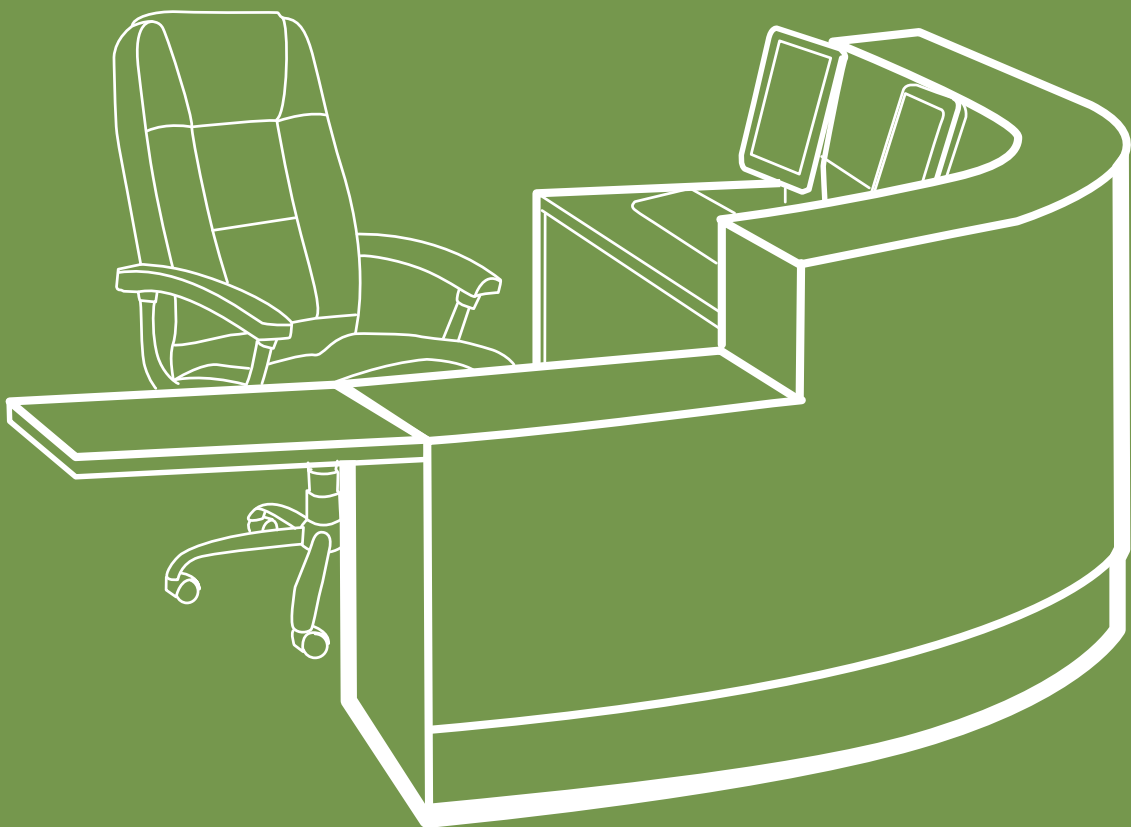# Building for Everyone:

A Universal Design Approach

Facilities in buildings

6

Centre for Excellence in Universal Design

Creating an environment that can be used by all people, regardless of their age, size, disability or ability.

The National Disability Authority's Centre for Excellence in Universal Design has a statutory role to promote the achievement of excellence in universal design in:

- the design of the built and external environment
- product/service design
- information and communications technologies (ICT)
- the development and promotion of standards
- education and professional development
- raising awareness of universal design

More information and updates on the website at: **www.universaldesign.ie**

Building for Everyone

Booklet 6 - Facilities in buildings

Contents

6.0   Objectives

The guidance in this booklet promotes the concept and philosophy of universal design and encourages developers, designers, builders and building managers to be innovative and think creatively about solutions that meet the needs of all building users regardless of age, size, ability or disability.

The objectives of the series of booklets are to:

- identify and promote best practice with regard to universal design of the built and external environment

- provide best practice guidelines that in no way conflict with the requirements of existing regulations in Ireland

- provide guidelines that are usable by and accessible to the target audience

- promote universal design in Ireland

This booklet aims to:

- identify and promote best practice for the design of a building's interior and the provision of facilities and equipment within the building with regard to universal design

- increase awareness of, and to encourage designers to identify, the needs of all those who require well-designed facilities and equipment within buildings in order to undertake daily activities

- highlight the wider benefits experienced by all when accessible and universally designed facilities and equipment are provided within buildings

- encourage designers to provide universal design solutions for facilities and equipment within buildings that look beyond the minimum requirements of national building regulations

This booklet is part of the series "Building for Everyone – A Universal Design Approach," which aims to provide practical guidance on the universal design of buildings, places and facilities.

Universal design places human diversity at the heart of the design process so that buildings and environments can be designed to meet the needs of all users. It therefore covers all persons regardless of their age or size and those who have any particular physical, sensory, mental health or intellectual ability or disability. It is about achieving good design so that people can access, use and understand the environment to the greatest extent and in the most independent and natural manner possible, without the need for adaptations or specialised solutions (see full definition in **Appendix A1**).

Why universal design?

People are diverse - some are left-handed and some right-handed - and people vary in their age, size and functional capacities. Illness or disability (whether temporary or permanent) can also affect characteristics such as people's mobility, dexterity, reach, balance, strength, stamina, sight, hearing, speech, touch, knowledge, understanding, memory, or sense of direction. A reference list with these booklets indicates some of the key differences in human abilities that should guide design of buildings and of outdoor places. (See full description of Human Abilities in **Appendix A2**).

People of diverse abilities should be able to use buildings and places comfortably and safely, as far as possible without special assistance. People should be able to find their way easily, understand how to use building facilities such as intercoms or lifts, know what is a pedestrian facility, and know where they may encounter traffic.

Given the wide diversity of the population, a universal design approach that caters for the broadest range of users from the outset can result in buildings and places that can be used and enjoyed by everyone. That approach eliminates or reduces the need for expensive changes or retro fits to meet the needs of particular groups at a later stage.

It is good practice to ascertain the needs of the range of expected users as early as possible, and to check the practicality and usability of emerging designs with a diverse user panel.

Designing for one group can result in solutions that address the needs of many others. For example:

- level entry (Step-free) entrances facilitate not just wheelchair users but also people with buggies; people with suitcases or shopping trolleys; people using walking or mobility aids; and people with visual difficulties

- larger toilet compartments provide easier access to wheelchair users; those with luggage or parcels; parents with pushchairs or accompanying small children; those using walking or mobility aids; and larger-sized people

- clear, well-placed signage that uses recognised symbols or pictograms helps people with reading or cognitive difficulties, and those whose first language is neither English nor Irish

Sometimes one solution will not suit all and a range of options will need to be provided, for example:

- providing both steps and a ramp where there is a change in level

- providing parking ticket machines that offer slots at different heights to facilitate use at standing height, at sitting height, and by people of small stature

This series of booklets is for architects, engineers, planners, developers, designers, building contractors, building workers, building managers, and others involved in designing, commissioning and managing buildings and their surroundings. It provides guidance on a universal design approach to all new buildings, and the use and adaptation of existing environments.

Those who commission, design, construct or manage any part of the built and made environment also have a duty of care to adhere to relevant legislation and regulations including equality legislation, building regulations and health and safety regulations.

The guidance is based on a best practice approach drawing on up-to-date international best practice, guidelines and standards; previous guidance by the National Disability Authority; and extends beyond disability access matters to incorporate a universal design approach. The series is fully compatible with Part M (2010) of the Building Regulations and associated Technical Guidance Documents related to Part M.

A disability access certificate is required for new buildings other than dwellings (including apartment buildings) and certain other works (as set out in Article 20 D (1) of SI 351 of 2009) to which the Requirements of Part M of the Building Regulations apply, which commence or take place on or after 1 January 2012. Further details on these and other relevant standards, codes of practice, and professional codes of practice are listed in **Appendix A3** Further Reading.

The detailed guidance provided here does not represent the only possible solution. Designers may come up with other ways to meet a diversity of users. New materials and technologies that emerge may open up further possibilities of accommodating the diversity of the population.

Checklists are provided throughout the series and while they provide a summary of main considerations and technical criteria, they should not be regarded as a substitute for the main text or an exhaustive list.

An comprehensive **index** is available with the suite of booklets.

The Building for Everyone series is available online at **www.nda.ie** and **www.universaldesign.ie**. Electronic links are provided to relevant sections in the different booklets. As standards and requirements develop, the electronic versions of these booklets will be updated.

The electronic version is produced in accessible PDF format in accordance with the Web Content Access Guidelines 2.0. If you have any difficulties in this regard or require the document, or particular sections, in alternative formats, please contact the Centre for Excellence in Universal Design at the National Disability Authority, **info@ceud.ie** or (01) 6080400.

6.2   Terminology

Accessible facilities – Facilities that are designed for all users of a building or external environment, including the young and old, and those of all sizes, abilities, and disabilities.

Automated teller machine (ATM) – A machine for dispensing cash and undertaking other financial transactions, including checking an account balance and changing a personal identification number. Also commonly termed cash point, cash machine, or cash dispenser.

Building user – A person regardless of age, size, ability or disability using facilities in a building or associated external environment.

Payphone – A public telephone that requires payment on a call-by-call basis, either using coins, a prepaid telephone card, or a credit or debit card.

Personal identification number (PIN) – A personal four-digit code used to verify card-based payments.

Textphone – A telephone device that facilitates text communication and incorporates a screen and keyboard.

6.3   Design Issues

Integration, not afterthought: Many facilities in buildings will be designed and specified by the project team, for example, a built-in kitchen or refreshment area in a new building or refurbishment project. By considering the spatial and detailed requirements of such facilities at the outset, clients and designers will be able to provide facilities that meet the needs of the broadest range of people and be universally designed.

