Portsmouth
CITY COUNCIL

Design guide for wheelchair accessible housing

Occupational Therapy Service

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Introduction

This design guide has been compiled by occupational therapists and incorporates information from Part M regulations, BS 8300 2001 standards and design briefs of leading housing providers and local authorities.

It is a Portsmouth City Council guide intended to for use by occupational therapists and building professionals, in conjunction with individual adaptation specifications. It represents good practice and is not a definitive interpretation of current building regulations.

The guide aims to anticipate many of the problems experienced by wheelchair users, although it is acknowledged that in some situations practical and financial factors may restrict options. It is important that architects, surveyors and occupational therapists are involved in the planning and alteration of properties for wheelchair users from the initial stages. If alterations are planned to a disabled person's home, it is also particularly important that their views, and the views of their carers, are included as part of the planning process.

1 Wheelchair mobility space

1.1 Turning space

For standard wheelchairs to turn through 360 degrees the space required is 1500mm x 1500mm

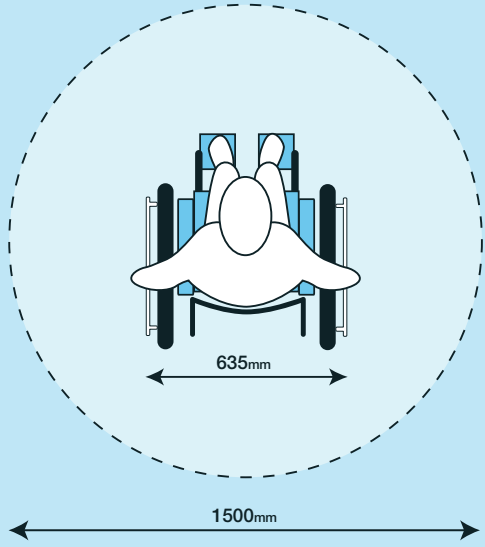

Diagram 1. Wheelchair turning circle

The overall width of a wheelchair is approximately 635mm when it is unoccupied. Additional space is needed at each side of the chair to enable the user to propel it manually.

There are many different types and sizes of manual and electric wheelchairs, some of which are modified and will take up greater space than already described, for example those with reclining backrests or elevating leg-rests.

2.1 Entrance requirements

Where possible, there should be level access to the property.

For ramped access, the gradient should ideally not be steeper than 1:20. A gradient of up to 1:12 is acceptable only if there is no alternative.

The clear width of the ramp should be a minimum of 1000mm.

Short, steep ramps should be avoided because they can cause the wheelchair to overbalance or the wheelchair user/assistant to lose control of the speed at which the wheelchair descends. It is also more difficult for wheelchair users to propel themselves up the ramp or for the assistant to push them.

If there is no alternative other than the construction of a long ramp, level resting areas must be inserted where the wheelchair user can rest. Resting areas must be at least the width of the ramp and a minimum of 1200mm long. They must be situated every five metres for 1:12 gradient, every 10 metres for 1:15 gradient, and every 18m for 1:20 gradient.

There should be a platform directly outside the front door measuring 1500mm x 1500mm to clear any door swing. The platform should extend 300mm to the side from where the door swings.

There should be a level area of 1500 x 1000mm at the foot of the ramp.

If the door opens outwards the platform will need to be increased by the width of the door. This is particularly important in ramps running parallel to the building, at 90 degrees to the door.

All platforms should have slight falls away from the building to prevent rainwater from collecting. The cross-fall gradient should not exceed 1:50.

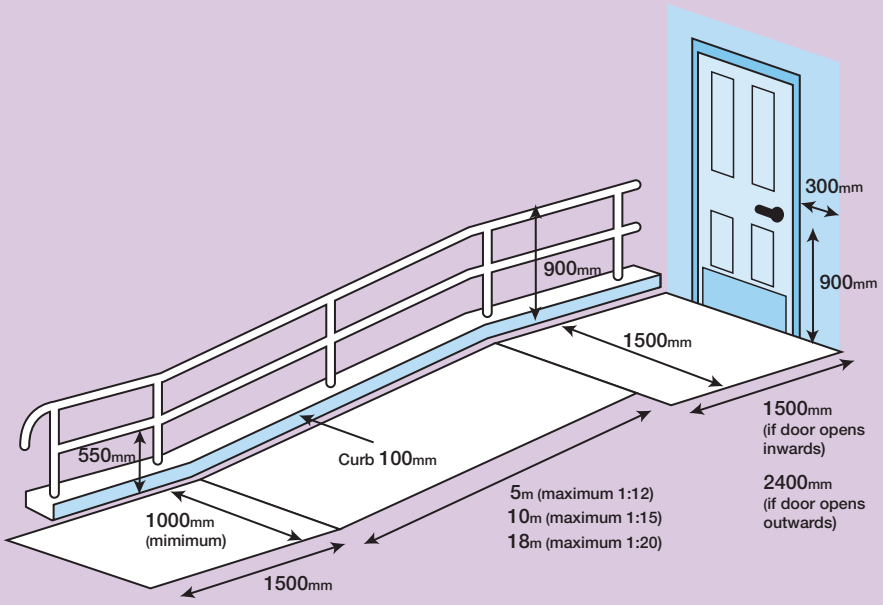

Diagram 2. Ramping

A channel drain with grid may be provided across entrance doors.

