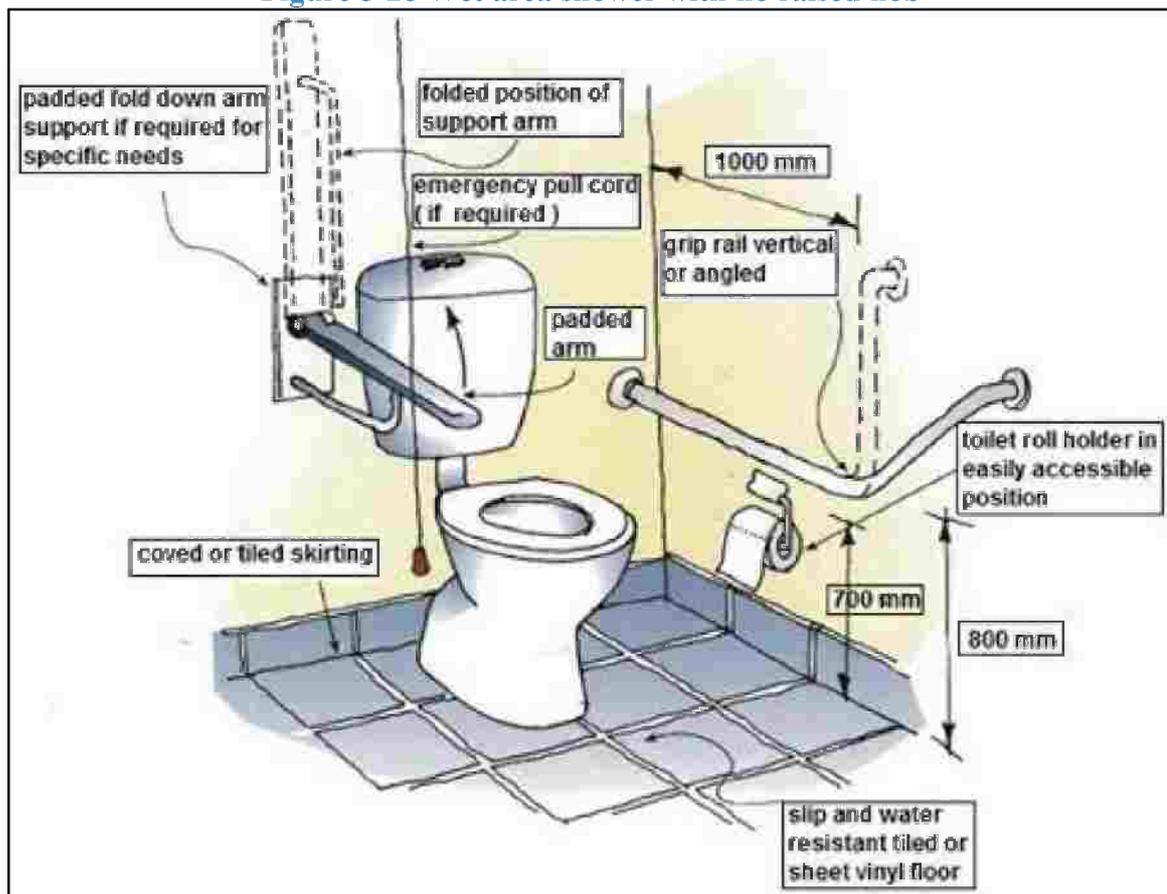


Figure 5-29 Grabrails make it easier to access bathroom fittings

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 5Recommendations of Bathroom**

Bathroom					
Category(1)	Y	Category(2)	Y	Category(3)	Y
Dwellings should have a toilet on the ground (or entry) level that provides: - A minimum clear width of 900mm between the walls of the bathroom if located in a separate room. - A minimum 1200mm clear circulation space forward of the toilet pan exclusive of the swing of the door in accordance. - If the toilet is located within the ground (or entry) level bathroom, the toilet pan should be located in the corner of the room to enable the installation of grabrails.		As for Category (1): - With a minimum clear width of 1200mm between the walls of the bathroom if located in a separate room, or between amenities if located in a combined bathroom.		As for the Category (2)with the following features added: - A toilet pan positioned between 450mm – 460mm from the nearest wall as measured from the center line of the toilet. - 600mm minimum clearance forward of the cistern measured from the front of the cistern to the front of the toilet pan. 800mm (+/-10mm) clearance is required if the cistern is recessed. - A height for the pan of between 460mm - 480mm above the finished floor level.	

**5.1.4 Bedrooms:**

A bedroom should be a place in which to feel relaxed, comfortable and safe.

The ambience is as important as the functionality of the room.

Everyone benefits from well-placed furniture, lighting, and communications, such as a telephone, as well as convenient access to an en-suite or shared bathroom. People in wheelchairs in particular, will benefit from having generous space in which to manoeuvre and transfer between wheelchair and bed.

**A. Individual bedroom:**

a bedroom layout suitable for most people, including those in a wheelchair. This example has the essential characteristics of an accessible bedroom:

sufficient space to move around and to make the bed close proximity to a bathroom good natural lighting and ventilation well considered clothes storage, furniture and other fittings.

As a guide, a room needs to be around 14m<sup>2</sup> or more to hold a double bed while still providing room for wheelchair access.

**B. The ideal bedroom:**

Opens directly onto an en-suite bathroom or shared bathroom to make it easy for people to move between bed, toilet and shower has easily accessed clothes storage such as a walk-in-robe and wardrobes with drawers.

People with limited mobility may benefit from a room that provides:

Ventilation good natural and artificial lighting and lighting is important:

- A pleasant outlook is especially appreciated by people who spend extended periods in bed.
- Ventilation is necessary to clear exhaled water vapour that can result in mouldgood natural and artificial lighting improves the ambience of a room.
- Natural lighting should be supplemented with artificial lighting to improve visibility for reading in bed.

- Completing tasks at a desk.
- For finding clothes in a wardrobe.
- The room will be more comfortable for all if it has:
- Power outlets in accessible and convenient locations
- Access to a nearby outdoor area adequate privacy.
- A suitably placed television or radio for entertainment telephone, intercom, emergency call, front door remote control or other communications that can be reached from the bed way light switching so that lights can be operated from either the bedroom doorway or the bed
- A firm floor covering, such as short pile carpet that is easy to move across.

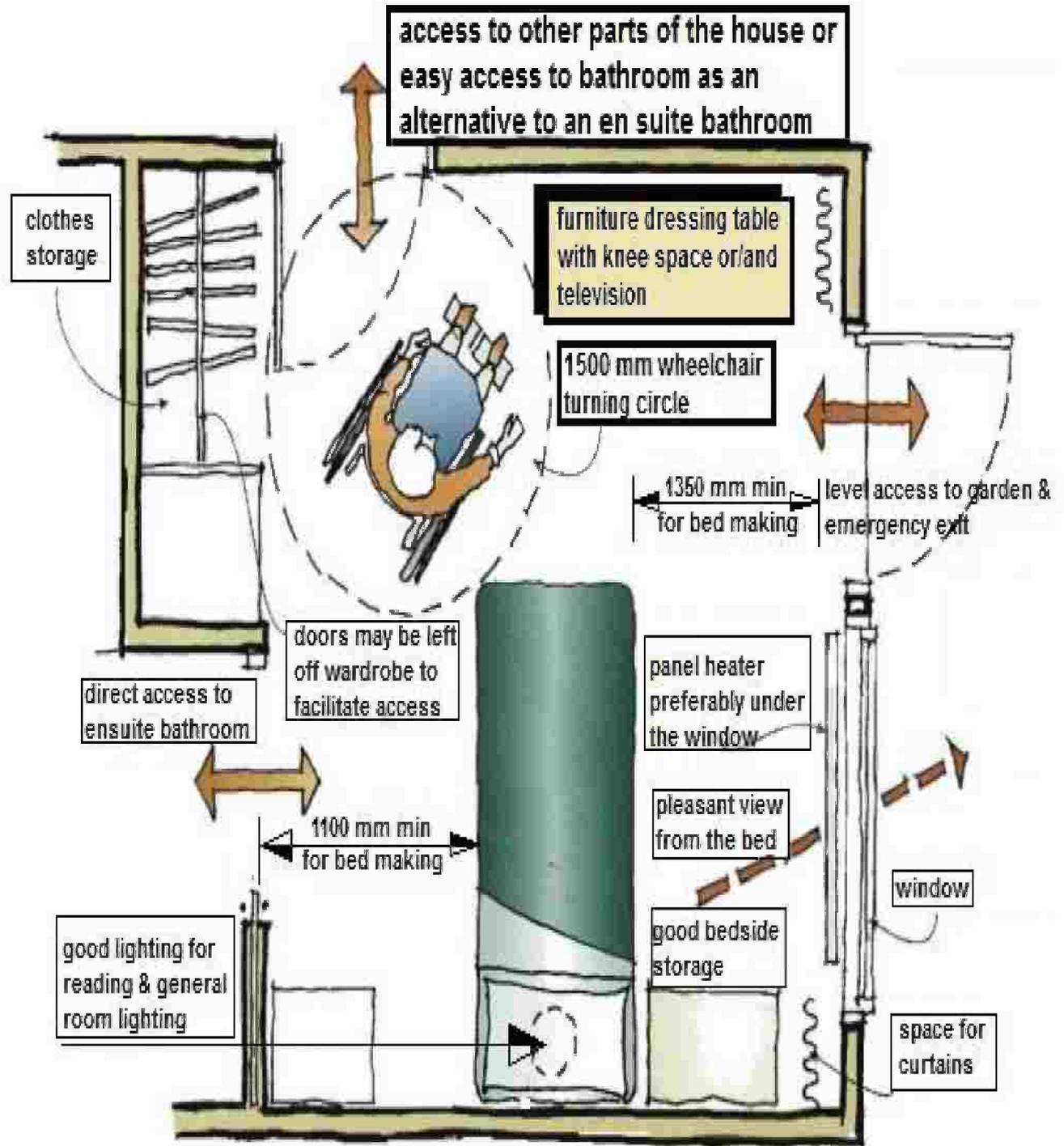


Figure 5-30A single access-friendly bedroom

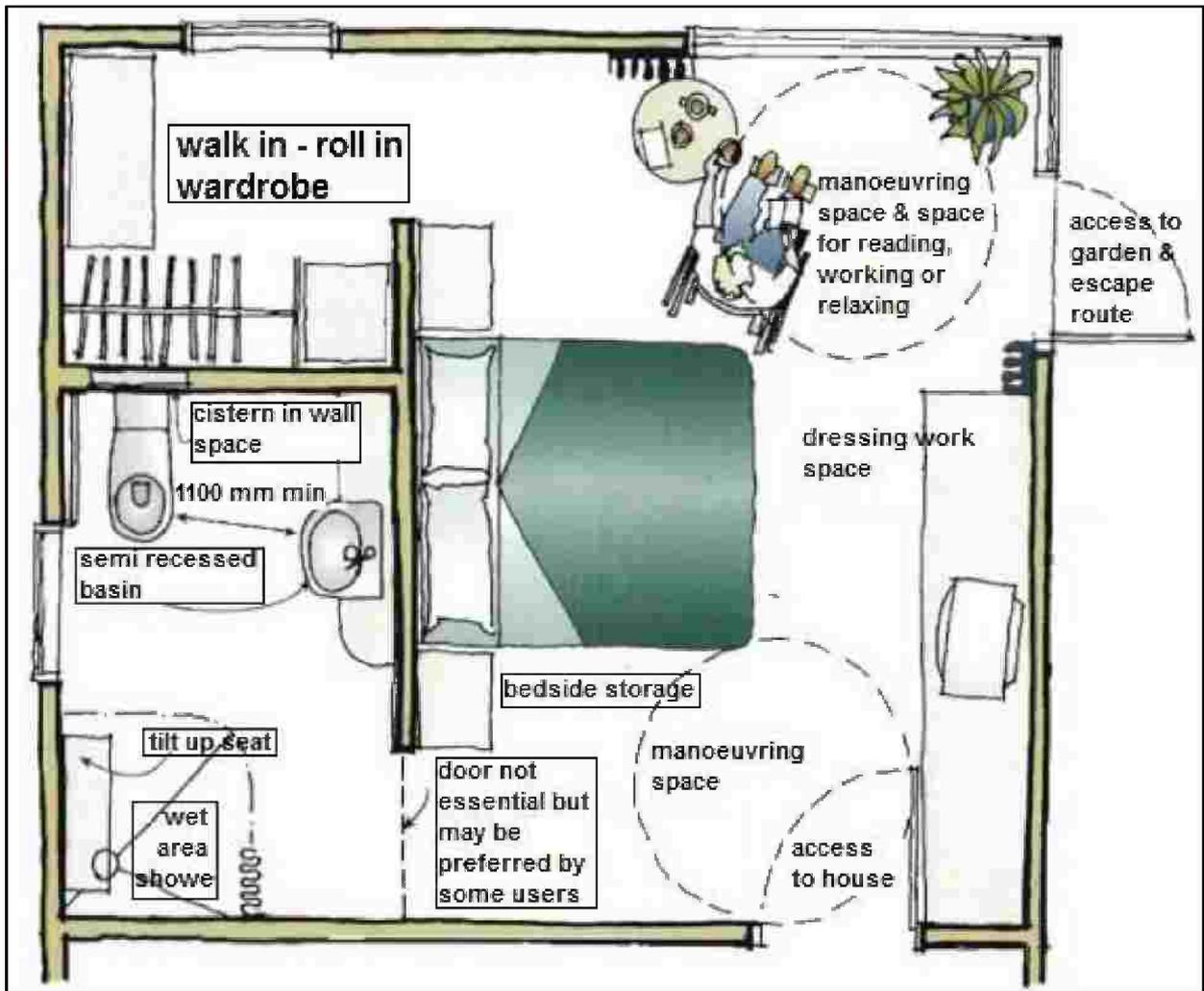


Figure 5-31 A double access-friendly bedroom

Are solutions have helped in the needs of the levels of physically disabilities:

Table 5- 6 Recommendations of bedroom

bedroom					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		The dwelling should feature a space (or room) on the ground (or entry) level that: <ul style="list-style-type: none"> <li>- Is of at least 10m<sup>2</sup> with one wall a minimum length of 3m.</li> <li>- Provides for a minimum path of travel of at least 1000mm on at least one side of the bed.</li> </ul>		As for the Category (2), but it also: <ul style="list-style-type: none"> <li>- provides a space 1540mm (width) x 2070mm (in the direction of travel) on the side on the bed that is closest to the door approach; and</li> <li>- provides for a minimum path of travel of 1000mm on the remaining side of the bed.</li> <li>- above the finished floor level.</li> </ul>	

### 5.1.5 Lighting :

Artificial lighting can define the ambiance of a house and is important for safety. Adequate lighting becomes increasingly important as a person ages, with some older people requiring two to three times more light than younger people for optimal visibility.

#### A. Light switches:

Design the electrical installation so that there will be sufficient switches and outlets in the right locations for current and future needs.

The preferred height for light switches is 900mm to 1100mm and aligned with door handles, as illustrated in figure 5.34.

They should be placed near the entrance to a room and at the same side of the door as the door handle.

Switches must be easy to use. Large rocker switches are ideal. Illuminated switches help people find them in the dark. Too many switches on one plate can create confusion, and two or three switches on a single plate is the maximum recommended.

In some cases, it may be appropriate to consider the use of proximity switches that operate the light on sensing the presence of a person.

This type of device is particularly useful for stairways and halls and for external lighting to entrances and garages. An alternative is a remote control switching device, which works in a similar manner to a TV remote controller. Two-way or three-way switches are also useful in stairways, corridors and bedrooms and for controlling exterior lights to entrances and garages.

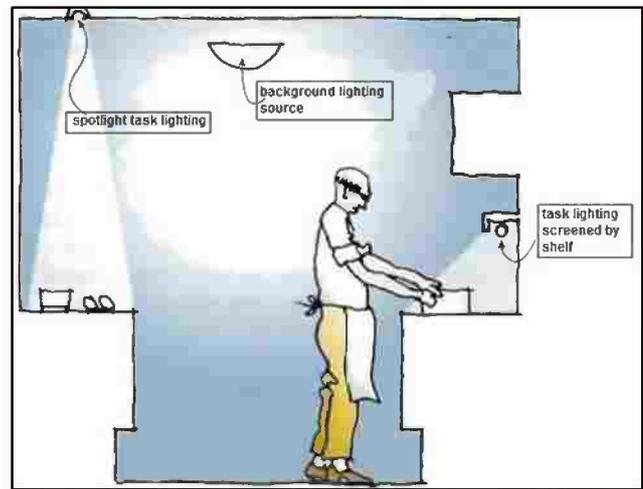


Figure 5-32 Background lighting and task lighting.

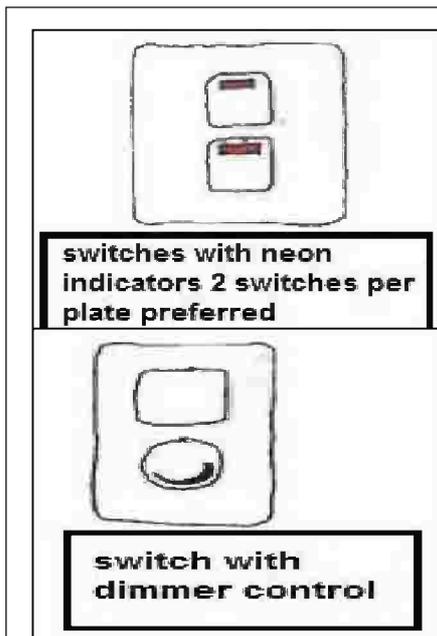


Figure 5-33 Large switches

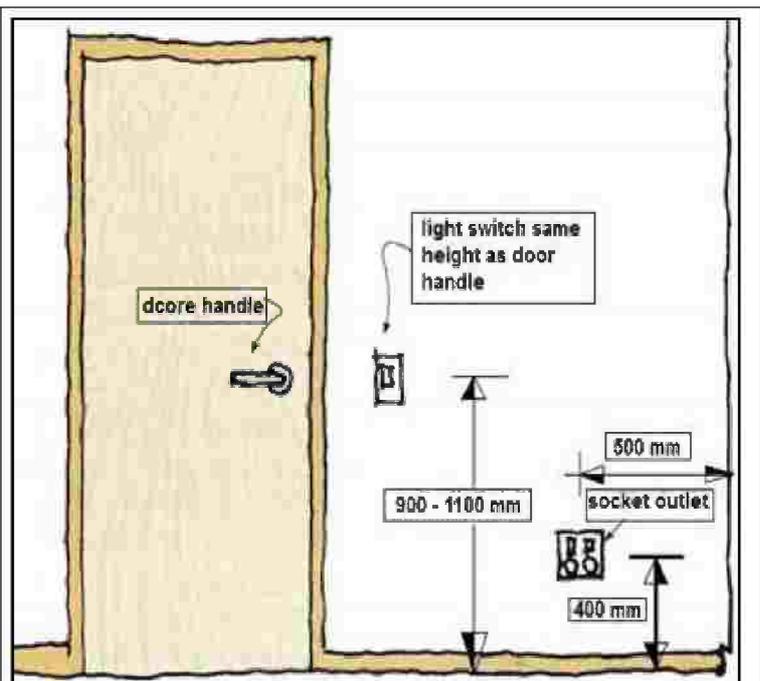
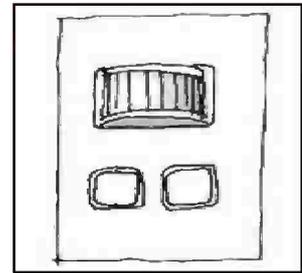


Figure 5-34 Preferred positions of light switches and socket

**B. Power outlets:**

A house needs to be equipped with enough easily accessed electricity outlets to avoid the need for extension cords and overloaded circuits. Extension cords can be a trip hazard. Electrical outlets should be doubles to avoid the later use of adaptors.

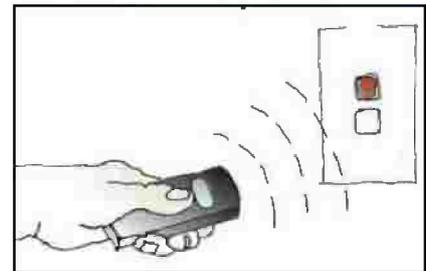
For ambulant people, power outlets on walls behind benches should be 100mm to 300mm above the bench . For people in wheelchairs



**Figure 5-35 Proximity switch**

and other people who have limited reach, outlets should be mounted, on the bench front or on the wall 500mm out from a corner.

Power outlets on walls should be installed at a consistent height throughout the house between 400mm and 500mm above the floor and located 500mm from a corner. This height, illustrated in figure 5.37 on the previous page, is a compromise. It may mean that outlets are too low for some people but not so high that the draped cord is a hazard. Where possible, locate power outlets-where they will not be obstructed by furniture.



**Figure 5-36 Remote control light switch**

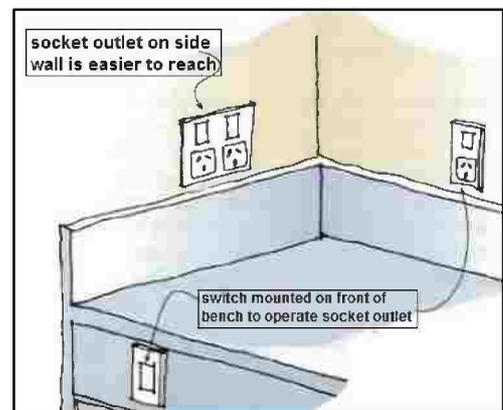
If a power outlet is to be placed above a bench-top standing

persons will find it generally accessible between 100mm and 300mm above the bench. For people in wheelchairs and others with a limited reach , outlets should be mounted at the bench front and 500mm away from a corner.

**C. Communications:**

Modern communications are almost essential for everybody but can be a lifeline .for many people with a disability.

Cordless and mobile telephones make it possible for people to telephone from anywhere ina house. The position of the main telephone point is not so important. For those who have difficulty holding a phone in one hand and dialing with the other, a fixed keypad should be installed in a suitable location in a house.



**Figure 5-37 Socket outlets on a bench-top**

Answering machines can be most useful for people who are unable to move quickly in order to reach the phone.

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 7Recommendations of Lighting**

Lighting					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		Light switches should be positioned in a consistent location: - Between 900mm – 1100mm above the finished floor level. - Horizontally aligned with the door handle at the entrance to a room. - PowerPoint's should be installed not lower than 300mm above the finished floor level.		As for Category (2)with the following feature: - Light and powerpoint switches should be rocker action, toggle or push pad in design with a recommended width of 35mm.	

**5.1.6 Living room:**

Depending on how it's used, the living room might be thought of as the family room, the sitting room, the TV room or the lounge room. It is often but not always part of a combined kitchen and dining room, and it often opens to an outside area.

Living rooms tend to accommodate much through traffic, particularly where they open directly onto a kitchen or outdoor area. They need to be designed and furnished so as to minimise obstacles. A living room should be planned without sunken areas, long pile carpet, threshold steps or other obstacles to access. Designing windows with low sills will ensure that both people who are sitting and standing will have a view from the living room. Good ventilation will ensure the room is comfortable year round.

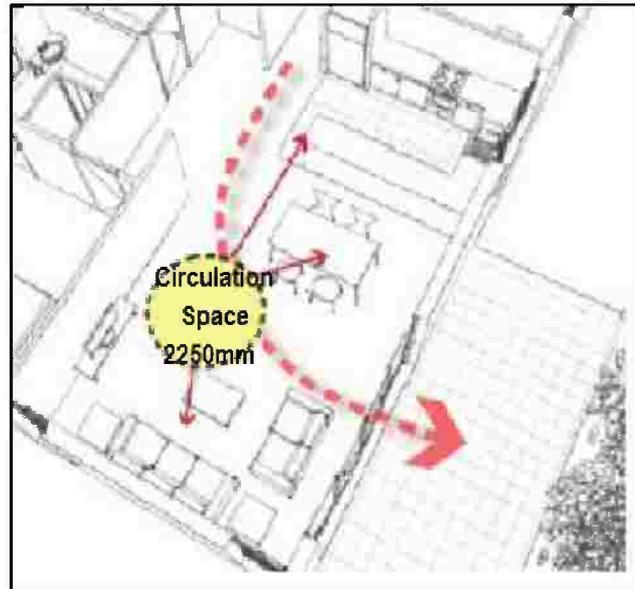
**A. Casual dining:**

Many of a household's social and recreational activities are centered on the kitchen and casual dining area of a home. The casual dining or meals area can be a place to eat, catch up with friends, read the paper, listen to the radio and do homework. Successful casual dining areas are built as part of the kitchen or are closely connected with the kitchen. This grouping:

- Tends to provide a welcoming ambience.
- keeps the cooks close to the centre of activity
- Makes it easy to transfer food and implements from kitchen to table.
- Allows table space to double as food preparation space or a place for other activities.