Other facilities – such as vending machines and telecommunications equipment, which are often free-standing and may be replaced or substituted periodically – may be selected by building managers or building occupiers after completion of a construction project or to supplement facilities in an existing building. In these cases, there is a risk that such new or additional facilities will be positioned in an unsuitable location, with insufficient space for access and manoeuvre and where they may present an obstruction to other building users. It is essential, therefore, that the provision of any facility or item of equipment should be considered as early as possible in the design process to ensure that adequate space is available in a suitable location in the building, even if the equipment is to be provided by others at a later stage.

In some cases, clients and designers should consider whether future changes in the occupancy or use of the building may necessitate the provision of additional or alternative facilities, and design the building in such as way as to easily accommodate future changes. This will require consideration as to the use of space, flexibility and, where electrically-powered or telecommunications equipment is likely to be installed, the provision of adequate power outlets and telephone sockets.

Checklist – Integration, not after-thought

- Consider the spatial and detailed requirements of facilities at the earliest possible design stage.

- Anticipate potential future requirements.

6.4　Reception Desks and Service Counters

Counters and service desks, including reception desks and information counters, should be accessible and understandable to everybody. This includes all visitors or customers in a building, as well as personnel who work on the staff side of the counter.

In larger buildings such as public service organisations, and in commercial offices, service counters and reception desks are likely to be large, with several positions for staff and customers. With this type of arrangement, there will be sufficient space to provide counters at different heights.

Image 6.1 Example of a low-level reception desk.

Reception desks should be placed conspicuously and in a direct, logical position in relation to the main entrance of a building to permit easy identification.

The reception desk should also be easy to find from key internal circulation routes such as the foyer, corridors, stairs or lifts.

Reception desks should be located away from potential sources of noise, such as a busy bar area or the main entrance doors in buildings, where there is likely to be significant external noise.

Image 6.2 Example of a reception desk with two levels.

Reception desks and service counters should incorporate a work surface at two different levels to facilitate use by people at a range of heights and in either a seated or standing position, as **Figure 6.1**.

The lower work surface should be a maximum of 760mm above floor level and have a clearance to the underside of 700mm. The lower section of counter should have a width of 1800mm (minimum 1500mm) to enable two people to sit alongside each other, or for two people to be positioned diagonally opposite each other. To enable people to sit comfortably and read or sign papers, the lower work surface should incorporate a knee recess 650mm deep. Where people are likely

to be seated on both the staff and customer side, it is preferable for the knee recesses to be positioned diagonally so that the counter is not excessively deep.

Figure 6.1 Height of counters to reception and service desks.
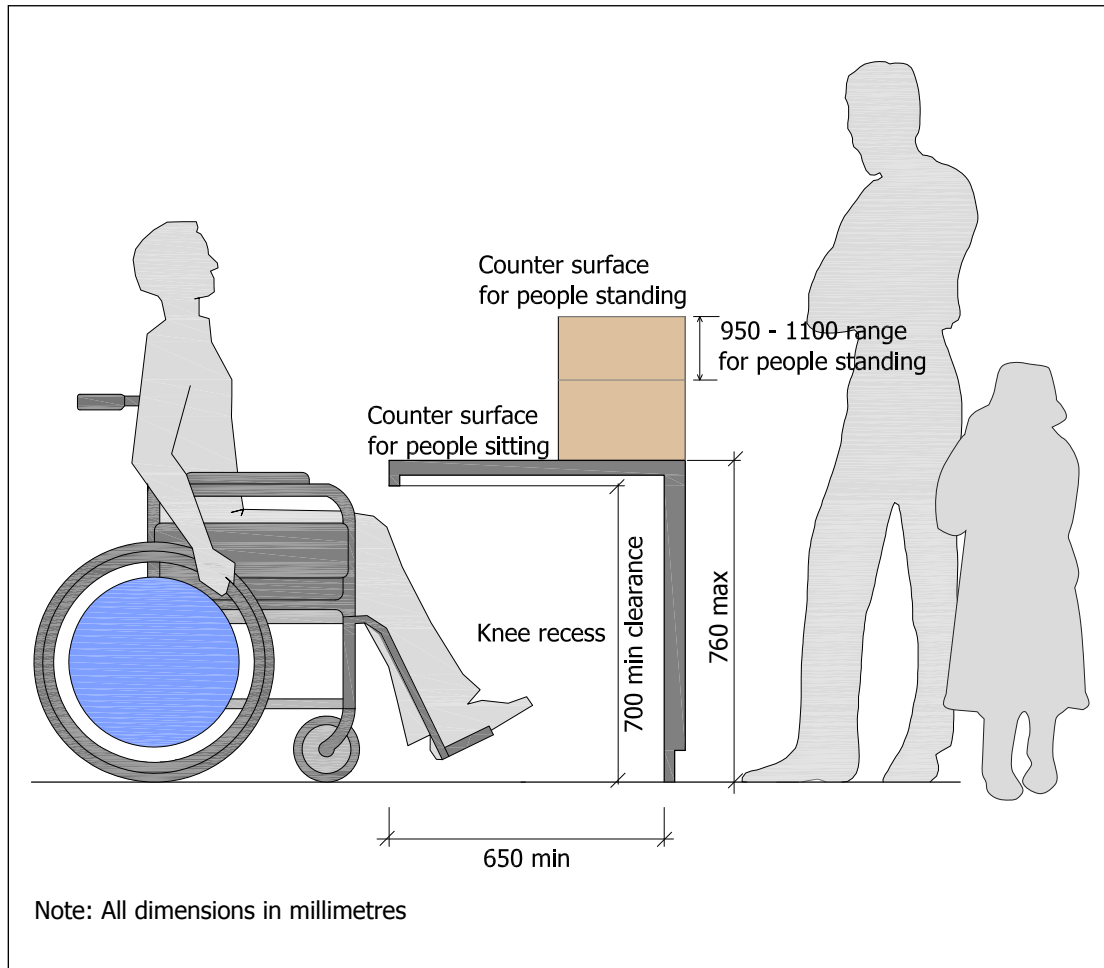
The upper work surface should be between 950mm and 1100mm above floor level. Where there is sufficient space, one work surface positioned at 950mm and another positioned at 1100mm above floor level could be provided to suit people of different heights.

There should be sufficient space on both sides of a reception desk or service counter for people to approach and manoeuvre with ease. A clear area of 2440mm x 2440mm should be provided for this purpose.

Where people are required to pick up small items such as tickets or money from a counter, the counter should incorporate an upward-sloping leading edge. This profile also reduces the likelihood of items falling off the counter. The leading

edge of the counter should visually contrast with the work surface so that it is readily identifiable.

Where reception desks and service counters are required to incorporate glazed screens for security or other reasons, they should be clear and unobstructed.

The position of artificial lights, external windows, and any other light source should be carefully considered in relation to any glazed screen to avoid the potential for glare and reflection, as this may obscure visibility and impair communication. Posters and notices should not be stuck to screens as these will obscure visibility and may be visually confusing.

Where glazed screens are provided, a voice augmentation system (also called a speech enhancement system or voice transfer system) should be considered. This is likely to benefit everybody, including people with hearing difficulties, as the clarity and volume of speech is often reduced by the presence of a screen.

Image 6.3 Alternative view of a reception desk with two levels.

Reception desks and service counters should be evenly illuminated to a level of 200 lux. Lighting should be positioned to adequately illuminate the face of any member of staff, which will aid visual communication and lip reading.

A hearing enhancement system should be provided at all reception desks and service counters. Refer to **Section 4.10** in **Booklet 4: Internal environment and services**.

For details of queuing areas and temporary barriers, refer to **Section 2.4.3** in **Booklet 2: Entrances and horizontal circulation**.

Checklist – Reception desks and service counters

- Ensure desks and counters are accessible and understandable on staff and customer sides.
- Locate in a logical position with direct access from main entrance.
- Include counters at different heights, as **Figure 6.1**.
- Include knee recess for people in seated position.
- Provide 2440mm x 2440mm clear space for approach to desk.
- Ensure counter has visually-contrasting, upward-sloping leading edge.
- Ensure glazed screens are clear and unobstructed.
- Consider the use of a voice augmentation system in conjunction with glazed screens.
- Provide a hearing enhancement system, clearly signed.
- Ensure adequate illumination at counter level.

6.5   Waiting Areas and General Seating

General seating enabling people to wait and rest should be provided in all reception and waiting areas in public and commercial buildings. It is essential in buildings where people may have to wait for long periods such as in some healthcare settings.

In public transport facilities and airports where waiting is inevitable, seating should be provided in all main waiting locations and in close proximity to

refreshment facilities, toilets and travel information. All seating should provide convenient access and comfortable facilities for everybody.

Seating should be readily apparent and clearly signed from any reception desk, service counter or information point. Access to seating should be direct and unobstructed and seats should always be located on a level floor and be positioned where they will not obstruct circulation routes.

Seating areas should incorporate spaces for people who use wheelchairs and electric scooters so that they can remain in their wheelchair or scooter and sit alongside companions. Such spaces are also useful for people with prams and pushchairs.

Spaces should be available to enable two people using wheelchairs or electric scooters and personal assistant to sit alongside each other.

A clear space at the end of a block of seating or within a row should be provided to enable an assistance dog to sit and rest, clear of any circulation route or seating aisle.