Both ramp and platform should have a raised kerb at a minimum height of 100mm to prevent the wheelchair slipping over the edge. If the kerb is formed as a continuous concrete upstand, spaces or holes should be made at intervals to allow rainwater to run off ramp or platform. The upstand should be differentiated from the ramp by colour contrast.

The handrail alongside the ramp will be at a vertical height of 900mm to the top of the rail and extend horizontally for 300mm past the end of the ramp.

An additional rail at a height of 550mm is essential to ensure wheelchair safety.

The rails should have a positive stop, preferably turned down and terminated at ground level.

The ramp should be slip-resistant and made of concrete with a lightly roughened surface to aid grip. A dimpled surface is preferable. Any inspection or access covers must be flush with the finished surface.

The front gate should have a clear opening width of 850mm minimum with no steps from the pavement to negotiate. Gates should not be spring-loaded. The latch should be large and easy to operate, i.e. lever action.

Lighting should be provided at the top and bottom of each flight of the ramp.

A patio area should be provided outside secondary external doors and, where practical, it should be linked to a main path to provide a safe means of escape for a wheelchair user in an emergency. The patio should be a minimum of 3m x 3m.

Wherever possible, the patio area should be level and adjacent to the door to provide safe secondary access and a sitting out area. Where possible, the patio should be level with adjacent garden.

Where a significant change of level is unavoidable, a raised 100mm kerb must be provided where there is a risk of the wheelchair rolling.

3 Doors

3.1 General requirements

All doors should be suitable for pulls or grab rails, needed to assist opening and closing, and for the subsequent fitting of other door furniture.

All doors should swing beyond 90 degrees, with door stops provided where required to protect walls/other doors.

Space must be provided to manoeuvre the wheelchair past the door swing.

Kick plates should be 350mm high and should be fitted to the bottom of the door to prevent damage by a wheelchair. Kick plates can be made of metal to order, or ordered ready made.

Door furniture should contrast in colour with the door.

3.2 Entrance doors

Entrance doors should be 1000mm door set. There should be a minimum clear opening width of 840mm. Ideally the door opening should be 900mm wide.

There should be a clear space of a minimum of 300mm between the opening edge of the door and nearest obstruction to the side, e.g. a wall.

Thresholds of external doors should be flush. If a threshold is unavoidable it should be no more than 15mm high and bevelled to prevent the wheelchair from jarring. Metal thresholds, which have compressible rubber strips, are most suitable.

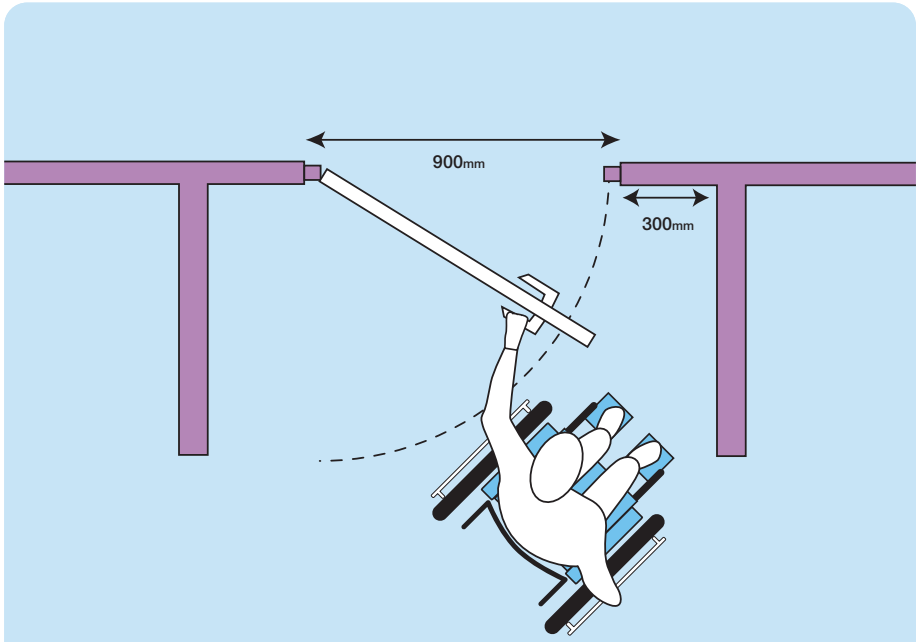

Diagram 3. Doorway

There should be a gap of at least 380mm between the top of the door and the ceiling so a suitable door-opening device, for example an electronically operated door opener/closer, can be installed if required.

Fully glazed doors are not appropriate. If a door with a vision panel is used it should have a zone of visibility between 500mm and 1500mm above the floor

The door furniture selected should offer maximum security while being easy to operate by people with limited control or strength in their hands.

The door handle should be a lever type and easy to operate, positioned at height of 1000mm

The door must be suitable for use with electric door release to allow future fitting of door entry system.