**B. Casual dining:**

areas are often spacious enough for all users to move around easily, however it is wise to ensure that people with limited mobility have sufficient room to manoeuvre. The doorways to adjoining rooms and spaces between furniture may need to be wide enough to accommodate a wheelchair, and tables and benchtops may need to be at a particular height.



**Figure 5-38 Circulation space**

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 8 Recommendations of Living room**

Living room					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		- No requirements		The family/living room should accommodate a free space, 2250mm in diameter, to enable ease of movement clear of furniture.	

### 5.1.7 Kitchens:

A kitchen may be designed to be generally accessible by integrating well considered spaces for preparing food and dish washing, effective lighting, well placed storage facilities, and handles and controls that are easily operated. An accessible kitchen is more likely to suit a family's needs as they change over time and to meet the unforeseeable needs of future home owners.

Alternatively, a kitchen may be personalized to the needs of a particular individual. The bench-tops, may be lower than average for a person who uses a wheelchair, As with the rest of the house, where the occupants have particular needs they should be factored into the kitchen's design.

#### A. Design:

The key ingredients of an accessible kitchen include:

- adequate space for moving around in
- work surfaces located at an appropriate height
- access to the waste disposal area to enable easy
- transport of groceries and rubbish
- access to the meals or dining area where food will be consumed adequate an
- suitable cooking devices
- suitable lighting
- convenient fittings, handles and controls

#### Ideally, a kitchen will:

- take advantage of a window and view
- maximize natural light
- Promote social interaction and access between the cooking area and main dining area..
- Designing the kitchen as part of a combined open-plan kitchen and casual meals area can maximise the benefits of the available space as well as facilitating easy movement between the two. It also tends to make the kitchen more of a social centre.

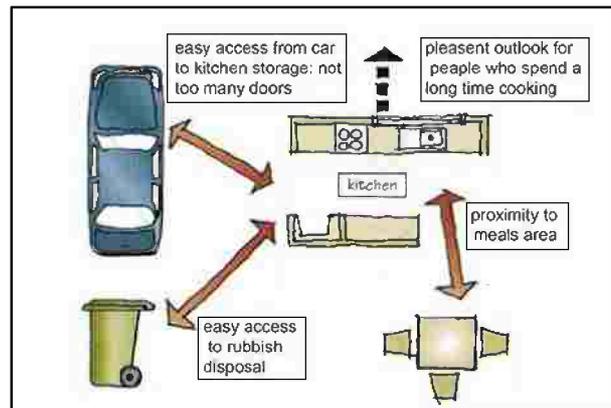


Figure 5-39 Locating a kitchen for easy access

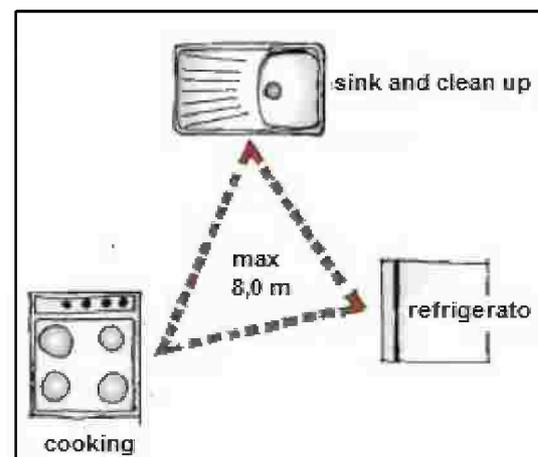


Figure 5-40 Locating the kitchen fittings for easy use

#### B. Kitchen layouts

While each kitchen should be designed around the needs of the users, the following figures of L-shaped, U-shaped and galley plans, illustrate the principles to apply. In each case the design should begin with the 'work triangle' of refrigerator, stove and sink, illustrated in figure 5.40. The work triangle highlights the functionality of the kitchen's three key fittings and how they need to be co-located to best facilitate food preparation.

- L -Shaped plan
- U -Shaped plan
- Galley plan

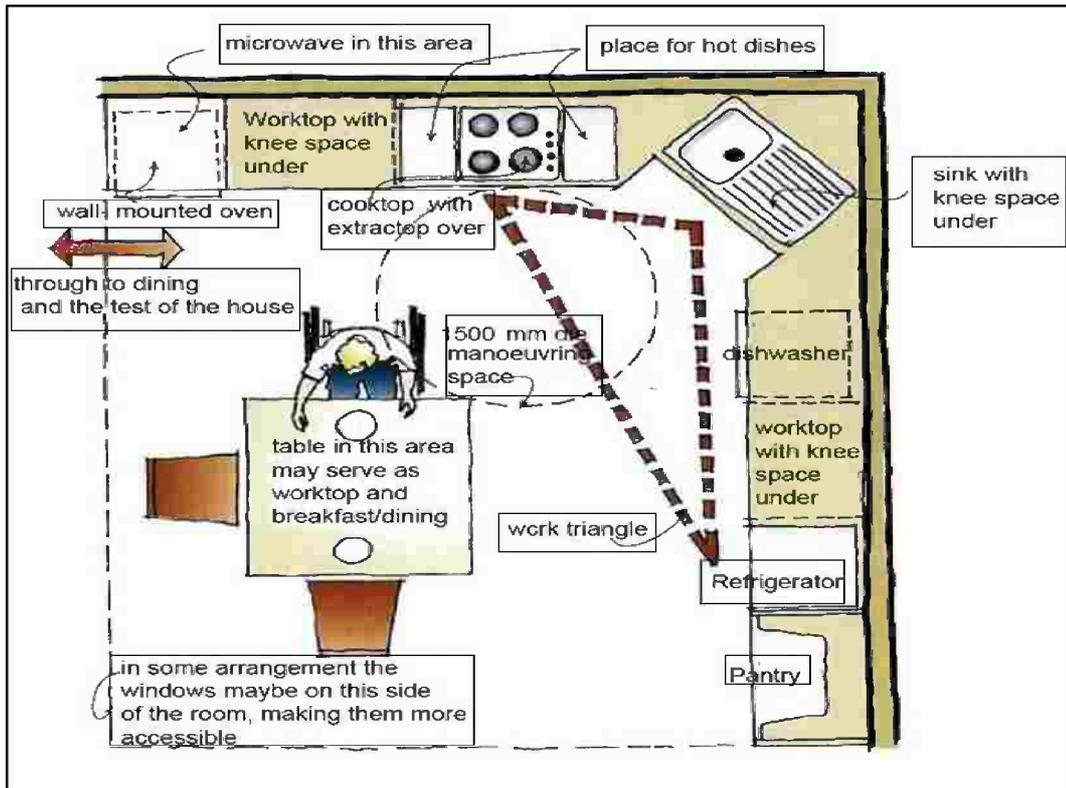


Figure 5-41 L-shaped kitchen

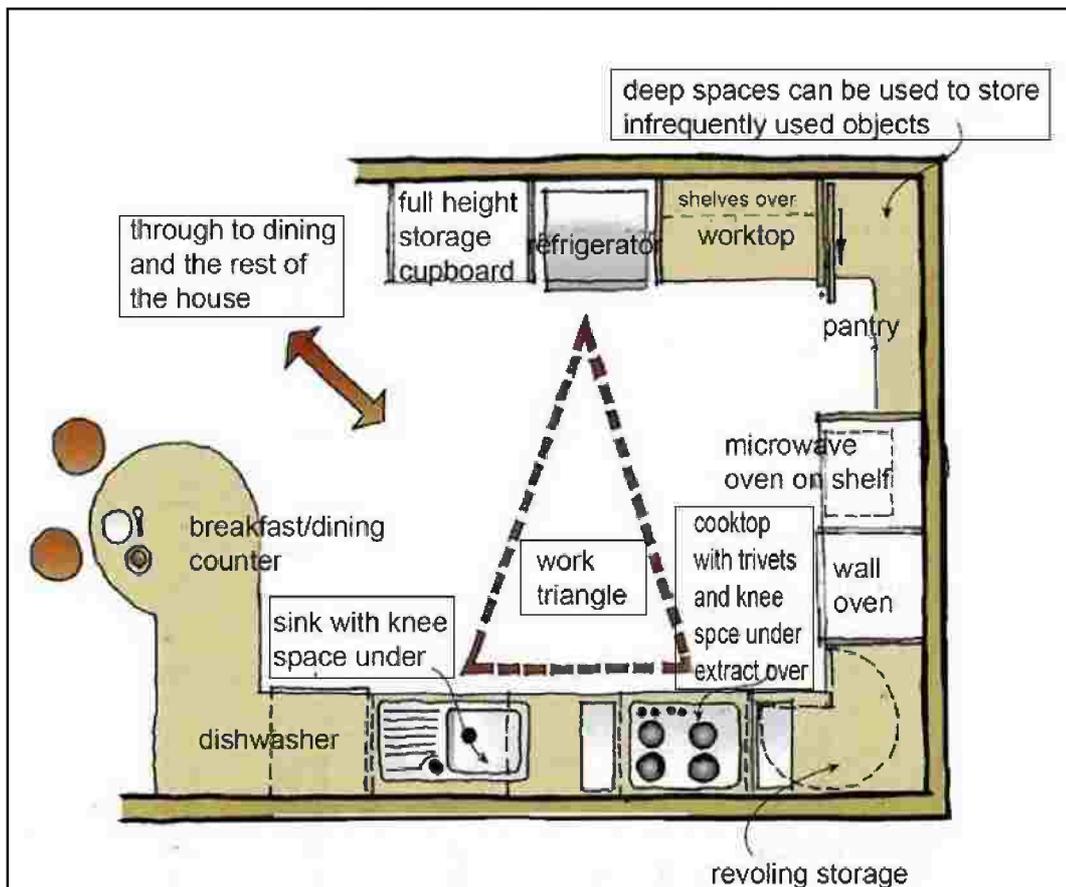


Figure 5-42 U-shaped kitchen layout

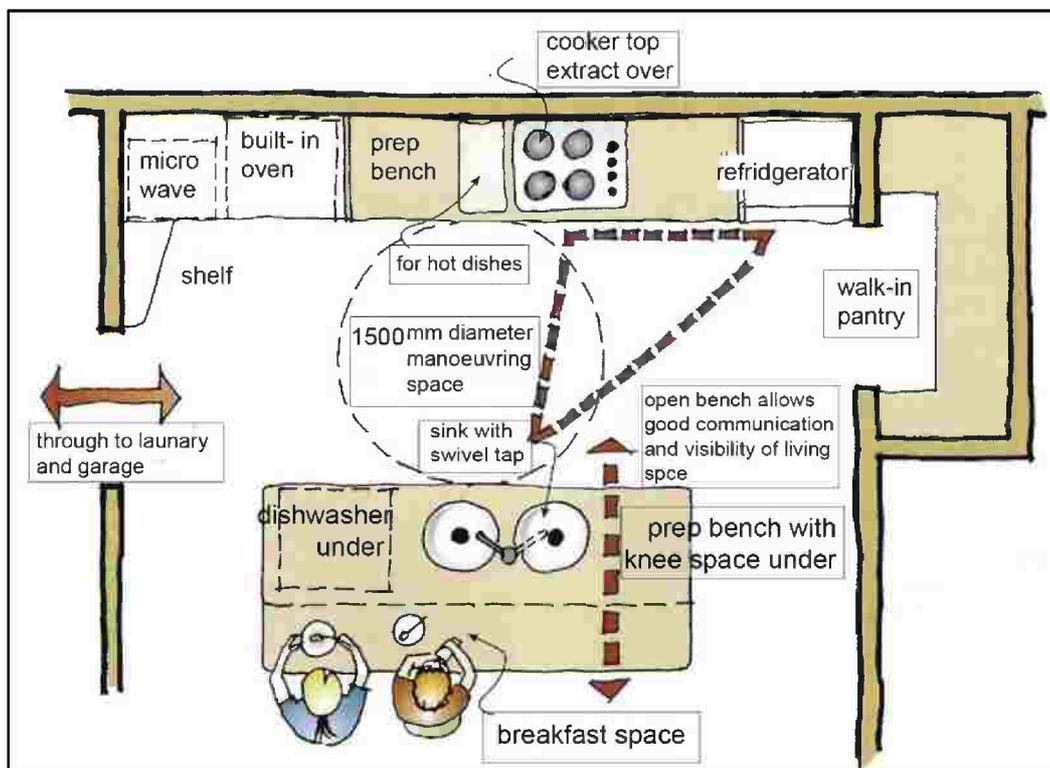


Figure 5-43 A galley plan kitchen

### C. Lighting

Kitchens should be well lit so that they are easy to work in and easy to clean. They should be illuminated with an adequate, uniform level of room lighting and specific task lighting to make it easy to see in areas used for dish washing and food preparation. A single central light is not enough to light a kitchen since a person standing under the light casts a shadow on their work surface. These shadows can be avoided by installing more than one light and by placing task lighting in front or above the major kitchen work surfaces.