Rows of seats should be positioned with a clear space of 1200mm between the leading edge of one seat and the rear of the seat in front. A clear aisle width of at least 1200mm should also be provided to the front and rear of the block of seats, as in **Figure 6.2**.
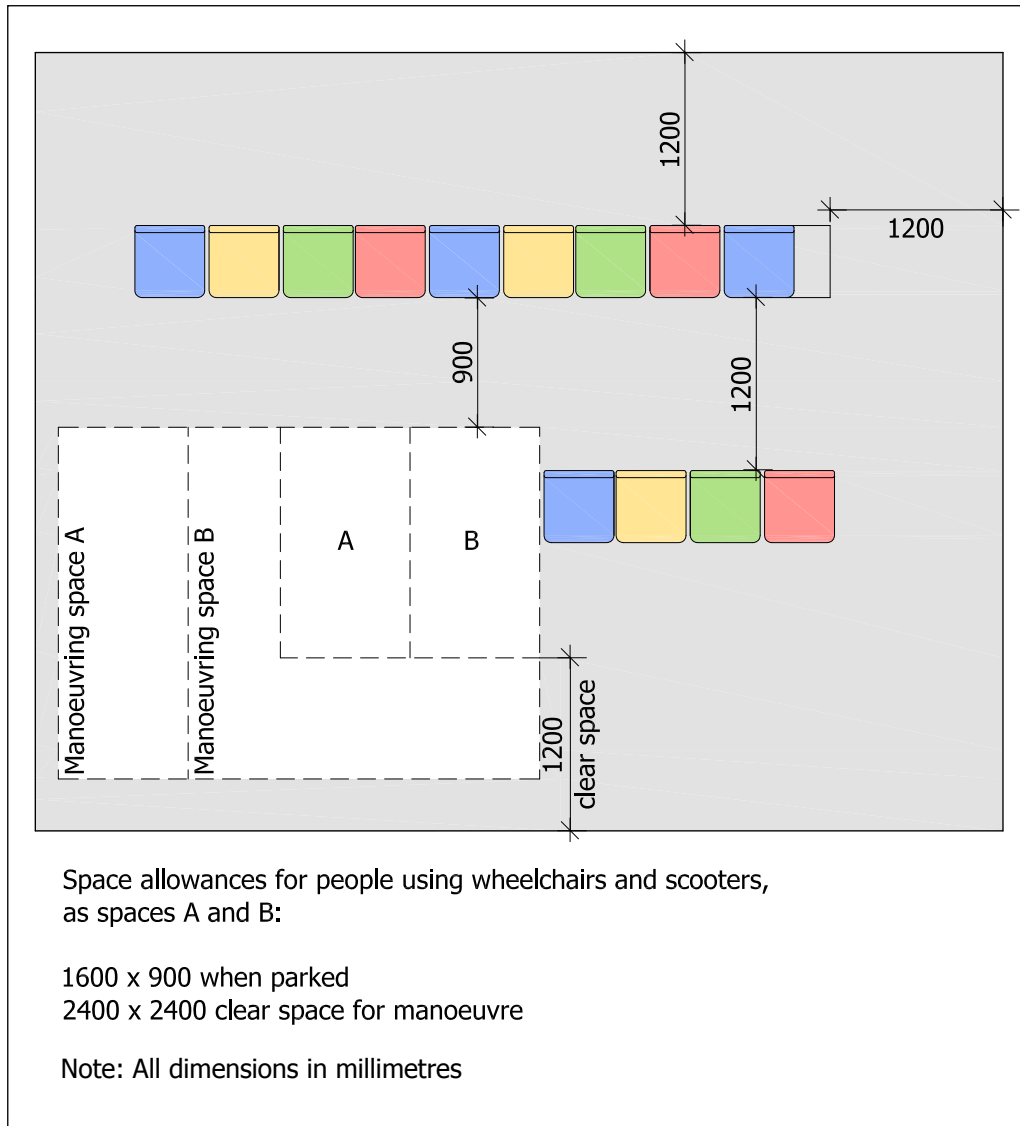
Spaces for people using wheelchairs and electric scooters should be 900mm wide x 1600mm deep when positioned alongside fixed seats. However, to enable people to manoeuvre into position, a clear space of 2400mm x 2400mm should be provided.

The needs and preferences of a greater number of people can be met if different styles of seat can be provided within seating areas. This could include fixed seats; moveable seats; seats with and without armrests; and seats with higher backs. Perching seats may be appropriate in some areas, particularly if space is limited. For the comfort of everybody, it is preferred if all seats have a fixed cushion.

The standard height for a seat is typically 450mm. Some seats should be provided with a seat height between 450mm and 475mm as these tend to be more

comfortable for people with mobility difficulties. Seats with a shallower depth than standard may be provided for people of smaller stature.

Figure 6.2 Key dimensions for general seating areas.

Space allowances for people using wheelchairs and scooters, as spaces A and B:

1600 x 900 when parked
2400 x 2400 clear space for manoeuvre

Note: All dimensions in millimetres

Perching seats should have a height of 500 to 750mm. It is recommended that all seats should be 500mm wide , but some should be wider to accommodate people of larger stature. A heel space at least 100mm deep makes it easier for people to stand up from a seat or perch. Seats with backrests are essential for additional support; armrests, positioned approximately 200mm above seat level, are also useful to lean against, and assist in getting in and out of the seat. Seats positioned or linked in a row should all be of the same style, such as all with armrests or all without. A mixture of seat styles in a single row can cause confusion for some people with visual difficulties.

All seats should visually contrast with the surrounding walls and floor surfaces to be readily identifiable. The use of floor finishes that are different in texture or colour can be useful to delineate seating areas from adjacent circulation routes or other facilities, particularly in large open-plan buildings. Refer also to **Section 4.4** in **Booklet 4: Internal environment and services**.

For seating in external environments, refer to **Section 1.5.4.7** in **Booklet 1: External environment and approach**.

For audience and spectator seating, refer to **Section 7.9.1** in **Booklet 7: Building types**.

Checklist – Waiting areas and general seating.
• Ensure all seating is readily apparent and clearly signed.
• Provide seating in all reception and waiting areas.
• Locate seating close to toilet facilities and a reception or information point.
• In public transport facilities, provide seating in all waiting locations.
• Make sure access to seating is unobstructed.
• Install seating areas that accommodate clear areas alongside seats for people with prams and pushchairs; people using wheelchairs and electric scooters; and for assistance dogs.
• Follow clear aisle widths and space between seats in **Figure 6.2**.
• Provide seats of different styles to suit different people.
• Consider perching seats where space is limited.
• Provide seats that visually contrast with surrounding surfaces.

Storage facilities encompass cupboards, drawers, and shelves that may be located in the workplace for general staff use or in hotels and residential facilities for storing personal effects. Shelves and racks in retail environments will be accessed by store staff and the general public.

Access to storage facilities should be direct and unobstructed. The location of storage facilities should be readily apparent or clearly indicated, particularly where access is available to members of the public.

Storage facilities should be solid, stable, and without sharp edges. They should contrast visually with adjacent surfaces and be adequately illuminated. Handles and any other items of projecting ironmongery should visually contrast with the mounting surface so they are readily identifiable.

Shelving should be positioned to suit people with different reach ranges; people of short stature; and not too low for people who can't bend down, for example, older people and people with mobility difficulties including people in a seated position. **Table 6.1** sets out recommendations for the height of shelving in storage facilities.

Table 6.1 Height of shelving in storage units			
	Height of shelving	**Depth of shelving**	**Distance between shelving units**
Seated approach with front access	650 to 1000 for frequent use 650 to 1150 for infrequent use	220	1200 where knee recess is provided 1400 without knee recess
Seated approach with side access	665 to 1060 for frequent use 630 to 1170 for infrequent use	220	1200
Standing approach	750 to 1500 for frequent use 700 to 1625 for infrequent use	Not stipulated	1200

All dimensions in millimetres

Where storage units such as filing cabinets or shelves are arranged in rows, the distance between the units themselves, and between the units and any adjacent wall or obstruction, should be at least 1400mm.

Clothes racks and hanging facilities in shops, hotel bedrooms, theatre foyers, and elsewhere should be accessible from a sitting or standing position, and to those of smaller stature. Pedestals and high hanging rails should be avoided.

To suit the broadest range of users including people of small stature, children, wheelchair users, and those with limited reach, hanging facilities should be positioned in the range 1200 to 1700mm above floor level.

Clothes rails should be positioned no higher than 1370mm above the floor and should provide a level approach to facilitate wheelchair access and those

of smaller stature. If a level approach is not possible, such as where built-in cupboards with a plinth are installed, the clothes rail should be no higher than 1200mm.

In retail environments, shelves and displays should be positioned to enable goods to be viewed and selected easily. Oblique-angled shelves above 1000mm from the floor should be avoided as this arrangement limits visibility for people with a lower eye level. A vertical stacking approach for displayed goods will ensure maximum accessibility. In this arrangement, a proportion of every item for sale should be placed on a number of shelves at different heights.

For lockers in changing rooms, refer to **Section 5.10.10** in **Booklet 5: Sanitary facilities**.

Checklist – Storage facilities
• Ensure access to storage facilities to be direct and unobstructed.
• Install storage facilities that are solid and stable, with no sharp edges.
• Incorporate handles that visually contrast with doors and drawers.
• Ensure shelving and rails meet the recommendations in **Table 6.1.**
• Make sure aisle width between shelves and cabinets is 1400mm.
• Avoid the use of a plinth below clothes rails.
• Avoid angled shelves above 1000mm.
• Arrange goods on shelves vertically to maximise accessibility.

6.7   Public Telephones

Telephones for use by members of the public who need to make personal calls should be provided in all public service buildings, transport facilities, visitor attractions, and retail developments, such as department stores and shopping centres.

In some buildings where the use of telephones can be closely monitored, such as telephones provided at or adjacent to a reception desk, calls may be provided free of charge to the customer or visitor. In most other locations, it is likely that payphones will be provided. Telephones should be accessible to all members of the public.

Telephones are often provided in buildings to make inter-departmental calls, such as to contact or summon people for an appointment within a large organisation. Such telephones do not require payment, but should be accessible to everyone using the service. Similarly, telephones linked directly to a taxi or dial-a-ride service should be accessible, useable, and understandable to everyone wishing to use the facility.

For telephones in lift cars, refer to **Section 3.7.6** in **Booklet 3: Vertical circulation**.

Checklist – Public telephones

- Provide telephone facilities in public service buildings, transport facilities, visitor attractions, and retail developments.

- Ensure all telephone equipment is accessible, useable, and understandable to everyone, whether the service is provided free or for payment.

6.7.1 Payphones

Payphones should be provided in an accessible location and clearly signed. Wherever payphones are provided, at least one should be positioned at a height suitable for a person using a wheelchair. Where several payphones are provided, they should be positioned to suit people at a range of heights.