If a door entry system is installed it should be located at the latch side of door with activation pad within 200mm of the doorframe, at a height of between 750mm and 1000mm.

The doorbell should be positioned at a height of 1000mm. Two spy hole viewers should be fitted at heights of 1000mm and 1400mm.

The letterbox should be at a height of between 700mm and 1000mm.

A wire basket should be fitted to collect letters etc and should be easily accessible with a lifting lid. It should not stop the door from being opened fully.

3.3 Internal doors

There should be a minimum opening width of 840mm. Ideally the door opening should be 900mm wide. This width should be a clear opening that is unobstructed by the internal architrave of the doorframe.

Reduced swing doors should be considered where space is tight.

There should be a clear space of 300mm between the opening edge of the door and nearest obstruction to the side, e.g. a wall.

Where self-closing doors, such as fire doors, are absolutely necessary, they should have a delayed self-closing mechanism to allow time for the wheelchair to pass through the doorway before the door closes.

The spring on the door should not exceed 15N, or should have an electrically powered hold-open device, which responds to a fire/smoke detection system.

Rising butt hinges can assist wheelchair users to close the door behind them when a self-closing system is not installed.

Thresholds should not generally be provided at internal door openings as

they inhibit free movement in a wheelchair. Shower room doors are the exception and should have a threshold strip with rubber insert, bedded in mastic.

Low profile cover strips should be used at the edge of sheet or tile flooring.

3.4 Sliding doors

Where sliding doors are provided, they must operate smoothly and easily. A minimum clear opening of 850mm is essential.

An easy to grip vertical handrail should be positioned 800mm from the ground.

Door travel must be stopped at a point that allows adequate finger space between the handle and the frame, in both open and closed positions.

4 Bathroom and toilet

The bathroom is the most important room in the home for many disabled people as the ability to live independently can depend on the right provision for personal hygiene.

Ideally the disabled person should have access to bathing and toilet facilities in the same room.

A bath or a shower might be equally appropriate for a wheelchair user and ideally, as a person's ability may vary over time, properties built or refurbished to wheelchair accessible standards should have both. It is recognised that financial considerations may not always allow the ideal arrangement and that occasionally either a bath OR a shower may be provided.

Where a property is being adapted to meet the needs of individuals, occupational therapists will make recommendations that will determine the types of work that need to be carried out.

4.1 General bathroom considerations

Circulation space

All rooms used for bathing and/or toileting should have a clear circulation space of 1500mm x 1500mm to allow room to manoeuvre a wheelchair.

If the door opens inwards into this space, the area will need to be increased by the width of the door, i.e. 900mm.

Door

The doorway should be a 1000mm door set with a clear opening width of 900mm either opening outwards, or a sliding door with the door hung on the outside of the bathroom. The lock should be a flip over type and should be operable from both inside and outside.

Electrical and heating systems

The ceiling light should be a closed diffuser type, operable by a switch that should be situated 900-1000mm high, outside the entrance to the room. If the switch needs to be placed inside the room, building regulations dictate that a pull cord must be used instead.

Heating needs to be considered. A fixed wall heater in addition to central heating might be appropriate, for example an electric heater such as a Dimplex FH20 or similar (1kw to 400cu ft or 2kw above 400cu ft area).

Under floor heating or pipe work should be avoided as this may interfere with fixing of rails into the floor

A humidity controlled extractor fan with a minimum extract rate of 15 ltrs per second should be installed, switched on and off by a pull-cord or a switch situated 900-1000mm high outside the bathroom entrance.

Rails

Plastic rails should be fitted in preference to metal rails. Where metal rails are used they should be earth bonded. All rails should have a non-slip surface and should contrast with background in both colour and luminance.

4.2 Toilets

A wash down toilet with low level cistern and spatula flush is preferable

Positioning

There should be a minimum gap of 500mm between the wall and centre of the toilet to allow a rail to be fitted to the wall.

There should be a clear space of 1000mm from centre of the pan on the open side of toilet and a minimum of 1200mm from the front of pan to nearest obstruction. These minimum distances are to allow for sideways and frontways transfers from the wheelchair.