### D. Customising to fit people in wheelchairs:

The minimum comfortable manoeuvring space for a person in a wheelchair is a 1500mm diameter circle. This dimension will also provide a comfortable working space for other people. If, in the case of a kitchen renovation, this space is unavailable, it may be possible for slim-line cupboards and broader bench-tops to provide knee-space under the bench in which a wheelchair might be manoeuvred. A large toe space, 250mm to 300mm high x 150mm deep, allows a person in a wheelchair to get closer to the kitchen benches and reach lower level drawers more easily. This is illustrated in figure 5.44.

When designing a kitchen to suit a particular person, it may be useful to measure that person. The measurements illustrated in figure 5.46 will assist. The key dimensions are:

- the height of knee space, for wheelchair users to sit comfortably at a bench or kitchen sink.
- the height of toe space, so that cupboards and appliances may be placed above that height.
- the maximum worktop height.
- the maximum shelf height within the reach range.
- the maximum cupboard depth within the reach range.
- Fittings and appliances should be located so that they can be used from either side, or from the occupant's preferred side as shown in figure 5.45.

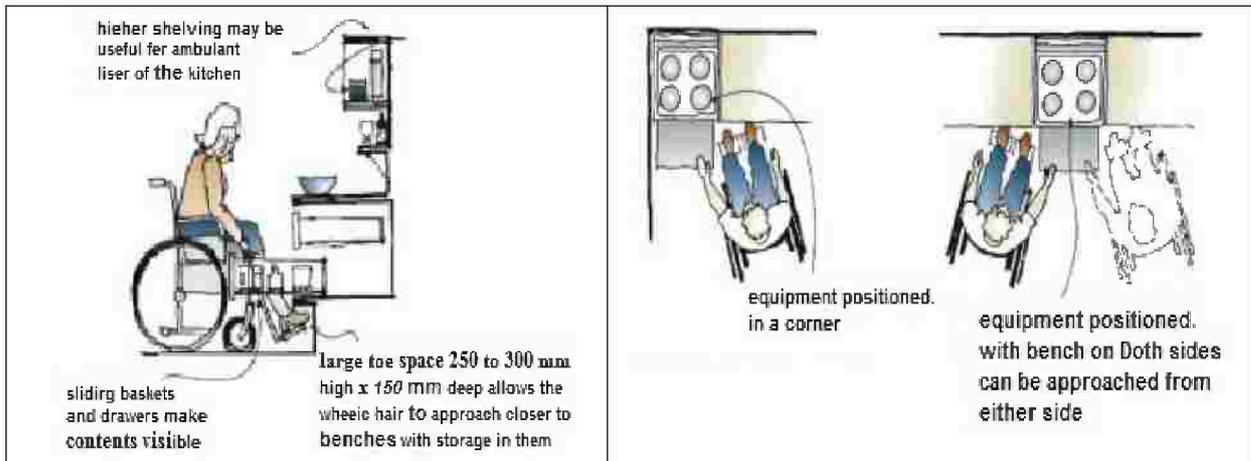


Figure 5-44 It may be important to establish the critical dimensions of the user

Figure 5-45 Position equipment so that people can approach it from their preferred side

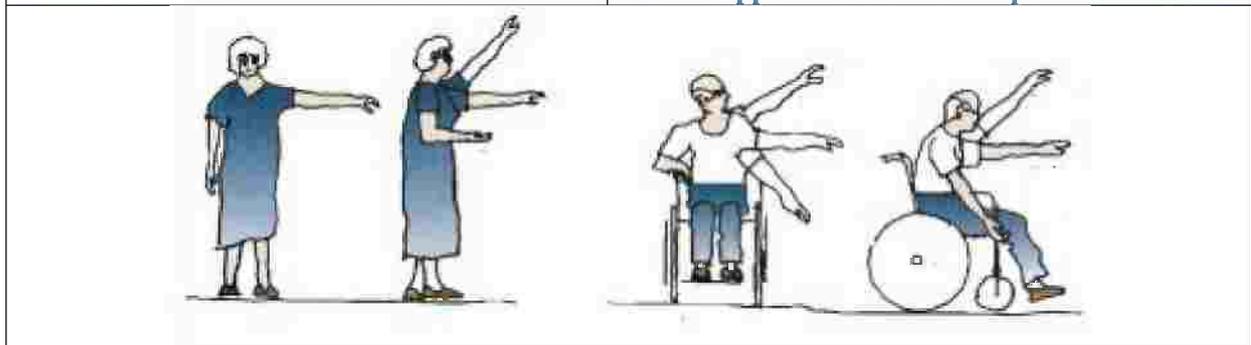


Figure 5-46 Storage accessible to wheelchair Users

**E. Worktops:**

Standing adults generally prefer a bench height of 850mm to 900mm or higher. People in wheelchairs prefer between 700mm to 850mm. When designing to suit a household in which only one person uses a wheelchair a compromise height may be found. Usually, however, it is better to find other design solutions such as:

- alternative work surfaces at different heights
- pull-out, retractable worktops, which may also be adjustable, as shown in figure 5.47
- adjustable height worktops as illustrated in figure 5.48.

The common 600mm deep bench is usually, but not always, appropriate. Workbenches should be as wide as possible for most people. Nobody complains that they have too much workspace. For people with a short reach and people using wheelchairs, however, a bench should only be as deep as the person's reach so that they can grasp all objects on the bench and can clean it properly.

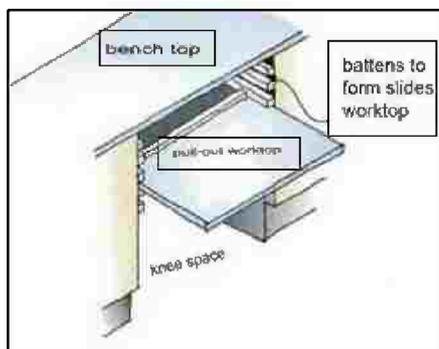


Figure 5-47 Pull-out adjustable height worktop

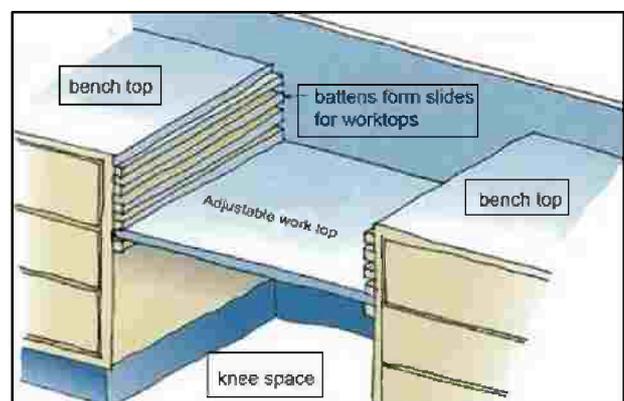


Figure 5-48 Adjustable height worktop

Even if the kitchen is not being built a person using a wheelchair, it may still be advantageous to design for knee room under the bench-tops so the user can sit or perch on a stool while preparing food. Figure 5.49 illustrates this facility.

in a suitable corner can, as figure 5.50 shows, be a good use of space. If using this approach, ensure that there is bench space on both sides of the sink and the rubbish bin and dishwasher are close at hand. A person using the sink should be able to easily scrape food scraps and stack the dishwasher from the sink position. This arrangement is illustrated in figure 5.51.

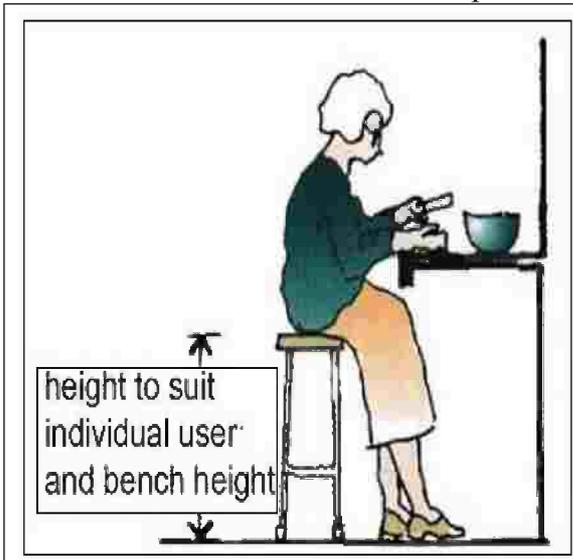


Figure 5-49 Many people prefer to sit while working

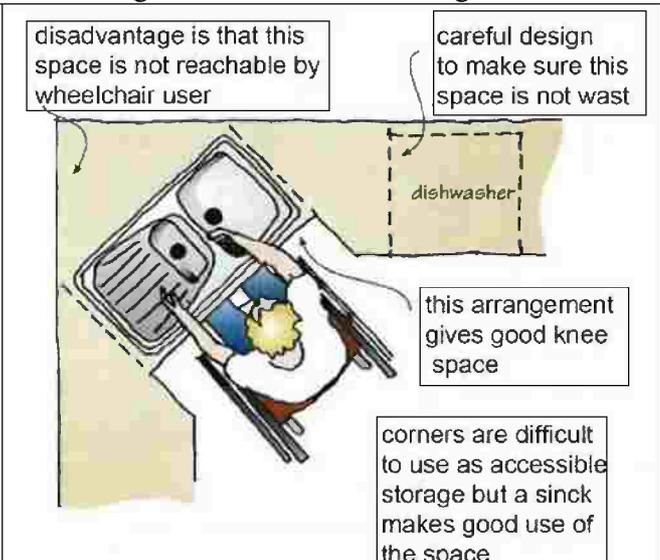


Figure 5-50 Placing the sink in a corner

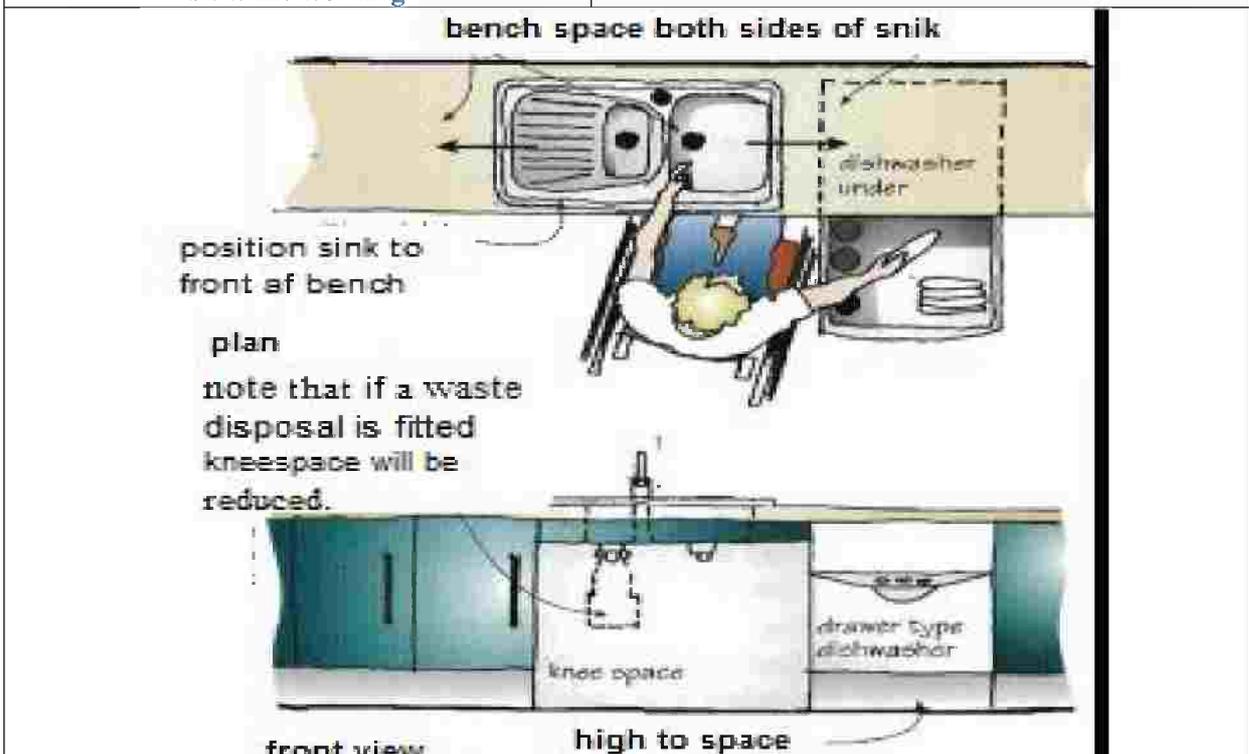


Figure 5-51 Preferred layout of sink, dishwasher and worktop

**F. Sinks:**

To best fit the work triangle the sink should be centrally placed in the kitchen plan. However, space in corners can be under-used and placing the sink.