Image 6.4. Example of two payphones fitted at different heights.

All payphones should incorporate an inductive coupler and adjustable volume control within the handset to facilitate use by people with hearing difficulties. Inductive couplers are generally provided in all new payphones, but they can also be fitted retrospectively in existing telephones. Inductive couplers enable people who wear hearing aids fitted with a T switch to hear amplified sound directly through their hearing aid. The presence of payphones with inductive couplers should be clearly signed with the appropriate symbol, as **Figure 6.3**. The volume control device should enable the sound of incoming speech to be adjusted between 12 decibels and 18 decibels above the ambient noise level.

**Figure 6.3** International symbol for an induction loop.

A clear floor area at least 2400mm x 2400mm should be provided in front of payphones to enable forward or side approach for people using wheelchairs and electric scooters.

The handset cord to all payphones should be at least 1000mm long so that it can be comfortably reached by people at a range of heights and by people seated either to the front or side of the telephone.

Where payphones are positioned at a lower level to facilitate access by wheelchair users, people of small stature, children, and those with limited reach, the controls should be positioned between 750mm and 1000mm above floor level and there should be a clear knee space under the telephone of 700mm high, as **Figure 6.4**. In situations where it is only possible to approach the payphone from the front, the knee space should be 500mm deep to enable a person in a seated position to reach and operate the controls.

Figure 6.4 Public telephone for use while seated.

Public telephone for use while seated

Controls positioned
between 750 - 1000
above floor level

700

Clear knee space

500

Note: All dimensions in millimetres
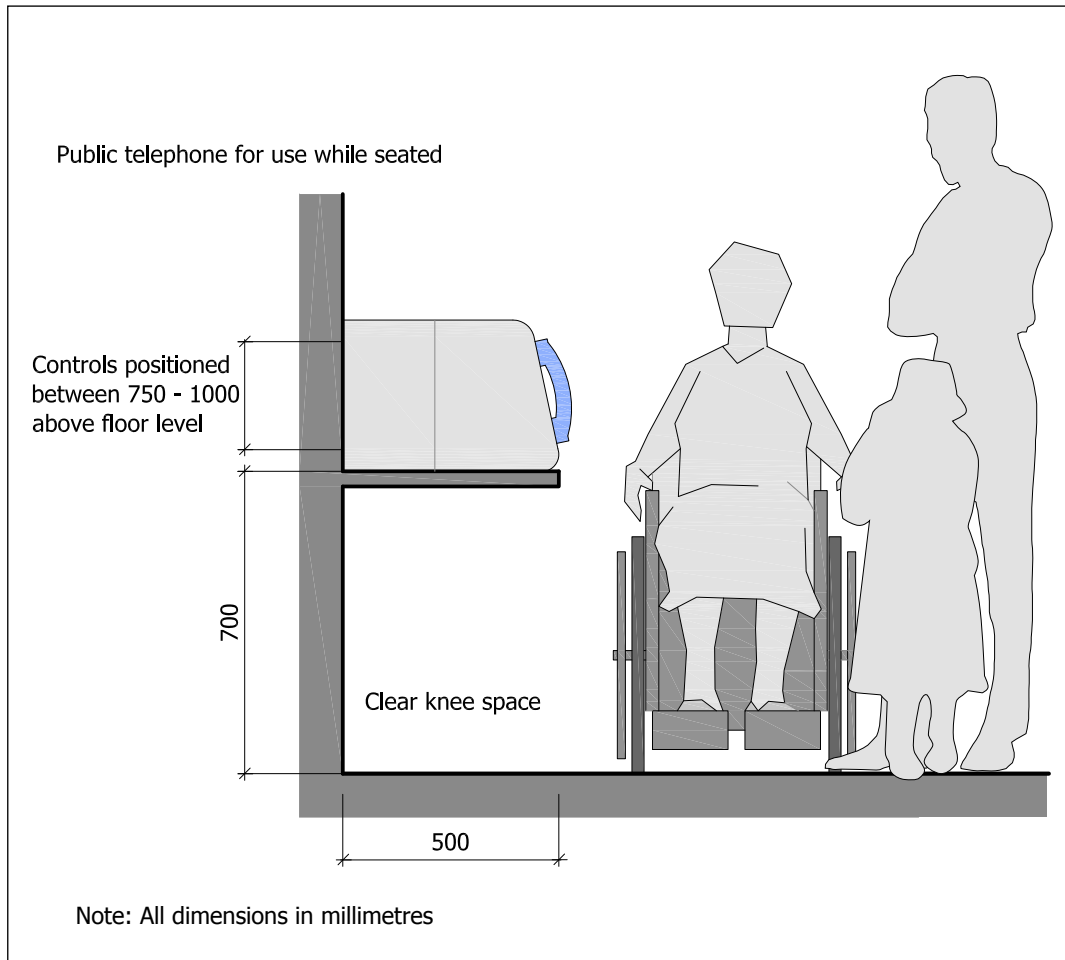
Where payphones are provided at a higher level to facilitate use by some
people in a standing position, the uppermost control should be no higher than
1370mm above floor level. Where several payphones are provided, they should be
positioned at a range of heights.

All telephones should have push-button keypads, with the central number five
incorporating a clear tactile marking. This is an invaluable orientation aid to many
people with visual difficulties when using keypad facilities. Card and coin slots
should be a funnel type as these are easier for all to use.

The telephone controls, adjacent shelf and associated instructions should all be
well lit, with a recommended level of illumination of 200 lux.

A seat beside a telephone will benefit anyone who prefers to sit whilst using the telephone. The seat may be a fold-down or perch type, so that it does not obstruct access when not in use. Refer to **Section 6.5** above.

Checklist – Payphones

- Position payphones to suit people of different heights.

- Incorporate an inductive coupler and volume control in all payphones.

- Ensure payphones with inductive couplers to be clearly signed.

- Provide a clear area for approach, 2400mm x 2400mm.

- Ensure payphone handset cords are at least 1000mm long.

- Ensure height of controls are as **Figure 6.4.**

- Install payphones with push-button keypads with a tactile marking to the number five.

- Ensure coin and card slots are funnel type.

- Illuminate payphones to at least 200 lux.

- Consider the provision of a fold-down or perch type seat beside payphone.

6.7.2 Textphones

Wherever public telephones are provided, a public textphone (also referred to as a pay textphone) should also be available. Textphones are an essential provision for public service organisations including hospitals, Garda stations, health centres, bus and train stations, hotels, and road recovery services.

The provision of textphone facilities at reception desks in public buildings should be considered. These can be used by reception and other staff to make and receive calls to people who prefer text-to-text communications, and also by members of the public who require textphone facilities. Where textphones are provided for use by staff in an organisation, they should be fully trained in using the equipment and also be familiar with the text relay service.

Image 6.5 Example of a textphone.

Image 6.6 International symbol for a textphone.

A textphone comprises a keyboard and screen linked to a telephone. The keyboard and screen may be an integral part of the telephone unit, such as in a pay textphone, or may be a standalone portable device that can be attached to a telephone receiver using an acoustic coupler. Textphones enable messages to be typed in using the keyboard and received by a similar device or relayed via a text relay service that translates text into voice messages and vice versa.

Image 6.7 Example of a textphone located at a public payphone.

Public telephones should always incorporate a shelf nearby to enable people to use a portable textphone. The shelf should be at least 250mm wide and 350mm deep, with a recommended 250mm height of clear space above. The clear height above the shelf is important to enable people to lift up and read a fold-down screen, and to use the keyboard.

Wherever textphone facilities are provided, they should be clearly indicated with the appropriate symbol, as **Image 6.6**.

Checklist – Textphones

- Provide a public textphone wherever payphone facilities are available.

- Consider the provision of a textphone at reception desks and service counters.

- Ensure staff are trained in using textphones and text relay services.

- Incorporate an adjacent shelf for portable textphones, recommended 250mm wide x 350mm deep with clear space of 250mm above.

- Make sure textphone facilities are clearly indicated.

6.7.3   Telephone booths

It may be preferable in some circumstances for a telephone for public use to be located within an enclosed telephone booth, or telephone room. This is particularly beneficial where people require a greater degree of privacy or where the background noise in an open plan area is likely to make communication difficult.

Telephone booths should be accessible and easy to use by all building users including people of small stature, children, wheelchair users, people with visual difficulties, and those with limited reach.
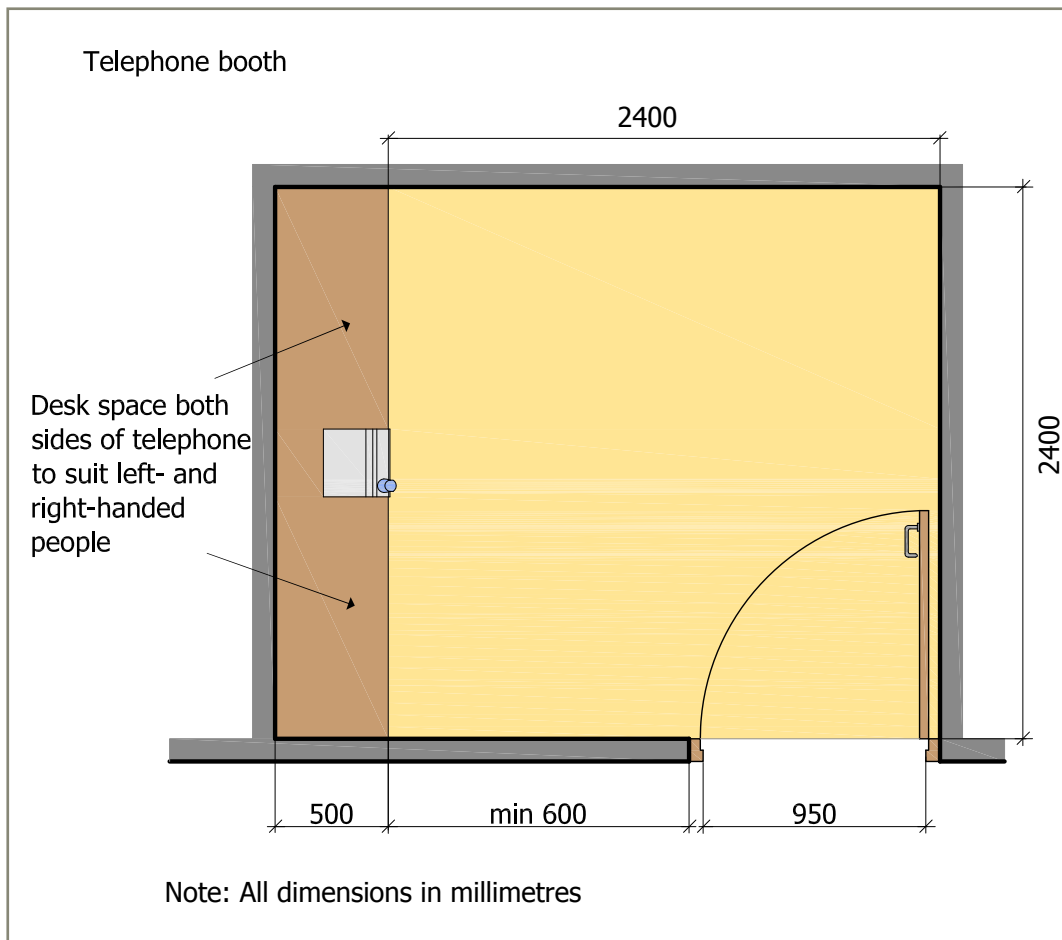
Telephone booths should incorporate a clear door opening width of 900mm. Clear space for access and manoeuvre should be provided on both sides of the door in accordance with **Section 2.6.4** in **Booklet 2: Entrances and horizontal circulation**. The telephone and associated shelf or desk should not encroach into the clear space. **Figure 6.5** illustrates possible arrangements for a telephone booth with inward- or outward-opening doors.