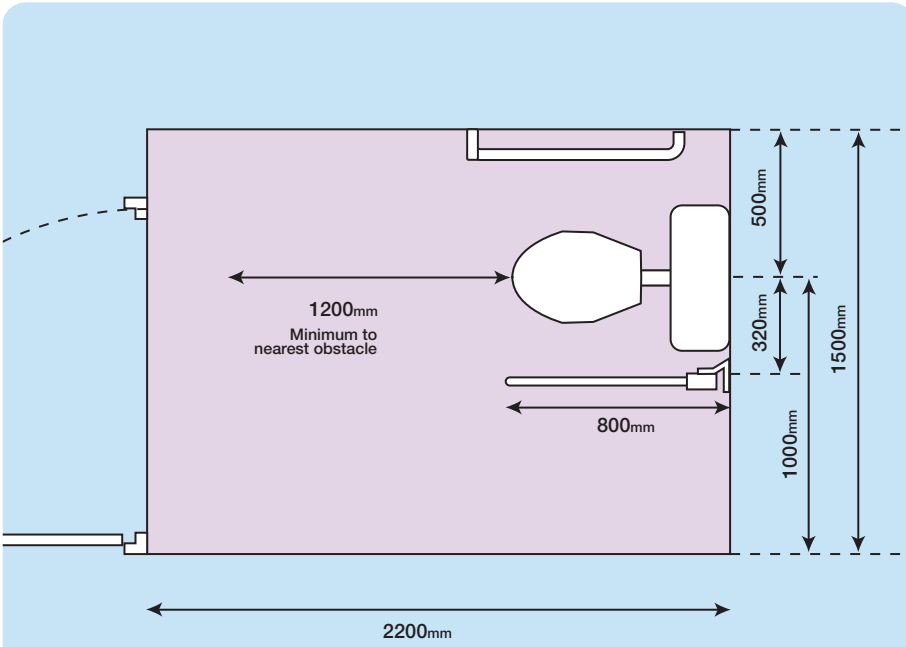

Diagram 4. Toilet and rails

An S trap waste should be fitted as a P trap running 90 degrees to the toilet would prevent the fitting of a toilet frame and restrict wheelchair accessibility.

There should be a minimum of 800 mm from the front of the toilet pan to the rear wall to allow good positioning of the wheelchair, enabling the disabled person to transfer onto the toilet by sliding across.

The overall height of the toilet pan, including the seat, should be 480mm from the floor. To enable sideways transfer from the wheelchair, a raised toilet seat may be used.

If a toilet with a wash/dry facility is to be used with a sani-chair, the manufacturer's instructions should be checked to see if a plinth under the toilet is required.

Rails in toilets

An L shaped rail should be fitted to the nearest side wall, 200mm in, at a height of 700mm from the floor.

A drop-down rail should be fitted to the back wall on the other side, at a distance of 320mm from centre line of the toilet and 700mm from the floor. This rail can be pushed up out of the way when the person needs to transfer from the wheelchair sideways onto the toilet. It is preferable for the drop-down rail to be single-hinge type with leg support. If a double-loop type rail is used, it should be fixed to the wall with rawlbolts to ensure a safe fixing because it is not supported by the floor.

There should be a minimum space of 640mm between the inside edges of the two rails and the toilet pan should be positioned centrally between these.

If a high-level cistern is being fitted, a horizontal rail should also be fixed to the back wall so the toilet lid stays in an upright position and a backrest is created.

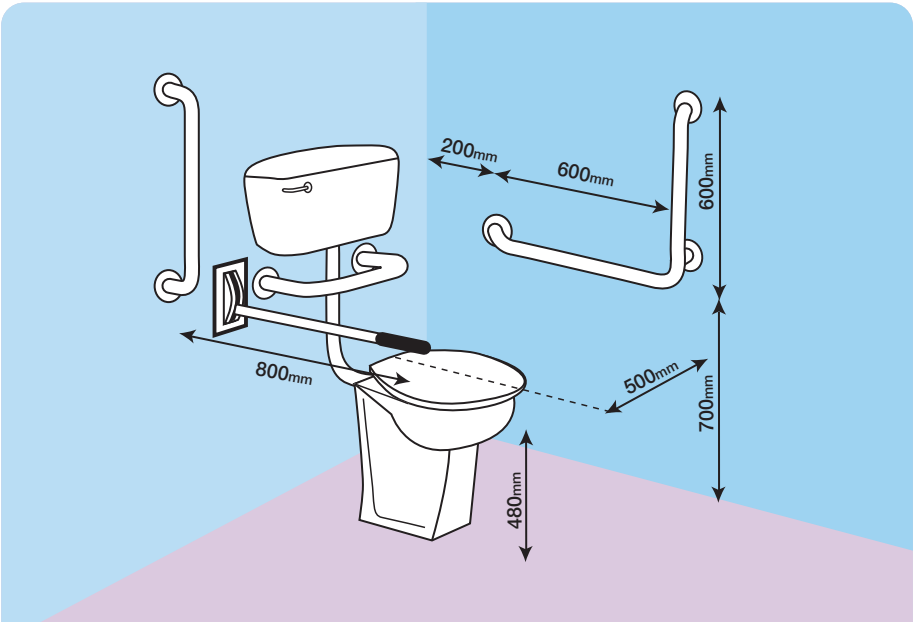

Diagram 5. Toilet and rails

Sanitary ware should contrast in colour and luminance to walls and floors.

Plastic or nylon rails should be fitted in preference to metal rails. Where metal rails are used they should be earth bonded.

Toilet roll holder

The toilet roll holder should be positioned below the L shaped rail. It should be a loose-leaf type, or have a locking mechanism fitted.

4.3 Wash hand basins

The basin should have a shallow fronted bowl and be securely fixed at 770-800mm above floor level. A Twyford Avalon basin with adjustable bracket and semi-pedestal is preferred where space allows.

Neatly installed flexible supply and waste pipes should be used to allow for subsequent height adjustment, if required.