As with bench-tops, standing adults of different heights prefer the sink to be positioned at different heights, and people in wheelchairs have different requirements again. If there are multiple users, a compromise height may be found or an adjustable height sink may be installed. An adjustable sink is illustrated in figure 5.52. The range of adjustment need only be about 150mm. The figure shows a manually adjusted sink in which fixing bolts are moved to a pre-drilled series of holes. The waste pipe in this arrangement is flexible and discharges to a remote trap. Many single lever taps already have flexible connections. Mechanically adjusting sinks and bench-tops are also available

For people in wheelchairs, it is helpful to select a shallow sink since this makes it easier to provide knee space underneath, as shown in figure 5.53. In kitchens designed for a person in a wheelchair or a person with a limited reach, consider installing a sink that is also narrow to bring the taps closer to the front. Alternatively, select a sink with a mixing tap set to the side.

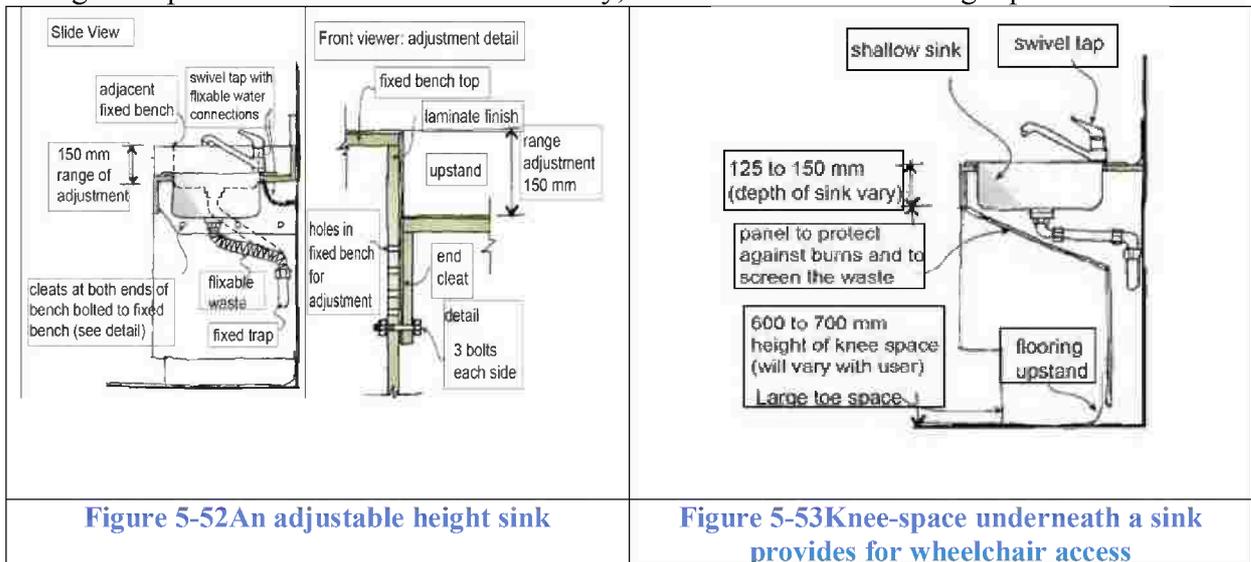


Figure 5-52 An adjustable height sink

Figure 5-53 Knee-space underneath a sink provides for wheelchair access

When designing for a person who uses a wheelchair you may also:

- place an insulating panel under the sink to protect the person's knees from coming into contact with hot pipes and to screen the plumbing from view
- set the waste trap close to the outlet to provide additional knee space under the sink
- Select traps that are less obtrusive to maximise the knee space.

**G. Storage:**

Storage is important in any kitchen. There should be sufficient storage capacity to keep food, dishes and implements within easy reach. Where possible avoid placing storage in corners since, even with revolving shelves, it tends to be difficult to access.

While the best storage layout for any person depends on their ability to reach and use it, in general:

- Narrow shelves just above bench height are useful for small items and do not interfere with the use of the bench.

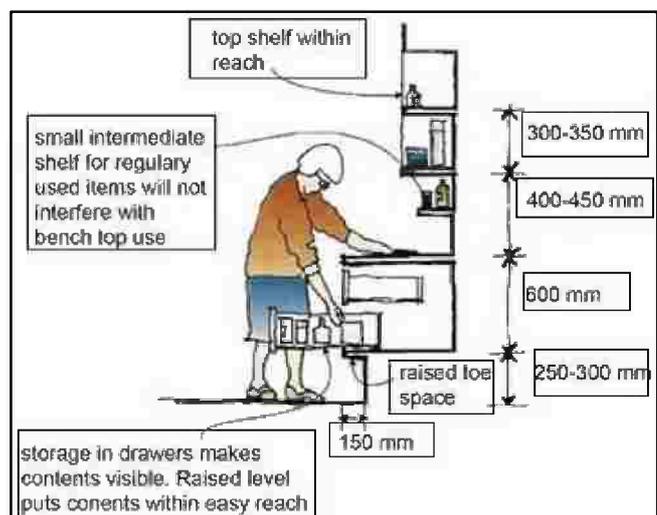


Figure 5-54 Indicates the range of storage suitable for most adults

- Drawers are often more useful than shelves since they allow the user to see all the drawers with roller slides are easy to open and close
- Baskets attached to the inside of cupboard doors provide additional easily accessed storage.
- Taking kitchen cupboards beyond a person's reach can provide storage space for seldom used items, but it encourages people to use a chair or step ladder to reach high items. This may be hazardous for older people. In place of high cupboards, a pull-down shelving unit can be installed within the shell of an overhead cupboard .
- Mobile units such as that illustrated in figure 5.56 are another way of providing kitchen storage. They can be fitted with wire basket drawers or shelves and doors. If they have a top, mobile units can be used as a work surface. They may be kept under benches and rolled out for use during food preparation when they can be positioned to suit the user. When designing a mobile unit ensure that the unit will not overbalance when the drawers are opened.
- Pantries should be designed to be spacious and easy to access from the cooking area of the kitchen. A walk-in or wheel-in pantry is shown in figure 5.57. Fitted with a bench, a pantry can also provide additional workspace. Slide-out pantries illustrated in figure 5.58, are very convenient for kitchen storage and suit everyone.

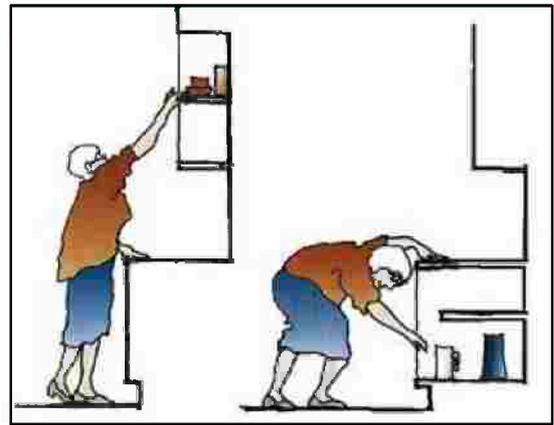


Figure 5-55 High and low cupboards are difficult to reach



Figure 5-56 Mobile storage units are versatile

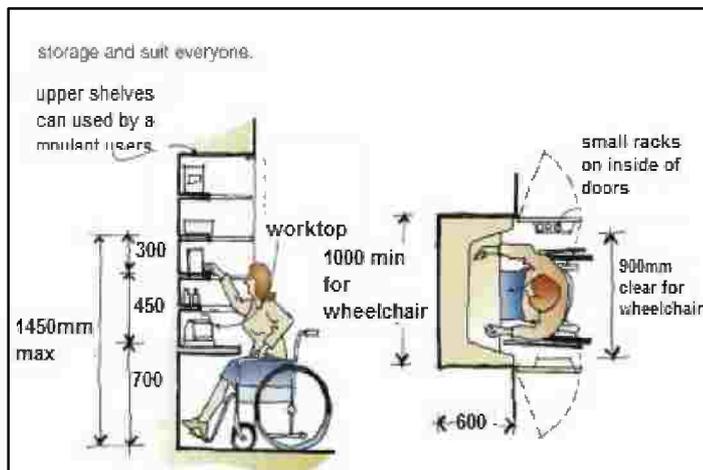


Figure 5-57 A walk-in or wheel-in pantry

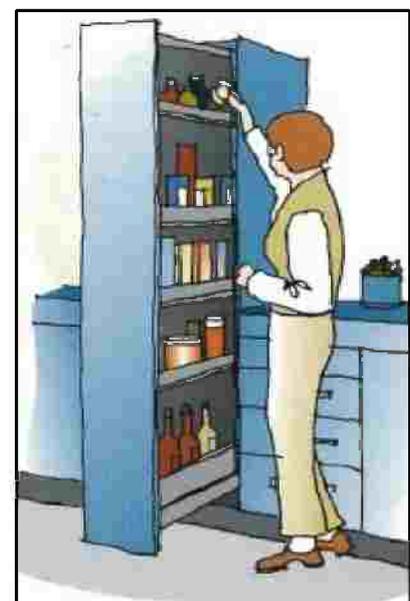


Figure 5-58 Slide-out pantries suit a wide range of people

**H. Taps :**

Rotating taps are often difficult for people with weak hand grip to operate. Many of the problems presented by these taps, however, have been eliminated by single-lever, ceramic disk, mixer-taps. These taps are available in a variety of models but swivel spouts with a high reach are especially useful.

An alternative is to use a tap with a pullout hose as pictured in figure 5.59. These taps can be used to fill containers and also for rinsing vegetables and dishes or cleaning down the sink. With appropriate location of the sink and cook-top, the pullout hose can also be used to fill pots.

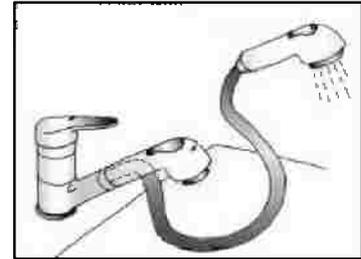


Figure 5-59 A tap

For people with limited reach, taps can be mounted at the side of the sink, instead of the back, to make them easier to access.

**I. Cooking :**

Different users may have different requirements for their cooking equipment and appliances.

**J. Ranges or stoves :**

A typical range or stove, shown in figure 5.60, with combination cook-top and oven, can be an efficient use of space but has characteristics that may present difficulties for some people. As figure 5.60 shows.