Where a telephone booth accommodates a telephone laid on a table top or desk, the telephone unit should have sufficient cord to enable a person to pick up the whole unit and move it to their preferred position in order to see the digits or to position it conveniently adjacent to paperwork on the desk.

If a wall-mounted telephone is provided, it should be meet the recommendations in **Section 6.7.1** above to facilitate approach and use by people in a seated position. A moveable seat should be provided. A shelf 500mm deep should be provided to both sides of the telephone to facilitate use by left- and right-handed people.

An embossed sign combining the telephone symbol with the International Symbol of Access should be clearly displayed outside the telephone booth and mounted between 1400mm and 1700mm above floor level, within 150mm of the door opening. Directional signs should clearly highlight the location of the telephone.

Figure 6.5 A plan of a telephone booth.

Telephone booth

2400

Desk space both
sides of telephone
to suit left- and
right-handed
people

2400

500 | min 600 | 950

Note: All dimensions in millimetres

✓ **Checklist – Telephone booths**

- Consider the provision of a telephone booth for increased privacy and to reduce background noise levels.

- Ensure booths have a clear door opening width of 900mm and a manoeuvring space as **Section 2.6.4** in **Booklet 2: Entrances and horizontal circulation**.

- Ensure un-fixed telephones have a long cord to enable them to be repositioned within the booth.

- Provide a desk or fixed shelf adjacent to the telephone to suit left- and right-hand use.

- Provide signage to clearly indicate the location of the telephone facilities.

6.8   Coin and Card-Operated Machines

Machines for dispensing money, tickets or small goods, such as drinks, confectionery, and items for personal care, should be accessible, useable and understandable to everybody, simple to understand, and easy to operate. They should be positioned in an accessible location and be readily apparent. Machines such as ticket dispensers and automated teller machines (ATMs) should be clearly signed.

All coin- and-card operated machines should be located on a level floor, with a clear floor area at least 2400mm x 2400mm in front. This will enable wheelchair or electric scooter users to approach from the front or side. Free-standing machines should not be mounted on a plinth as this can inhibit close access for some people and may place the controls out of reach. If the use of a plinth cannot be avoided, it should not project beyond the face of the machine and controls should be within the recommended height limits when measured above the surface of the access route.

Instructions for coin- and card-operated machines should be readily apparent and should use a large, clear typeface that is at least 16 point, and that uses both upper and lower case letters. All instructions should be concise and easy to understand, supplemented wherever possible with universally recognised symbols and unambiguous diagrams. Instructions should contrast visually with the background surface so that they are readily apparent. Instructions may also be provided in Braille.

All controls should be capable of being easily operated with one hand, without the need to grip or twist. Push-button controls, pull handles, levers, and sensors are preferred. Buttons should be at least 20mm diameter and slightly raised above the surrounding surface so as to be identifiable by touch. No control should require a force greater than 19.5 N to operate.

Controls and instructions to all coin- and card-operated devices should be illuminated to a level of 200 lux.

Wherever possible, procedures should be in place to summon the assistance of a member of staff if a person is unable to use a machine for any reason.

This is particularly important for ticket-dispensing machines such as in car parks or public transport facilities, as it will ensure that no one is penalised or disadvantaged for not being able to purchase a ticket.

In external environments, a canopy – extending to a recommended depth of 1200mm from the building face – should be provided above any external machine, to offer some protection from the rain. The canopy should provide at least 2200mm height clearance so as not to cause an overhead obstruction.

Checklist – Coin and card operated machines

- Ensure coin- and card-operated machines are simple to understand and operate.

- Locate machines where they are readily apparent.

- Make sure ticket machines and ATMs are clearly signed.

- Provide a clear space for approach to machines of 2400mm x 2400mm.

- Avoid the use of plinths.

- Ensure instructions are readily apparent and easy to understand.

- Use at least 16 point text and incorporate upper and lower case letters.

- Use pictograms to supplement text wherever possible.

- Provide instructions in Braille.

- Ensure controls are easily operated with a single hand.

- Make sure buttons are at least 20mm diameter and slightly raised above the mounting surface.

- Ensure a maximum 19.5 N force to operate any control.

- Ensure adequate illumination of at least 200 lux.

- Ensure procedures are in place to summon assistance.

- Provide a canopy over machines in external environments.
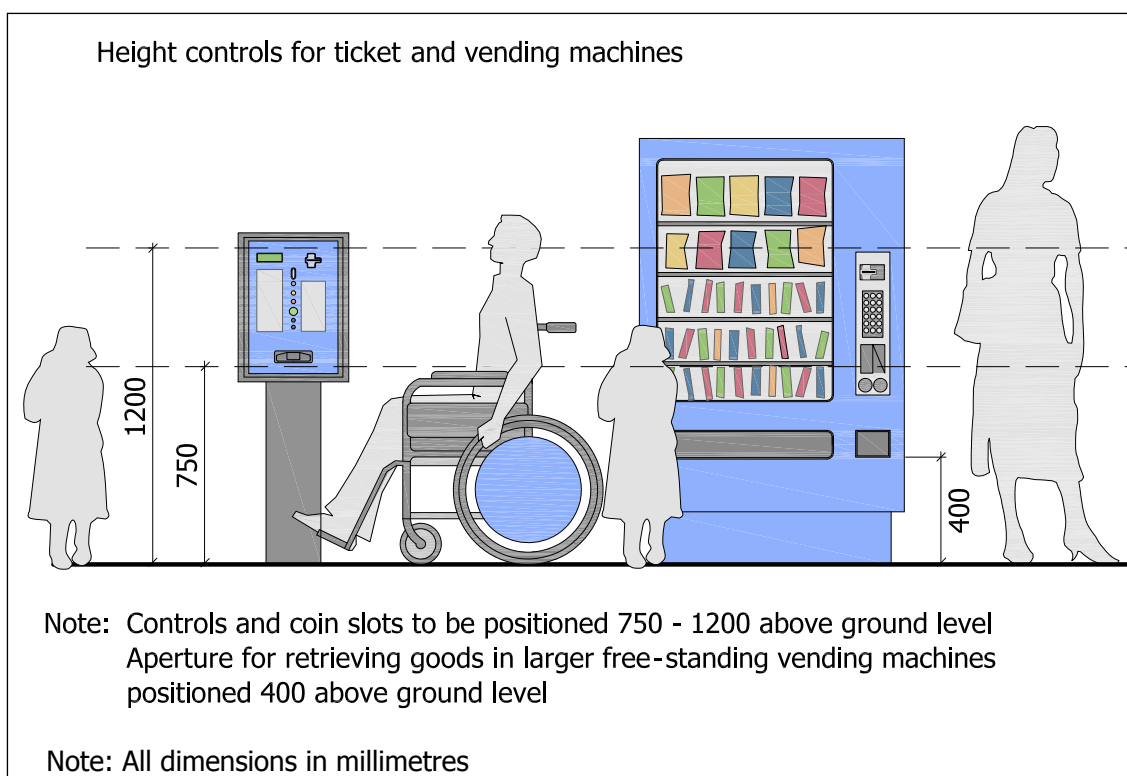
6.8.1 Ticket dispensers and vending machines

The operable parts of ticket dispensers and vending machines should be positioned between 750mm and 1200mm above floor level, as in **Figure 6.6**. Any apertures for retrieving tickets, coins, and goods should be large enough to enable a person to use their whole hand. They should not be so small as to require the use of only the ends of fingers or one or two fingers as this will present difficulties to people with reduced manual dexterity.

For wall-mounted vending machines, the dispensing drawer or tray should be positioned within the same limits for operable parts, that is, between 750mm and 1200mm above floor level. For larger, free-standing drink and snack dispensers, where this is likely to be impractical, the aperture for retrieving goods should be at least 400mm above the floor, as in **Figure 6.6**.

For ticket dispensers designed to be reached from inside a car such as those in multi-storey and underground car parks, refer to **Section 1.4.5** in **Booklet 1: External environment and approach**.

For vending machines in toilet facilities, refer to **Section 5.10.17** in **Booklet 5: Sanitary facilities**.

Figure 6.6. Height of controls for ticket and vending machines.