Taps should be single lever mixer type.

There must be a 1200mm space in front of the basin for straight wheelchair approach, with knee space underneath. Pipes/ducting should not obstruct the wheelchair footplates.

Hot water from basin should not exceed 41˚C at outlet.

Washbasin should contrast in colour and luminance with the walls and surfaces around them.

4.4 Baths

If a bath is specified, it should be standard size (1700mm x 700mm x 500mm high) and made of pressed steel. Acrylic baths are not suitable for the fitting of some bath equipment.

General rules about circulation space apply, so there must be a minimum space of at least 1500mm x 1500mm that is free from obstructions.

Grab rails should be fitted to suit the needs of each individual client.

The wall by the bath should be constructed so nylon/plastic rails can be installed.

Where the bath meets the wall, there should be sufficient room for a bath board to rest safely. The rim of the bath should therefore be at least 50mm wide.

Taps should be lever or half lever type mixer taps and should be situated where they are easily accessible, for example in the front corner.

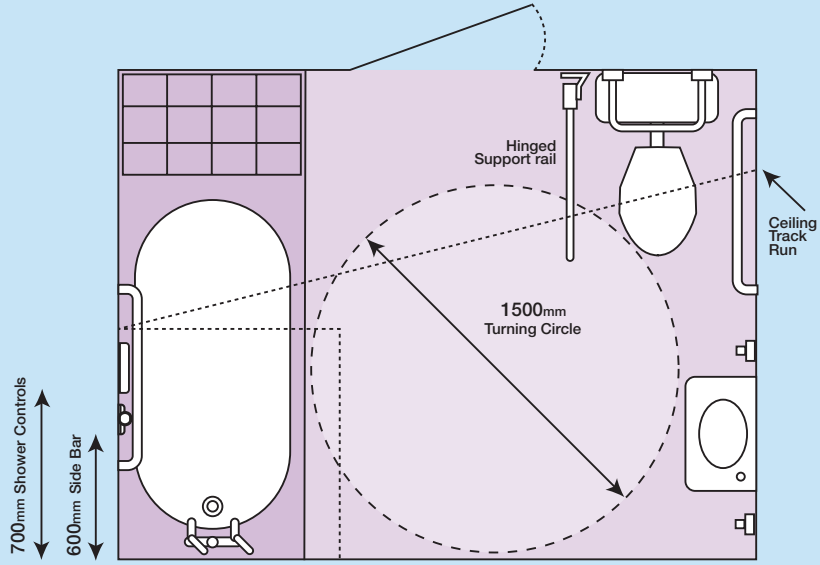

Diagram 6. Bathroom layout

5 Showers

5.1 Shower requirements

Flooring/trays

A level access shower is recommended. There are two main ways this can be provided.

1. Wet-room style shower - where the floor of the room is also the floor of the shower. The shower should be laid with a 1:40 fall towards the gully outlet. Suitable drainage must be provided to the floor and the floor must be covered with either non-slip tiles or Altro-type slip-resistant covering.
2. Shower where the tray is laid flush with the surrounding floor. In this case the ideal minimum size is 1000mm x 1000mm.

The drain should ensure rodding access. A waste pump will often be needed to remove wastewater, as it is not always possible to get the drainage fall that is necessary for these types of showers. The position of the pump and its maintenance should be considered, and it should be accessible to the user and their carers.

Where a shower tray is installed, it is recommended that the surrounding floor should be covered with Altro-type slip-resistant flooring.

Enclosures

Half height shower screens contain splashes and enable the disabled person to be assisted while showering. The half height shower screen doors can be used in conjunction with a half-length curtain that drops to just below the top of the screen doors.

Doors should be hinged to make access easier.