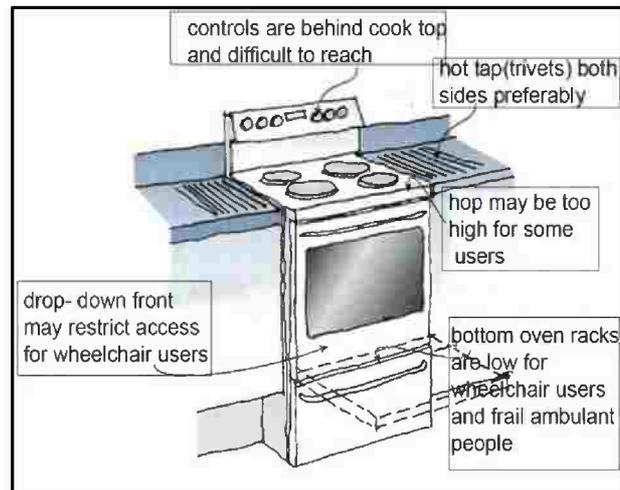


Figure 5-60 A typical range

- the controls are generally at the back of the cook-top, so the user has to reach over cooking food to adjust the temperature
- where front controls are fitted, they can present a danger to children .
- The cook-top of a stove is high off the floor. Hence people in wheelchairs and people of short stature may have difficulty using it safely and effectively
- The lowest cooking shelf in the oven is very low and may be difficult for some people to access.
- Stoves open with a hinged-down front door that restricts the possibility of approach by a wheelchair-user.

**K. Wall-mounted ovens:**

Separate wall mounted ovens have characteristics that make them access-friendly, wall-mounted ovens:

- Have easy to access front controls are available with soft touch.
- Electronic controls instead of turning knob controls.
- Allow the user to inspect the cooking food without lifting it, by sliding out the rack supporting it.
- Provide easy access with a variety of door types

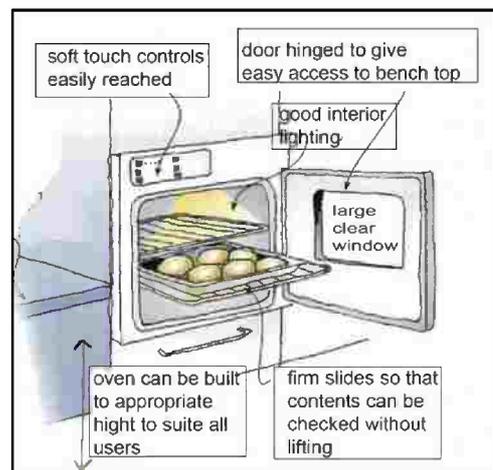


Figure 5-61 Features of the wall-mounted oven

available including side and top-hinged and doors that fold completely away for unrestricted access.

- Can be easier to clean than traditional stoves.

**L. Cook-tops :**

To make the best use of the work triangle, locate the cook-top close to the sink to make it easy to transfer heavy dishes to and from the sink. The cook-top should be set in a bench top. It is best to avoid placing windows, cupboards or shelves over the cook-top to avoid encouraging anyone to risk burning or scalding by reaching over it.

As with wall-mounted ovens, separate cook-tops are easily installed at a height which best suits the intended user's needs. For people in wheelchairs, people of short stature, or elderly people with reduced strength, the most functional cook-top may have a ceramic or an induction hotplate that provides a perfectly flat surface. People can slide pots across this surface instead of having to lift them. The controls are generally located along the front or along the right hand side of a Cook-top. A front location is ideal.

A space for knees under a cook-top is an advantage for person in a wheelchair, however, if this knee-space is provided, consideration should be given to the risk of spillage and scalding that is illustrated in figure 5.75. An upstand lip could be placed at the edge of the cook-top to divert

Potential spills. For people with manipulative difficulties it may be better to omit the knee space.

One type of cook-top that offers considerably greater user-safety is the induction hob that heats with magnetic contact. When a magnetic pot is placed on the element a magnetic field will heat the bottom of the pot, and only the pot. The cook-top itself does not become warm and no objects left on the top will be heated.

**M. Microwave ovens:**

Microwave ovens cook food quickly and their side-opening door makes them easily accessible. Most models hinge on the left. They are light and portable and can easily be positioned on open shelves or on a bench top. They can be placed at bench height or up to 1250mm from the floor depending on the reach of the user.

**N. Kitchen extractor fan:**

Vapour extraction is important to prevent both smells and moisture accumulating. Fans can be located in a hood over the cook-top, which can also contain task lighting, or in an underbench extractor, with a grill in the bench-top. Where possible the controls should be located within easy reach

**O. Dishwashers:**

A dishwasher should be located close to the sink and waste disposal. Most dishwashers are installed to fit under a full height bench. This can cause problems if the user has difficulty reaching the lower dishwasher draw. To improve access for users who have trouble bending

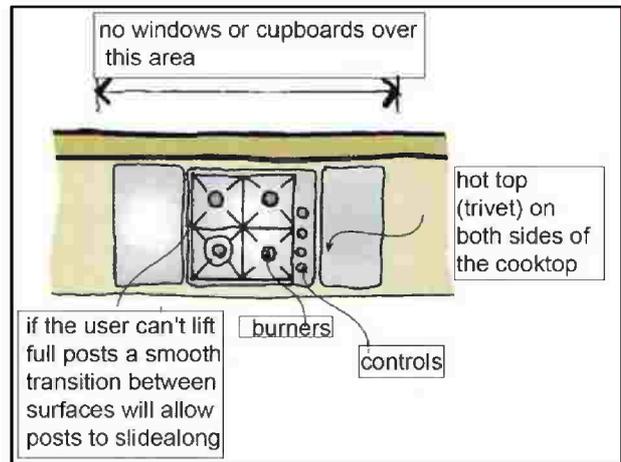


Figure 5-62 Layout of a Cook-top

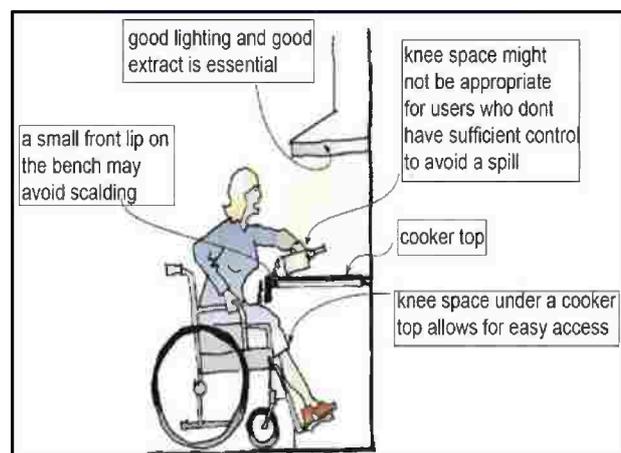


Figure 5-63 The danger of spills

down a traditional dishwasher may be mounted on a plinth, or a half-draw dishwasher may be installed at the most accessible height.

**P. Refrigerators and freezers:**

Compact side-by-side refrigerator freezer models with double doors offer the most accessibility with both freezer and fridge space available at a central height. If a single-door refrigerator freezer is preferred, the most accessible design is one with the refrigerator placed above the freezer compartment and the freezer comprising of drawer units.

**Are solutions have helped in the needs of the levels of physically disabilities:**

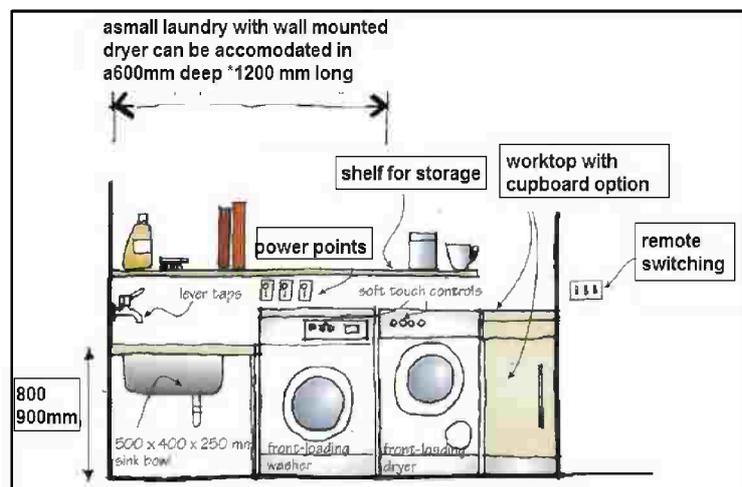
**Table 5- 9Recommendations of Kitchens**

Kitchens					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		The kitchen space should be designed to support ease of movement and adaptation with: - At least 1200mm clearance provided in front of fixed benches and appliAt least 1200mm clearance provided in front of fixed benches and appliances. - Slip resistant flooring. - Where practicable, floor finishes should extend under kitchen cabinetry to enable cupboards to be removed without affecting the flooring.		As for the Category (2)except that the kitchen space describe should be designed to support ease of movement and adaptation with: - At least 1550mm clearance should be provided in front of fixed benches and appliances. - task lighting installed above workspaces.	

**5.1.8 Laundries:**

Is often the smallest and most tightly furnished room in a house. Into this little space, we generally pack a washing machine, a dryer, a trough, storage units and an ironing board.

The laundry is a workspace in which ease of operation and manoeuvrability are paramount considerations. The ideas presented can be incorporated into laundry designs generally or applied to create an enabling laundry for a person with a particular disability.



**Figure 5-64 Laundry arrangement**

**A. Location and Layout**

Wet washing is both bulky and heavy. The laundry and drying areas should be located so as to minimize the distance that washing needs to be moved. The path between the two areas should be level, reasonably slip resistant, barrier free and, if necessary, wide enough for a wheelchair.

Key factors in accessible laundry design include:

- Sufficient room to move around work surfaces and sinks at the most appropriate height.
- Adequate and well located storage.
- Good lighting
- Fittings and appliances that are easy to use and located to.
- Facilitate work flow.

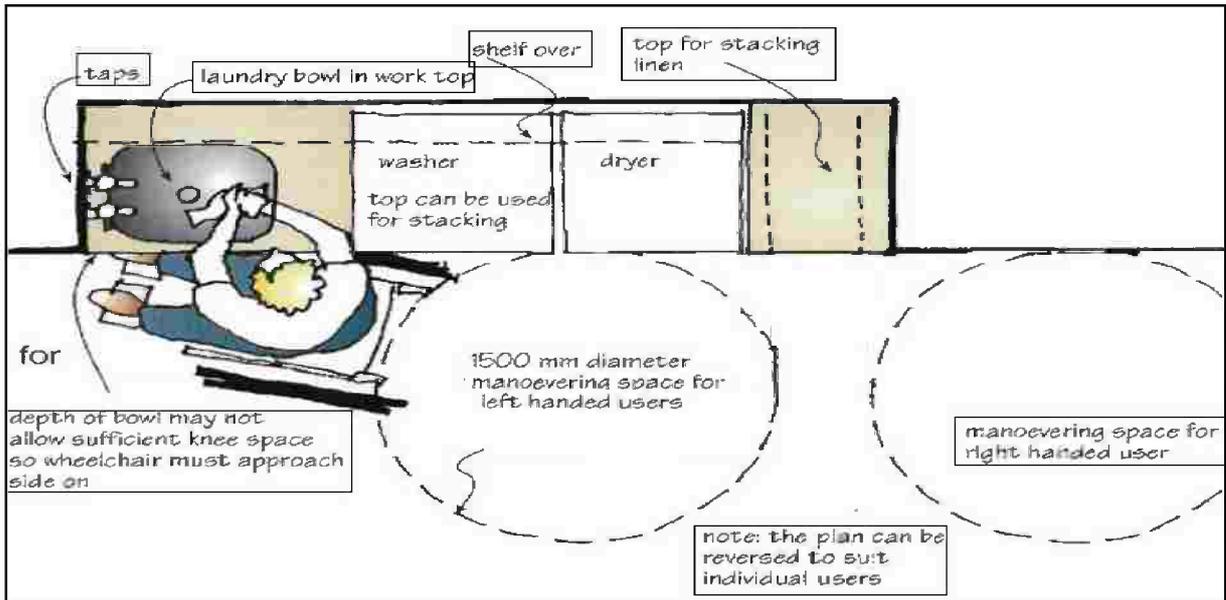


Figure 5-65 Low trough setting for ironing board sideways wheelchair access

Are solutions have helped in the needs of the levels of physically disabilities:

Table 5- 10 Recommendations of Laundries

Laundries					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		As for Category (1) except: - The laundry space should be designed to support ease of movement and adaptation with: - At least 1200mm clearance provided in front of fixed benches and appliances. - Slip resistant flooring. - Where practicable, floor finishes should extend under laundry cabinetry to enable cupboards to be moved without affecting the flooring.		As for the Category (2) except that in laundry space described, should be designed to support ease of movement and adaptation with: - At least 1550mm clearance should be provided in front of fixed benches and appliances; - lip resistant flooring. - Task lighting installed above workspaces.	