Height controls for ticket and vending machines

1200

750

400

Note: Controls and coin slots to be positioned 750 - 1200 above ground level
Aperture for retrieving goods in larger free-standing vending machines positioned 400 above ground level

Note: All dimensions in millimetres

6.8.2   Automated teller machines (ATMs)

ATMs are commonly located in both internal and external environments. They are often inset into the external walls of banks and supermarkets, but may also comprise free-standing secured units positioned inside banks or shopping centres, within the open-plan foyer of a building, or in an external forecourt.

The location of ATMs should be clearly signed. The preferred position for signage is above the ATM where it faces forwards and to both sides. This enables the sign to be seen clearly, from across a road, for example, and also on the approach along an access route on either side. Where ATMs are located externally, signage should be illuminated.

The approach to ATMs should be level and free of obstructions. In external environments, if a cross-fall is necessary to allow proper drainage and prevent the formation of puddles on a footpath, the gradient should not exceed 1 in 50.
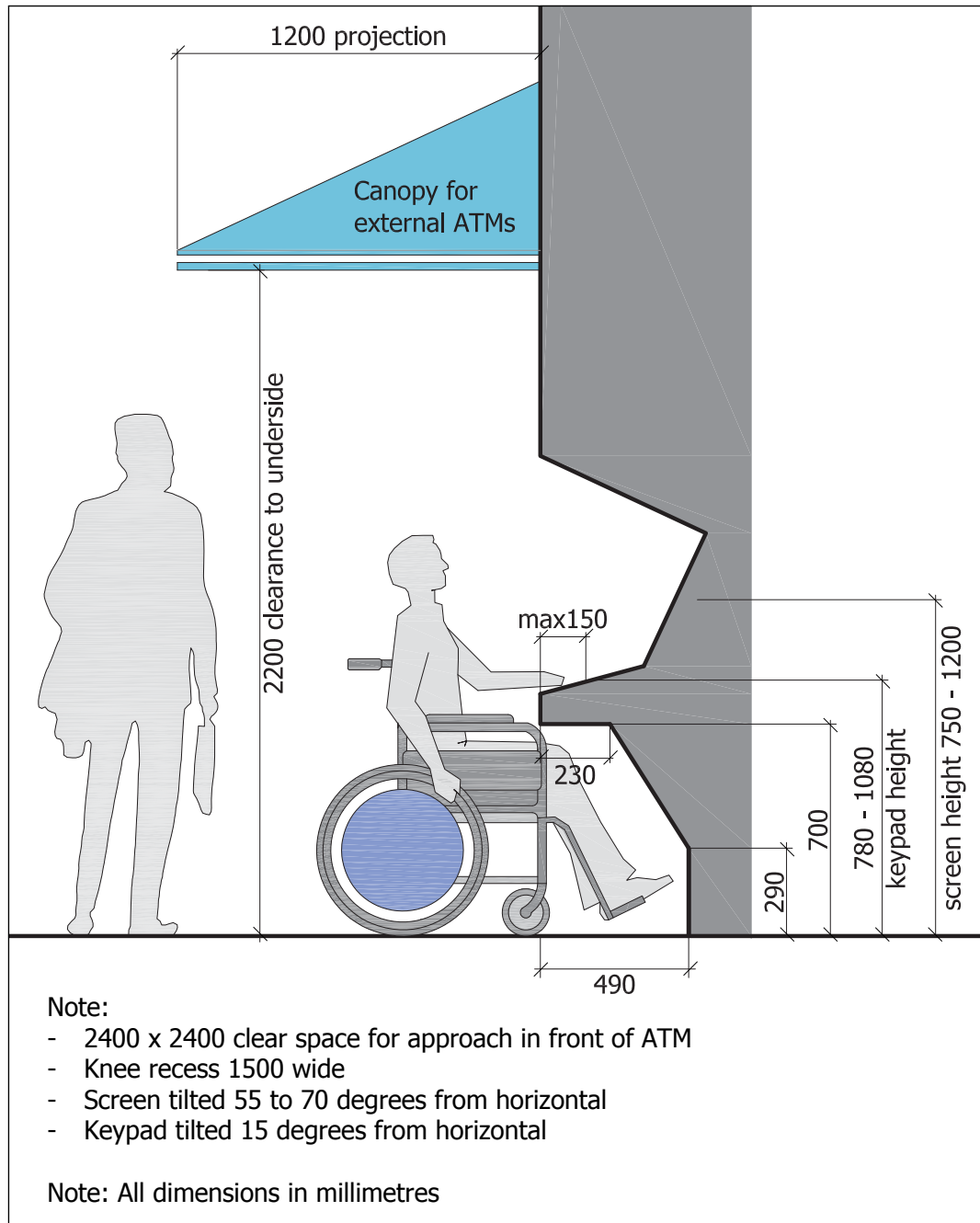
There should be a clear area at least 2400mm x 2400mm in front of ATMs to enable forward or side approach for people using wheelchairs or electric scooters. An area of this dimension also affords an element of privacy at ATMs if the queue starts outside the area. The area leading up to and around ATMs should be illuminated to a level of at least 200 lux.

Wherever possible, external ATMs should be protected by a canopy, extending to a recommended depth of 1200mm from the building face and with a clearance of 2200mm to the underside. External ATMs should also be orientated to reduce the incidence of direct sunlight on the screen as this can obscure visibility.

A knee space 490mm deep x 700mm high should be provided at ATMs to facilitate frontal approach for wheelchair users, as **Figure 6.7**. The knee space should be 1500mm wide (minimum 1000mm).

should be tilted up by 15 degrees (+/- two degrees) towards the user and should not be more than 150mm from the leading edge of the machine. They should be at a height of 780 to 1080mm above ground or floor level.

Figure 6.7 Key dimensions for ATMs.

Note:
- 2400 x 2400 clear space for approach in front of ATM
- Knee recess 1500 wide
- Screen tilted 55 to 70 degrees from horizontal
- Keypad tilted 15 degrees from horizontal

Note: All dimensions in millimetres

Keys on keypads should be 15mm x 15mm and spaced at 18.2mm between centres, allowing a gap of 3.2mm between keys. Keys should be raised at least 1mm above the surrounding surface and preferably be slightly concave.

Numeric keypads should follow the same layout as a telephone, rather than a calculator. Numerals should be 10mm high and should contrast visually with the key. A raised pip on the '5' key assists orientation for people with visual difficulties. Keys should be matt finished, and lighting should be arranged so as to avoid any reflections.

Screens should be 750 to 1250mm above the ground, and tilted 55 to 70 degrees from horizontal. Screens should be 230mm wide and 250mm high to accommodate 18 point text.

Instructions for the use of ATMs should be simple and clear. Text should be a minimum of 18 point. Where use of an ATM involves reading screen text, the speed of text flow should be such as to allow time to pause and consider each instruction. Individual users should be able to control the rate of screen change or scrolling: this should not be preset as the time required by different people will vary widely. There should be good visual contrast between the text and screen background, and a logical sequence of commands. Screen software for ATMs can be designed so as to recognise individual users and to adjust the size and speed of screen information accordingly. A choice of language should be available for on-screen instructions.

The keypad and screen should be evenly illuminated to a level between 200 lux and 300 lux. Lighting should be positioned so that is does not present a source of glare or create reflections on the screen.

Voice output technologies and bluetooth are now being considered as new solutions to enable more people especially those with visual difficulties to operate ATM machines.

The way of inserting the card and the order or structure of commands should not be changed without warning, as this may confuse customers with visual difficulties and other people who are accustomed to the machine.

Card-insertion points should be positioned at a height of 950 to 1000mm. There should be an illuminated bar immediately above the slot, which should flash when a card is inserted or withdrawn. The mouth or lead-in for the card should be wide with a gradual reduction in area up to the intake. When a card is ejected, it

should protrude at least 25mm to facilitate grasping. The force required to insert or retrieve a card from the slot should be no more than 22.2 Newtons.

Cash, receipts and statements ejected by ATMs should project at least 25mm to enable people to grasp and remove them easily. The force required to remove any of these items should not exceed 22.2 Newtons.

Receipts and statements should be printed in a bold, clear typeface that is as large as possible, enabling them to be read easily. Alternatives could also be offered, such as larger print documents posted or emailed to a home address or on-screen information in a larger typeface.

Where ATMs incorporate a cash-deposit facility, the opening for envelopes should preferably be motorised. Where this is not possible, drawers or flaps should be capable of being operated with a single hand and require a force no greater than 22.2 Newtons.

Outdoor parking meters should either be in an adequately lit area or have a guide light for the coin or card slot.

For further information on public access terminals Please refer to 'About Public Access Terminals Accessibility' on the Centre for Excellence in Universal Design's website.

Checklist – Automated teller machines

- Ensure signage is clearly visible from the front and side.

- Illuminate external signage.

- Provide a clear area for approach, 2400mm x 2400mm, and a level surface.

- Illuminate approach area to a minimum of 200 lux.

- Ensure external ATMs are protected by a canopy.

- Orientate ATMs to minimise the likelihood of glare on the screen.

- Provide a clear knee space to facilitate frontal approach for wheelchair users.

- Ensure keypads are tilted upwards and comprise large keys with clear numerals.

- Include instructions that are simple and easy to understand.

- Ensure screen text is minimum 18 point and contrasts visually with the screen background.

- Employ screen change and scrolling controlled by user.

- Ensure choice of language is available for on-screen instructions.

- Make sure illumination at the keypad and screen is between 200 and 300 lux.

- Ensure the card-insertion point is wide.

- Make sure cards, cash, receipts and statements all project at least 25mm to facilitate grasping.

- Include printed material with a large, bold typeface.

- Ensure the force required to operate cash-deposit drawers and to retrieve card does not exceed 22.5 Newtons.

6.9 Kitchen and Refreshment Facilities

Where kitchen facilities and areas for making refreshments are provided in buildings, they should be accessible, useable and understandable to everyone. They should be located on an accessible route and be in close proximity to associated dining or seating areas. An open-plan arrangement for kitchen and dining areas is preferable as this maximises circulation space and avoids the need for people to pass through doors whilst carrying trays, plates or drinks.