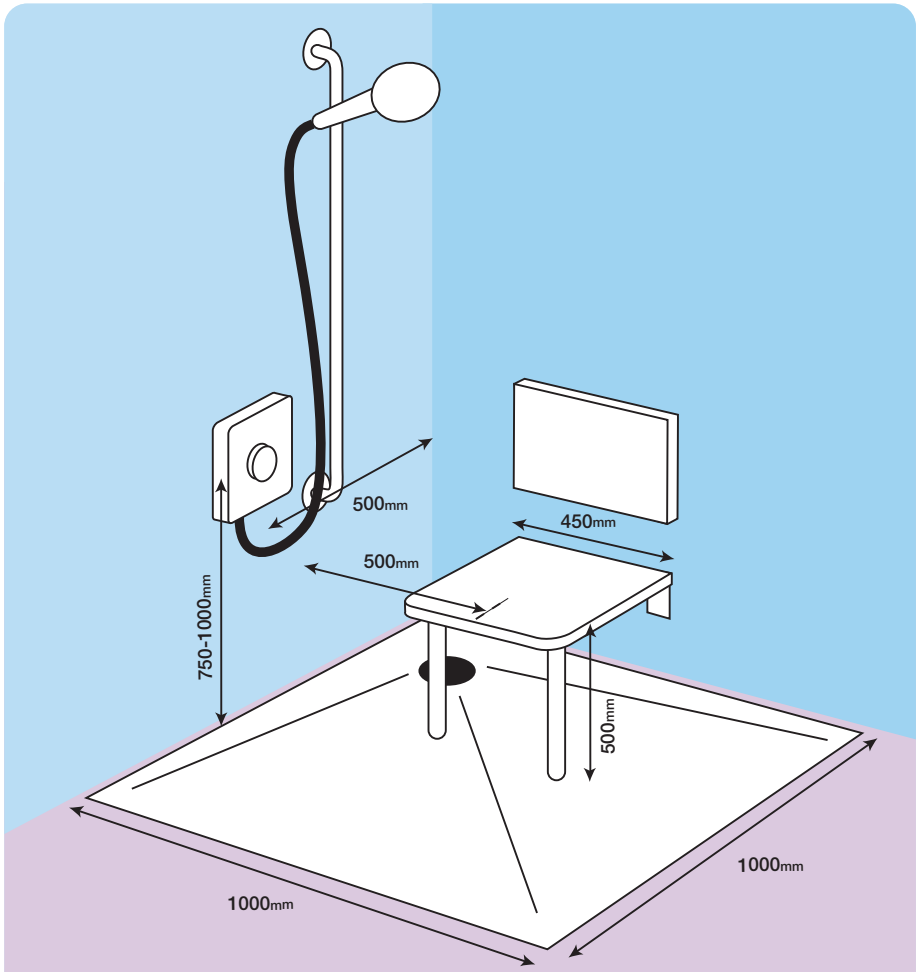

Diagram 7. Shower layout

Curtains

A sturdy curtain rail should be securely fixed around shower area. The curtain should be 1800mm long, heavy duty with a weighted bottom seam just touching the floor, so it can be easily pulled from a seated position.

Shower seat

A wall fixed shower seat with backrest should be provided. The seat should be at least 450mm wide x 450mm deep and should be 500mm from the

floor. There should be at least a 500mm space between the wall and the centre of the seat.

Shower controls

Shower controls, and an adjustable height showerhead with a 1500mm long hose, should be positioned within easy reach of the disabled person while they are sitting on the shower seat. The showerhead should be fitted on a 1000mm sliding bar so the shower can be used while seated or standing. The bar should be 750mm from the floor at its lowest point.

Controls should be fitted between 750mm and 1000mm from the floor and should be positioned 500mm in from the corner on the wall adjacent to the seat.

The shower should be fitted with an anti-scald thermostatically controlled device and must have a safety cut out at 43 ˚C. The controls should be touch sensitive or lever type.

Rails

Two 600mm (preferably plastic) rails should be positioned in the shower area, according to the needs of the disabled person. A grab rail should be securely fixed within easy reach of the shower, where it can act as a towel rail. Rails should contrast in colour and luminance to walls.

Showers over baths

In some circumstances, an occupational therapist may recommend a shower be installed over a bath.

Shower controls and a removable adjustable height showerhead with 1500mm hose should be positioned within easy reach on adjacent wall, when sitting on a bath board. The controls should be no more than 1200mm high.

The shower should be fitted with a safety cut out at 43 ˚C. Two 600mm rails, which contrast in colour and luminance to the walls, should be positioned according to the needs of the disabled person.

At the design stage of building it is often not known whether the kitchen will be used by a wheelchair user or by a carer, therefore it needs to be designed so it can be easily adjusted when a tenant is identified. As well as being convenient and safe for wheelchair users, kitchens should not look obviously different from the general range of designs.

The most important thing to consider when planning kitchen areas and fittings is the need to bring food preparation areas, cooking areas and appliances within easy reach of a disabled person. Units and equipment should be easy to use and arranged to minimise the need for manoeuvre.

In particular, the height, depth and extent of clear space below work surfaces can affect how far a wheelchair user can reach and can have a major impact on how easy it is for them to use the kitchen.

It must be easy to move saucepans between the sink and the hob so a worktop and unobstructed knee space is needed between these units.

6.1 General kitchen considerations

Floor space and knee recesses for wheelchair users

The kitchen area should have clear circulation space of 1500mm x 1500mm between facing floor units, or between floor units and a wall.

A knee recess, the depth of the work surface and at least 800mm wide, should be provided below or adjacent to key task areas, including the hob, the sink and food preparation areas.

Where possible, an unobstructed space or knee recess at least 600mm wide should be provided to one side of kitchen appliances including refrigerators, washing machines, freezers or ovens.

The height of work surfaces and wall-mounted units should be easily adjustable.

Work surfaces

Where possible, work surfaces should be continuous and designed so travel between the main appliances and task areas is minimised.

When fixed, the height of the work surface will usually be 800mm from the floor, with clear knee space height of 760mm for wheelchair users, although some people may need surfaces lower than this.

The work surface should be 600mm deep with a rounded front edge profile. It should be smooth, not textured, so equipment with suction pads can be used. It should have fascia only when needed for fixing switches or to conceal a sink bowl.

As it is not possible for major appliances such as the fridge or washing machine to be situated underneath a wheelchair-height work surface, either the work surface above the appliances should be standard height, or the appliances should be free standing.