### 5.1.9 Interior finishes:

A building's interior finishes influence an occupant's aesthetic experience and may determine a home's level of accessibility.

#### A. Floor finishes:

Most people know which floor finishes they want in their house. The most common choices are carpet, ceramic tiles, People generally select one finish in preference to another based on:

- the construction method and materials of the underlying floor
- the function of the room or space aesthetics budget.

Before installing a particular floor finish it is useful to ascertain:

- the most appropriate method of laying or fixing .
- the need for a seamless finish
- how easy the surface is for the occupant to move across
- the need to finish special shapes, nosings or covings.
- the most appropriate colour for the room or space.
- the preferred acoustic qualities
- the need for the finish to be stain • resistant or easily cleaned
- the need for the finish to be slip-resistant
- the suitability of the finish to passage by people with limited mobility and those in wheelchairs.

Where there are junctions between different types of floor finish ensure that the junctions are level and secure to avoid creating a trip hazard.

#### B. Rugs:

Loose rugs and carpets can create a trip hazard and may be best avoided altogether. Where a rug or loose carpet is placed, fix a backing to ensure that it stays flat and in place.

#### C. Wall finishes:

Finishes on walls, doors and cupboards can be damaged by the impact of a wheelchair, especially the footplate. In some locations, such as narrow corridors, consider using a dado of a hardwearing material such as carpet. Alternatively, line the lower parts of framed walls with a tough material, such as compressed sheet. Where necessary, replaceable metal skirting, timber, metal or PVC protectors fitted to corners can prevent serious damage to walls.

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 11Recommendations of Interior finishes**

Interior finishes					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		- No requirements.		- No requirements.	

### 5.1.10Doors and handles:

Doors are an important part of the access equation. A door that is cumbersome or difficult to open can be an access barrier. A door that is appropriately placed, designed and installed serves a useful purpose without compromising accessibility.

Not every opening between rooms needs a door, but reasons why a door may be needed include:

- Security privacy, both noise and visual.
- Interior climate control.
- Escape in an emergency, such as a fire.

- Sound reduction between room's containment of cooking and other smells.

If it is decided that a door is needed there are other decisions that follow. These include deciding the door's proportions, the type of door, the type of hinge or sliding gear and the type of handle and latch combination.

**A. Sliding doors or hinged doors:**

When a hinged door is swung fully open, the width of that door takes up part of the doorway space reducing the apparent opening dimension. An 820mm hinged door makes a clear opening of about 800mm when the door is fully open. An 870mm doorway is preferred because it provides a clear opening of about 850mm.

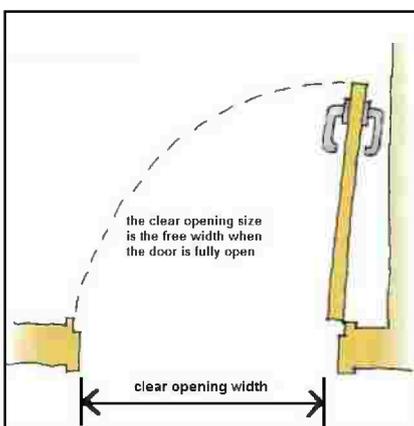
Similarly, a fully open sliding door provides a narrower opening than the width of the door frame it is placed within. For the same size of door frame, a hinged door will provide a wider opening than a Sliding door.

**B. Characteristics of doors:**

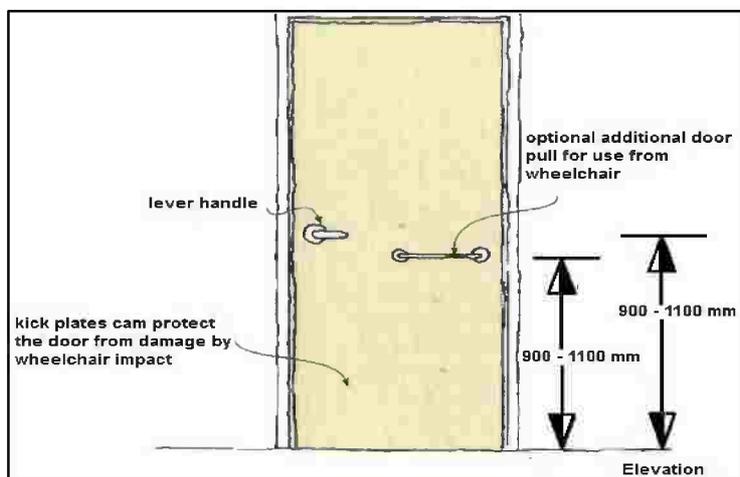
Hinged and sliding doors have different characteristics making one more appropriate to a design situation than another:

**Table 5-12 Characteristics of doors**

Surface Mounted Sliding doors	Recessed Sliding Doors	Hinged Doors
May be a little noisy in operation	May be a little noisy in operation	Relatively quiet operation
May be a little more difficult to operate	May be a little more difficult to operate	Relatively easy to operate
Difficult to make sound proof	Difficult to make sound proof	Can be made to trap sound
Difficult to make draught proof	-Difficult to make draught proof	Can be made draught proof
Difficult to make light tight	Difficult to make light tight	Can be made light tight
Has higher maintenance demands	Has higher maintenance demands	Has lower maintenance demands
Does not intrude into space but does use <b>wall</b> length	Does not intrude into space or use <b>wall</b> length	Swing may intrude on available space
More readily operated from a wheelchair	More readily operated from a wheelchair	Can be difficult to operate from a wheelchair
Surface mounted handles are recommended	Surface mounted handles are recommended	Lever handles are recommended



**Figure 5-66 Clear opening width**



**Figure 5-67 Hinged door layout**

**C. Hinges:**

Doors should generally open into the room to which they give access. However, in smaller rooms it may be better to fit the door so that it opens outwards. This maximises the useable space in the room and ensures that if a person were to collapse against the door, their body would not prevent someone opening the door and entering to assist them.

Alternatively, an inward opening door can be fitted with lift-off hinges that allow it to be removed. This provides access to the room if someone falls, as shown in figure 5-68.

For other indoor entrances, it may be desirable to use loose-pin hinges that allow doors to be taken off their doorframe for painting or to be removed altogether.

Offset hinges, as shown in figure 5.69, provide more room than other hinges when the door is fully opened. This can be useful when moving furniture.



Figure 5-68 Elevated view of lift-off hinges used in an emergency

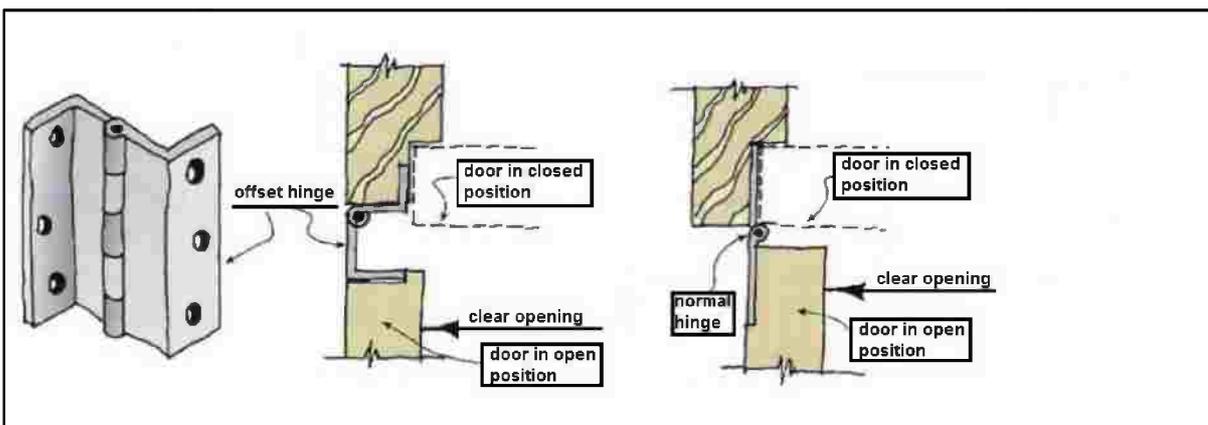


Figure 5-69 Offset hinge

**D. Automatic door closers:**

Door closers can be convenient if correctly installed in an appropriate location. They are most likely to be useful if installed on external doors. For a door closer to help the user and not constitute a barrier, it needs to allow the door to swing open without requiring too much pushing force.

An alternative to an automatic door closer is a hinge that causes the door to swing shut when it is not held open.

These hinges are most commonly used in toilet cubicles, and offer a simple way) close light doors without effort.

**E. Bi-fold and double doors:**

Bi-fold doors can be a solution. They are widely available in regular dimensions as ready-made units. Care must be taken to select sliding gear that is appropriate to the door to ensure that the leaves move smoothly and open easily.

Double doors, may be preferred in some situations.

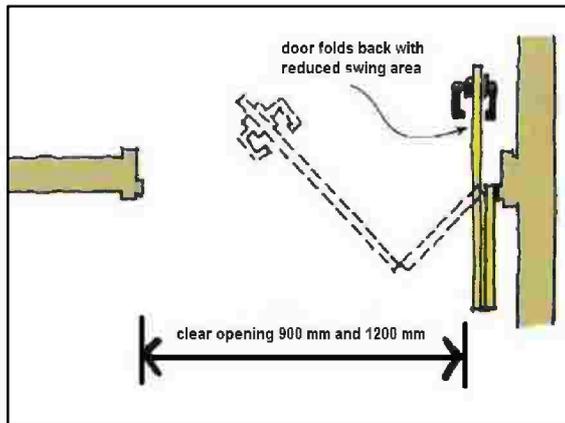


Figure 5-70 A bi-fold door

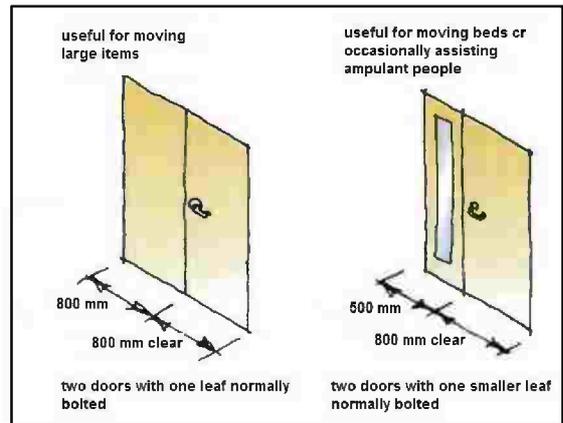


Figure 5-71 Some double door

**F. Sliding doors:**

There are two types of sliding doors: concealed and surface mounted. In both cases, sliding doors provide less of a barrier to light, sound and smell than a hinged door, which fits snugly into its frame and closes firmly. A sliding door is generally easier for a person in a wheelchair to operate than a hinged door.

Sliding doors that are the only means of access to a room, especially a bathroom, should be fitted with emergency access latches to allow the doors to be forcibly opened in case of an emergency.

**G. Sliding doors -within the wall thickness:**

Sliding doors that are concealed in a wall cavity when the door is opened, as illustrated in figure 5.72, are not recommended for installation in wet areas where they may become damp and distorted, or where their sliding gear may corrode.

**H. Handles:**

Select door handles that are easily gripped and operated with one hand. Handles should be placed at a height that is reasonable for walking adults, people in wheelchairs and, where appropriate, children. The compromise position is low.