Checklist – Kitchen and refreshment facilities

- Locate close to dining or seating areas.

- Consider an open-plan arrangement to facilitate easier circulation between kitchen and dining areas.

6.9.1 Layout and work surfaces

Kitchens should incorporate work surfaces and appliances at different levels to cater for people who work at different heights. Lower work surfaces should also incorporate a clear knee space underneath to enable people to sit whilst using appliances or preparing food.

Wherever possible, work surfaces at two different heights should be provided within a kitchen or refreshment area to cater for a wide range of people, as in **Figure 6.8**.

An alternative arrangement is to provide adjustable-height work surfaces. These should be electrically operated so that they are easy to adjust to meet individual needs.

Fixed-height work surfaces for people who are standing should be 900mm high and work surfaces for people who are seated should be 760mm high. For people who are seated, a clear knee space 700mm high x 600mm deep x 800mm wide should be provided directly below hobs, sinks, and task areas, and adjacent to appliances including ovens, washing machines, dishwashers, refrigerators, and freezers.

The side on which the knee space is located should relate to the direction of opening of appliance doors and the location of any controls. Knee spaces should be clear of any support brackets, legs, pipes, and cables. To enable convenient approach to any knee recess and alongside any appliance requiring sideways access, a clear space 1370mm long x 800mm wide should be provided.

Where fixed base units are provided, they should incorporate a 150mm deep x 250mm high toe recess to facilitate easier access to counters for wheelchair users.

Where refreshment areas provide a limited range of facilities for tasks of relatively short duration, for example, equipment for making drinks only or for heating food in a microwave oven, it may be acceptable to provide a single-height work surface for all users, 850mm high, in place of dual-height work surfaces. A work surface of this height should not be provided in kitchens where full meals are prepared as it is likely to be uncomfortable and unsuitable for people undertaking tasks of longer duration.

Kitchens with work surfaces and appliances on three sides should incorporate a turning area 2400mm in diameter, clear of all units, as shown in **Figure 6.8**. Kitchens or refreshment facilities with work surfaces on two sides, and where access is possible at both ends, should provide a clear space 1100mm wide between all units, as shown in **Figure 6.9**.

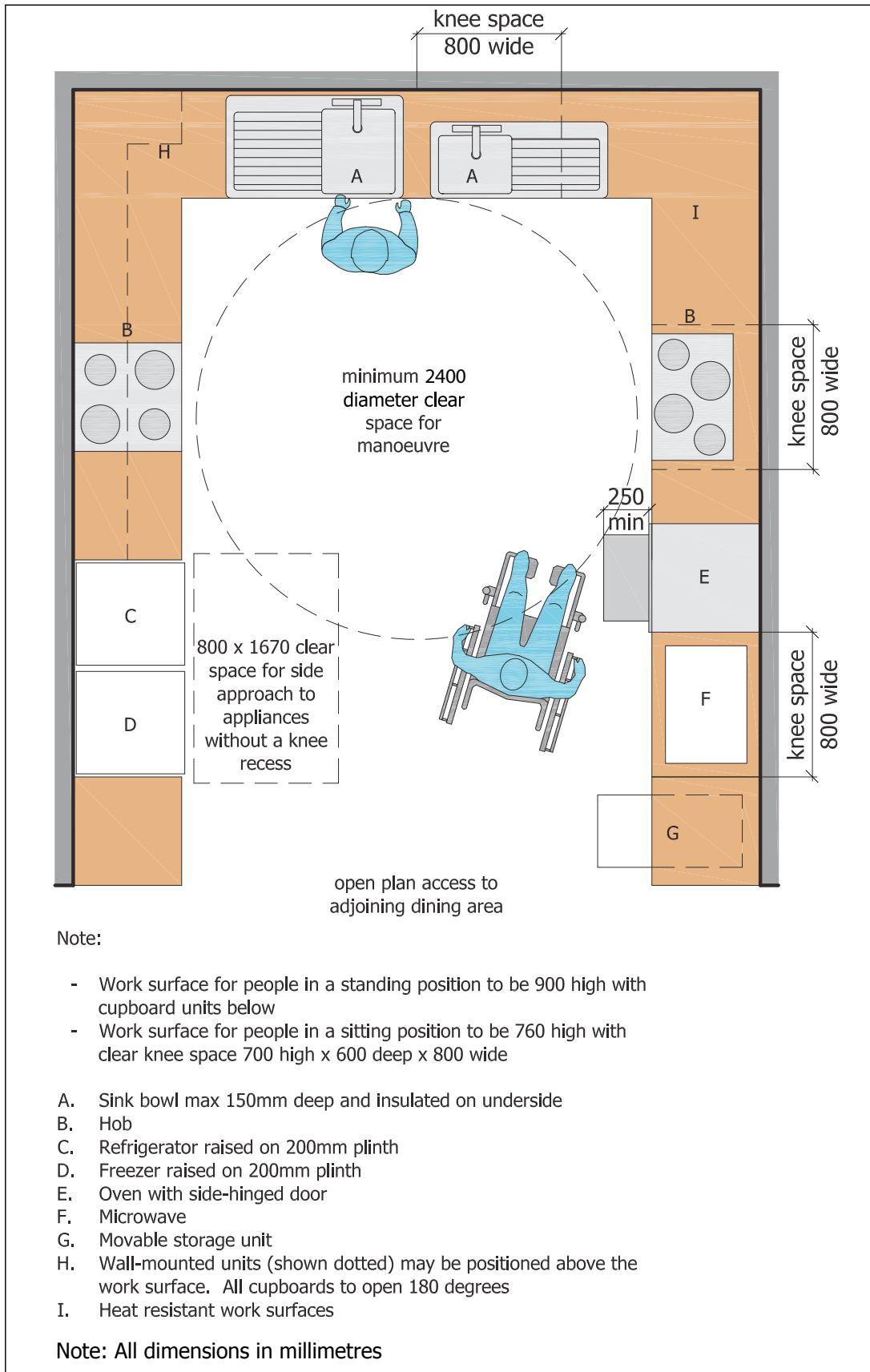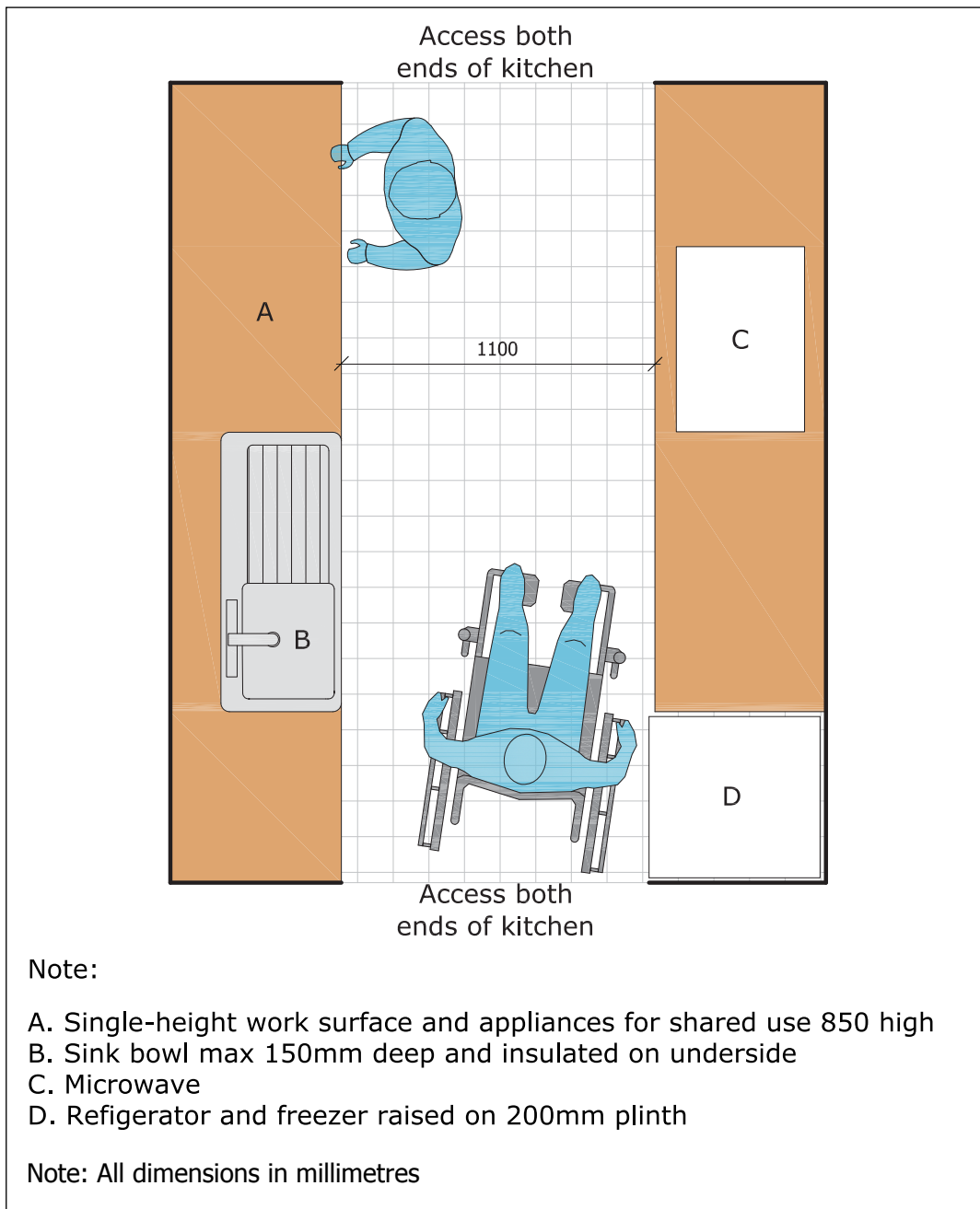**Figure 6.8** Kitchen layout with dual-height work surfaces.

knee space
800 wide

H

A

A

I

B

B

knee space
800 wide

minimum 2400
diameter clear
space for
manoeuvre

250
min

E

800 x 1670 clear
space for side
approach to
appliances
without a knee
recess

C

D

F

knee space
800 wide

G

open plan access to
adjoining dining area

Note:

- Work surface for people in a standing position to be 900 high with cupboard units below
- Work surface for people in a sitting position to be 760 high with clear knee space 700 high x 600 deep x 800 wide

A. Sink bowl max 150mm deep and insulated on underside
B. Hob
C. Refrigerator raised on 200mm plinth
D. Freezer raised on 200mm plinth
E. Oven with side-hinged door
F. Microwave
G. Movable storage unit
H. Wall-mounted units (shown dotted) may be positioned above the work surface. All cupboards to open 180 degrees
I. Heat resistant work surfaces

Note: All dimensions in millimetres

Figure 6.9 Galley-style kitchen with single-height work surfaces.