A pullout board should be provided below the work surface where cupboards restrict the wheelchair user's access to work surfaces.

Where circulation space and floor mounted cupboard space is at a premium and an accessible work surface for all kitchen tasks is not possible, pull out boards provide supplementary accessible work surfaces for wheelchair users.

Storage units

The kitchen should contain a number of storage units including base units, wall units, tall storage cupboards, drawer units and mobile storage units.

It is recognised that there is a limit to the amount of accessible storage that can be created within a limited height range and that higher shelves, used by carers or other family members, can be used to store items that are used less frequently.

To be fully accessible for a wheelchair user, any shelving above a work surface should be no higher than 1150mm above the floor.

The base of wall units should be 350mm from top of work surfaces.

Door handles should be easy grip D handles and located at base of wall units.

A pull-down storage basket should be included in at least one wall unit. Cupboard doors should swing open through 180 degrees. A cupboard with a 90-degree opening is a hazard, especially for visually impaired people.

A carousel shelf unit should be provided to enable access to corner base units.

A moveable trolley, consisting of drawers or open containers, provides flexible accessible storage where space is limited and can be used instead of fixed, floor-mounted units.

Kitchen sink and taps

The kitchen sink should be inset with a shallow bowl that is 140mm-150mm deep. The worktop adjacent to the bowl should be a minimum of 500mm wide.

The underside of an exposed sink should be heat insulated to avoid the possibility of burns to knees and legs. There should be clear knee recess under the sink that is not less than 900mm wide. Any fascia should be no deeper than the projection of the bowl below the worktop.

A swivel neck mixer tap, with clear markings to indicate hot and cold settings for the benefit of visually impaired people, should be fitted to the sink within easy reach of wheelchair users, if necessary, at the side of the sink bowl. The tap should have a quarter turn lever operation from off to full water flow.

6.2 Appliances

Hob

The hob should

- be located near the oven, with a preparation area in-between the oven and the hob
- have a work surface on at least one but preferably on both sides, providing a support surface for pans
- be insulated on the underside
- have a means of indicating if the rings are still hot
- have positive controls at the front of the hotplate
- be self igniting where gas rings are used
- have knee space underneath and clear knee space round to sink
- have an extractor hood fitted over the hob with accessible controls that are no higher than 900mm from floor

Oven

The oven should

- be set in a housing unit that allows for height adjustment, with a deep base drawer unit underneath and storage above
- have a pullout board under the work surface on the opening side of oven
- have a reversible side-hung door opening to 180 degrees - the swing of the door should not impede access for wheelchair users
- have slide-out non-tilt shelves
- be at the same height as the work surface at its mid level point
- have controls that are easy to use and manipulate, that are no higher than 1050mm from the floor
- have display panels no higher than 1150mm from the floor
- have markings that are clear and easy to understand

Other appliances

There should be a minimum of three 610mm-wide appliance spaces for four-person properties. Additional space should be provided in properties designed for five people.

Fridge/freezer

A space that is at least 610mm wide should be left for a refrigerator/freezer, allowing the door to be opened fully and shelves to be removed. Where fitted as separate units, the fridge and freezer should be fitted on 200mm plinths.

Wall units, switches, sockets and controls should not be fitted over a fridge/freezer.

Washing machine/dishwasher/tumble dryer

Front-loading washing machines, dishwashers and tumble dryers intended for use by wheelchair users should be fitted onto 200mm plinths.

6.3 Switches, sockets and controls

Where a clear space has been provided under a work surface, a switched socket outlet should be positioned on the wall at the back of the worktop with the centre line no higher than 1000mm above floor level.

Where no space has been provided beneath a work surface, a switched socket should be positioned no more that 100mm above the work surface or 150mm back from the front edge of work surface.

Switches and controls in the kitchen, where mounted on a wall without an intervening work surface, should be fully accessible to wheelchair users and mounted at 900mm from floor level.

6.4 Windows

Wheelchair users should be able to reach the opening and closing mechanism of the window from a seated position. If the design does not include this then some form of ventilation should be added, for example extractor fan controls within reach or controls to a high window that extend down to a level within reach.

6.5 Flooring

Flooring should be slip resistant and contrast in colour and luminance with wall surfaces. Bold patterns and shiny floor and wall surfaces, which can produce reflections and glare, should be avoided as they can be confusing to visually impaired people.

6.6 Lighting

General lighting in a kitchen should be in the range 150 lux to 300 lux. Lighting that creates glare reflections or shadows on the work surfaces and sink should be avoided and any task lighting under work surfaces should be well diffused to avoid glare.