Hinged swing doors and sliding doors have very different handle requirements. Sliding doors are easiest to open and

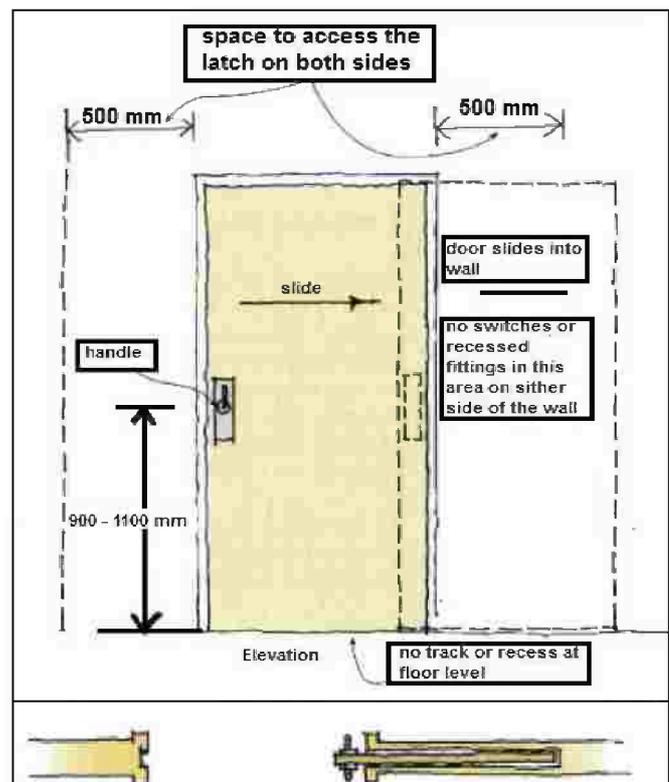


Figure 5-72 A cavity sliding door

close if fitted with raised pull handles that can be easily gripped. Recessed handles are difficult for many people.

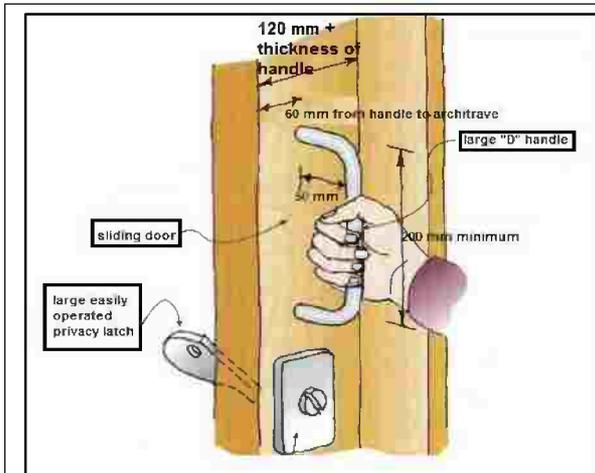


Figure 5-73 D pull handle

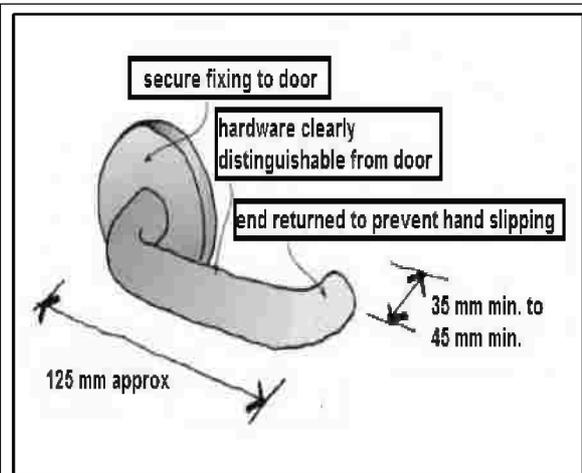


Figure 5-74 User-friendly lever handle

An excellent pull handle for use on a sliding door is the D pull handle, shown in figure 5.85. Hinged doors have a handle that is rotated. Doorknobs, which are traditionally used, are difficult to grip and turn. Lever handles such as one illustrated in figure 5.86 are easier to use. The preferred shape has a long lever and a turned-in end.

Lever handles enable a person to open a door with as little effort as leaning on the handle with their hand or elbow. This is most useful for people:

- carrying something or someone
- with an intellectual disability with reduced strength in their hands with poor hand/eye coordination

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 13 Recommendations of Doors and handles**

Doors and handles					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		- Doorways should feature door hardware installed at between 900mm – 1100mm above the finished floor		As for Category (2) with the following features: - Doorways should feature lever or D-pull style door hardware.	

**5.1.11 Windows:**

Everyone appreciates natural light and ventilation. Windows should be designed to suit the aesthetic and functional requirements of a space, its orientation to the sun and prevailing winds, and local factors, such as the shading provided by a verandah.

Windows should be designed to maximize natural light intensity at floor level while minimizing strong shadow or glare. Other issues to consider are that windows:

- Are the cause of significant heat loss and heat gain in a house
- Cause down-draughts due to the cooling of air near the glass
- Can enable occupants to benefit from a view
- Can compromise occupant's privacy may pose a security risk
- May be dangerous in the event of breakage

- Need regular cleaning
- With opening sashes provide natural ventilation.

Descriptions of the principal types of window used in housing are as follows.

**A. Sliding windows:**

Sliding windows are commonly used in new housing. Some models can be difficult to operate and to lock. Others, fitted with larger handles can be easily operated and are accessible to all.

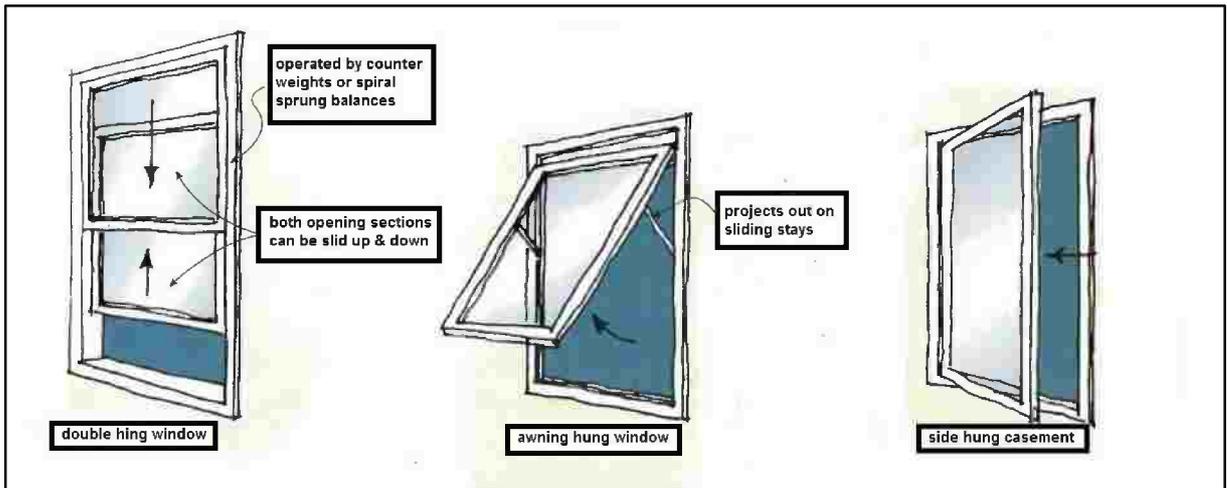


Figure 5-75 Window options: double hung sash, awning hung and casement sash

**B. Opening sash windows:**

Opening sash windows are generally framed in wood or metal that is then hinged or suspended to allow it to open.

Double hung windows are common in older houses but improved versions are still frequently used. One sash sits above the other in the window frame and a rope and pulley or other mechanism allows each sash to be raised and lowered independently.

The modern spiral mechanism is generally easier to operate than the old style rope and pulley. Double hung windows provide well-controlled ventilation and do not protrude into the space adjacent to the window.

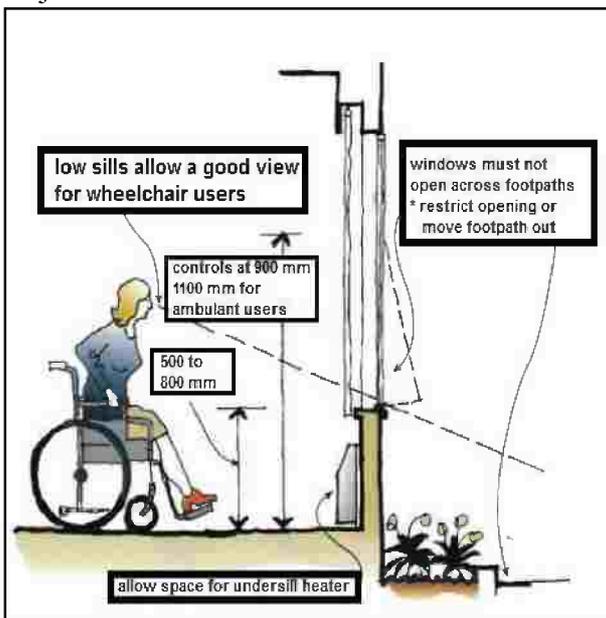


Figure 5-76 Garden keeps people at safe distance from protruding window

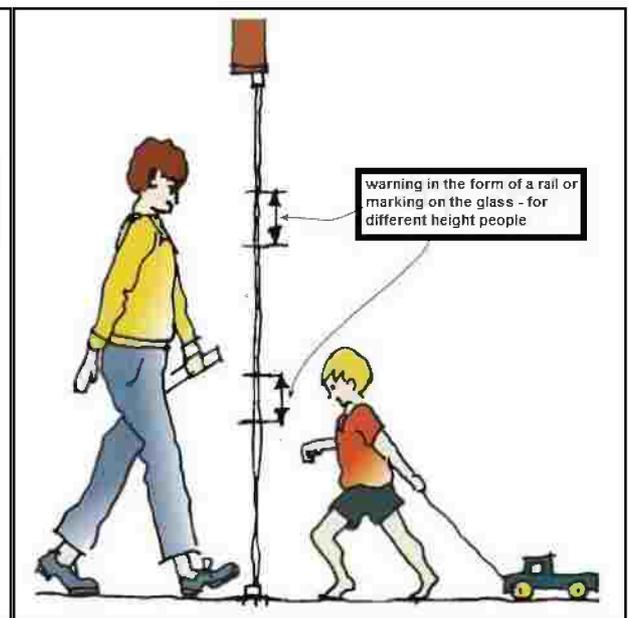


Figure 5-77 Markings to differentiate glazed panels from openings

Top or awning hung sashes are hinged to the window frame along their top edge and open out and up. Top hung windows may be placed low on a wall for easy access and may be opened to expose both sides of the glass for cleaning.

Generally, they are easily opened but may be difficult to secure closed. Awning windows can be fixed in an open position with security stays to provide ventilation.

Casement sash windows are hinged to the window frame along their side. A variety of hinges and locks are available for casement windows and can be positioned where it is most convenient for the operator. Casement windows are less secure than awning windows.

**C. Ventilation:**

In rooms with more than one external wall, consider locating windows on two or more walls to enable cross ventilation or a choice of ventilation.

Certain window frames come with inframe ventilators that allow continuous low volume ventilation regardless of weather conditions and without security risk.

**D. Security and privacy:**

Elderly people and people with reduced mobility may be particularly security conscious. Illegal entry can be discouraged by fitting security window stays that limit the opening to about 100mm and by installing laminated safety glass which is difficult to break.

**E. Make it easy:**

Windows will be most useful if they are easy to open and close and are at a height that suits all users. Low windowsills provide a view for seated persons. The window opening and closing mechanism should be easily gripped and operated using one hand.



**Figure 5-78 Some window layout considerations**

Standing adults can reach window locks and operating mechanisms up to about 1400mm above the floor. People using wheelchairs can typically reach up to 1100mm from the floor and should have window controls no higher than this, even when the window is open.

People in wheelchairs also need space to approach a window to operate it. For this reason, the area below a window should be free of furniture.

Figures 5.79 show how difficult it may be for a person to access a window located behind a kitchen bench or a bath.

Remote controlled window operation may be appropriate for difficult to reach or difficult to operate windows. Window locks, catches and other hardware tend to be small and can be too small for some to operate. Selecting the largest possible hardware enables the greatest ease of operation.

People in wheelchairs and others with limited reach may have difficulty in operating blinds and may prefer curtains. Some people may find bi-parting curtains inaccessible, especially if furniture is placed in front of the window, and prefer motorised curtains or curtains operated using a draw cord.

Some people have a hand preference and may operate a window or window furnishings with one hand or from one direction, but not the other. The operating mechanism should reflect this.



Figure 5-79 If opening sashes are placed behind benches, consider using remote winders

**Are solutions have helped in the needs of the levels of physically disabilities:**

**Table 5- 14 Recommendations of Windows**

Windows					
Category(1)	Y	Category(2)	Y	Category(3)	Y
- No requirements.		- No requirements.		Window sills on the ground (or entry) level in living areas and bedroom spaces should be positioned no higher than 1000mm above the finished floor level to enable enjoyment of the outlook. - Window controls should be able to be easy to operate with one hand and located within easy reach from either a seated or standing position. - Note :A concession from (a) is reasonable in kitchen, bathroom and utility spaces	