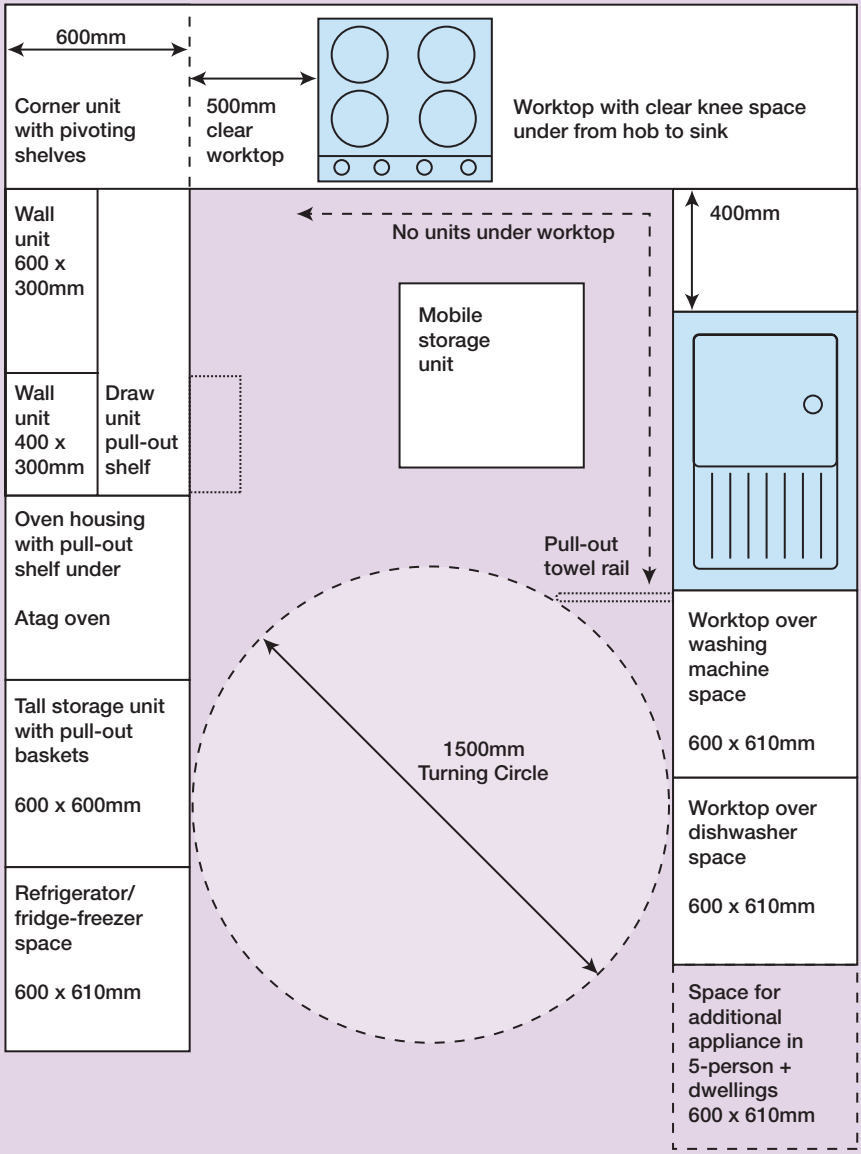

Diagram 8. Kitchen layout

7 Switches, sockets and controls

7.1 General requirements

All outlets, switches and controls, including two-way switching, should be positioned consistently in relation to doorways and corners, and in a logical sequence so they are easy to follow through the building.

To make light switches easy to find they should be aligned horizontally with door handles.

All outlets, switches and controls should be at least 350mm from room corners.

Electrical sockets, telephone points and TV sockets should be 900mm above the floor, as should all switches and controls that require precise hand movements, such as heating installations, ventilation etc.

Switches for permanently wired appliances should be mounted at 1000mm from the floor.

Meters should be mounted between 1200mm-1400mm from the floor.

8.1 Heights of window sill and transoms

The solid wall or panel below a window that opens should be no higher than 800mm (the level required for safety in accordance with BS 6180) so wheelchair users and seated people can enjoy a reasonable view out of the window and can see below eye level.

For safety reasons, the part of the window that opens should be no lower than 800mm above the floor. Safety glass should be used in any windows below 800mm from the floor.

When the window is closed, the glazing line at the sill should be no more than 900mm above floor level.

Transoms should **not** be positioned between 900mm and 1200mm from the floor in order to maintain a clear view through a window from a seated position.

Where windows open outwards onto pedestrian routes, projections should be limited to 100mm to avoid collision.

8.2 Window controls

Windows should have easily accessible fastenings that are located between 800mm and 1000mm from floor level.

Ideally, the need for finger dexterity should be avoided so it should be possible for the controls to be operated with a clenched fist. It should not be necessary to use both hands simultaneously to operate the controls.

Lever handles are preferable to knobs.

The torque force required to operate a lever handle should not exceed:
a) 8 Nm to depress and 5.5 Nm to lift a handle with an oval cross section;
b) 4 Nm to both depress and lift a handle with a rectangular cross section.

Powered window systems or window winders should be used for windows that are inconveniently positioned, such as above a sink.

Window controls should contrast in colour and luminance with their background for the benefit of visually impaired people.

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For translated information, please call:

- the **Bengali** answerphone service on **023 9284 1651**; or
- the **Cantonese** answerphone service on **023 9284 1652**.

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Wood fibre from sustainable forests

Printed August 2006

This document has been produced by the Directorate of Health, Housing & Social Care.

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