Access both
ends of kitchen

A

1100

C

B

D

Access both
ends of kitchen

Note:

A. Single-height work surface and appliances for shared use 850 high
B. Sink bowl max 150mm deep and insulated on underside
C. Microwave
D. Refrigerator and freezer raised on 200mm plinth

Note: All dimensions in millimetres

The layout of all kitchens and refreshment facilities should be designed to minimise travel distance and avoid the need to carry items across a room. This will benefit everyone and will reduce the likelihood of congestion when more than one person is using the facility. The position of task areas and appliances should be logical and facilitate effective and efficient use of all storage, preparation, cooking and cleaning areas.

L-shaped and U-shaped arrangements are generally the most efficient and compact. They also provide a continuous work surface, which is useful to people who need to slide rather than carry items from one work area to the next. It is particularly beneficial for hobs and sinks to be positioned on a continuous section of counter, so that kettles and saucepans can be filled with water and slid along rather than lifted.

Galley-style kitchens with parallel work surfaces on opposite sides are generally less efficient and require items to be carried from one side of the kitchen to another.

Image 6.8 Example of a well-designed, accessible kitchen with easy access to the living space.

The provision of pull-out boards in addition to fixed work surfaces may provide an alternative or supplement to the use of lower-height counters. They are particularly useful adjacent to hobs, ovens, and refrigerators. They need to be secure and able to take weight of saucepans etc without bending or wobbling. They may also be suitable where space is limited and it is difficult to provide the recommended clear knee space beneath work surfaces due to storage requirements. Pull-out boards should contrast visually with surrounding surfaces so that they are clearly visible when pulled out. The leading edge of the board should be easy to grip and slide in and out.

Work surfaces in kitchens and refreshment areas should contrast visually with wall and floor surfaces. Cupboard doors and drawer fronts should also contrast visually with adjacent surfaces so that all are clearly identifiable.

✓	**Checklist – Layout and work surfaces**
	• Incorporate work surfaces and appliances at different levels, as shown in **Figure 6.8.**
	• Ensure standing-height surfaces are 900mm high and surfaces for seated approach are 760mm high.
	• Provide clear knee space to lower work surfaces and appliances for people in a seated position.
	• Consider the use of adjustable-height units.
	• Provide a clear area of 2400mm diameter between units in L- or U-shaped arrangement.
	• Provide a clear width of 1100mm between parallel work surfaces with access at both ends.
	• Install an efficient kitchen layout that comprises a continuous work surface.
	• Consider the use of pull-out boards to supplement work surfaces.
	• Ensure work surfaces to visually contrast with adjacent walls and floors.

6.9.2   Storage in kitchen and refreshment areas

Adequate storage facilities should be provided in kitchens and refreshment areas to enable items to be stored and retrieved safely and conveniently. The provision of adequate storage is likely to reduce clutter on work surfaces that may otherwise obstruct the use of appliances and task areas. Storage facilities should be accessible, useable and understandable to everyone using the kitchen or refreshment area.

Storage facilities may include pull-out units with banks of drawers that are accessible on both sides, or swing-out shelves that avoid the need for a person to bend and reach into a below-counter cupboard. Where space is at a premium, the

use of storage units on castors, or trolleys with drawers or open containers, may be considered. These could be located under fixed work surfaces and moved away when clear knee space is required.

Where moveable units incorporate a suitable flat upper surface, they may also be used as an additional low worktop. Cupboard units in the corner of rooms should be fitted with rotating carousel units to enable everyone to access the full range of items. Open shelves fitted above lower-height work surfaces should be no higher than 1150mm above floor level.

High-level, wall-mounted cupboards may be provided to supplement storage capacity. However, as these are likely to be beyond the reach of many people, they should not be used for items in regular use. They could be used, for example, to store surplus crockery and provisions, as long as adequate supplies are available within easy reach at a lower level.

Image 6.9 Example of well-designed, accessible cupboards, fridge, and oven.

Drawer and cupboard door handles should all be easy to grip and should contrast visually with the drawer or door surface. Small knob handles and recessed pulls should be avoided as they are difficult for many people to use.

Pull-handles are preferred; they should be mounted close to the top of base units and close to the bottom of higher, wall-mounted cabinets. Hinged cupboard doors should be capable of swinging open to 180 degrees so that the door, when open, does not obstruct access and manoeuvring space, or present a head-height hazard.

Image 6.10 Example of accessible cupboards.

Checklist – Storage

- Ensure storage facilities are safe to use and facilitate easy retrieval of goods.

- Consider the use of pull-out units, swing-out shelves, carousels and trolleys to facilitate easy access.

- Install handles that are easy to use and contrast visually with the drawer or door front.

- Make sure cupboard doors are hinged to 180 degrees.

6.9.3 Sinks and appliances

Sinks should be positioned with their centreline no closer than 460mm to any side wall, cupboard unit, or a return in the work surface. Sink bowls in kitchens that

are set into lower-height counters to enable use by people in a seated position should be no deeper than 150mm.

As a person's knees and legs will be positioned close to the base of the sink, the underside of the sink bowl should be insulated and there should be no abrasive surfaces or sharp edges. The water supply pipes and waste outlet underneath the sink should be fixed as close to the rear wall as possible so that they do not project into the clear knee space. Hot water pipes should be insulated wherever there is a possibility that the pipes could be reached or touched inadvertently. Sinks and appliances set into adjustable-height units should be fitted with flexible pipe connectors to the water supply and waste pipes, and should enable the sink to reach the lower and upper adjustable limits.

Sink taps should be lever type, with the lever requiring a quarter turn between off and full flow. The outlet should be a tall swivel-neck mixer type, positioned so that the outlet can be twisted over the draining board to fill kettles and saucepans. This removes the need for a person to hold large items while filling them with water. Taps should be positioned within easy reach, which may necessitate placement to the side rather than the rear of a sink unit.

Pop-up plugs, operated with a lever, are generally easier for many people to use than plugs with chains. The lever should be clearly visible and easy to use with a single hand.

Hot water supplied at sinks should not exceed 40 degrees Celsius for safety reasons. The water pressure supplied via sink taps should be adjusted so that the water does not spray or splash people using the sink or adjacent surfaces.

Image 6.11 Example of an accessible sink.

Image 6.12 Example of an adjustable-height, accessible sink. Note the sink may be raised or lowered as suits the user.

Hob and oven units should be separate so that each can be placed at their optimum height, and positioned with a work surface between them.

Ceramic hobs are preferable as these enable saucepans to be slid from one surface onto another rather than be lifted.

The work surface either side of a hob and oven should be heat-resistant so that saucepans and dishes can be transferred directly.

Image 6.13 Example of an accessible ceramic hob.

Hobs positioned over a knee recess should be insulated on the underside. Hob controls should be easy and safe to operate, and should be located at the front of the unit rather than the side so that they are within easy reach of all users especially those with limited strength and reach, which will reduce the risk of burning. Electric hobs should incorporate a means of warning that the rings are still hot once they are switched off. Burners on gas hobs should be self-igniting so that they can be operated easily with a single hand.

Ovens provided for people in a seated position should be positioned so that the lower rim is 760mm above floor level.

Ovens provided for people in a standing position should have the lower rim 850mm above floor level.

Oven doors should be side hung and should open to 180 degrees so as not to interfere with the approach space or present a hazard to other people. Ovens with side-hung doors should have a heat-resistant pull-out board directly below the oven, extending at least 250mm x the full width of the oven. The shelf or board should be capable of supporting a heavy dish or tray.

Image 6.14 Example of an accessible kitchen design.

Oven controls should be positioned between 750mm and 1050mm above floor level, with any displays no higher than 1200mm. Controls should be clearly visible, simple, and easy to operate with a single hand.

Microwave ovens should be mounted on a surface or built in to a unit so that the base of the oven is no more than 850mm above floor level. The uppermost control should be no more than 1150mm above floor level and the controls should be easy to understand.

Cooker hoods generally have fixed controls that are out of the reach of many people. Wherever possible, switches should be reorganised or repositioned to be within reach of everyone expected to use the kitchen. In some cases, the use of a low-level pull cord may be appropriate.

Consideration should be given to the provision of a refrigerator, freezer, dishwasher, and washing machine installed on a 200mm-high plinth. This will create easier access for wheelchair users and people who may not be able to bend to access the lower shelves and drawers of floor-standing appliances. Such provision is likely to depend on the overall space available, as the use of a plinth will reduce the opportunity for work surfaces typically installed above such appliances.

A first aid cabinet, fire blanket, and a multi-purpose, hand-held type fire extinguisher should be provided at 450 to 1300mm above floor level and should be easily accessible, useable, and understandable to those needing to use the equipment.

Kitchen utensils and crockery, if provided, should contrast with the worktop colour, to assist people with visual difficulties.

6.9.4 Switches and socket outlets

Switches for built-in appliances and socket outlets for portable appliances in kitchens and refreshment areas should be clearly visible and positioned within easy reach, as shown in **Figure 6.10**.

Figure 6.10 Position of switches and sockets.

Note:

A. Socket on rear wall above knee access
B. Socket on return wall or side of unit above fixed base unit
C. Isolating sockets on rear wall above fixed base units

Note: All dimensions in millimetres
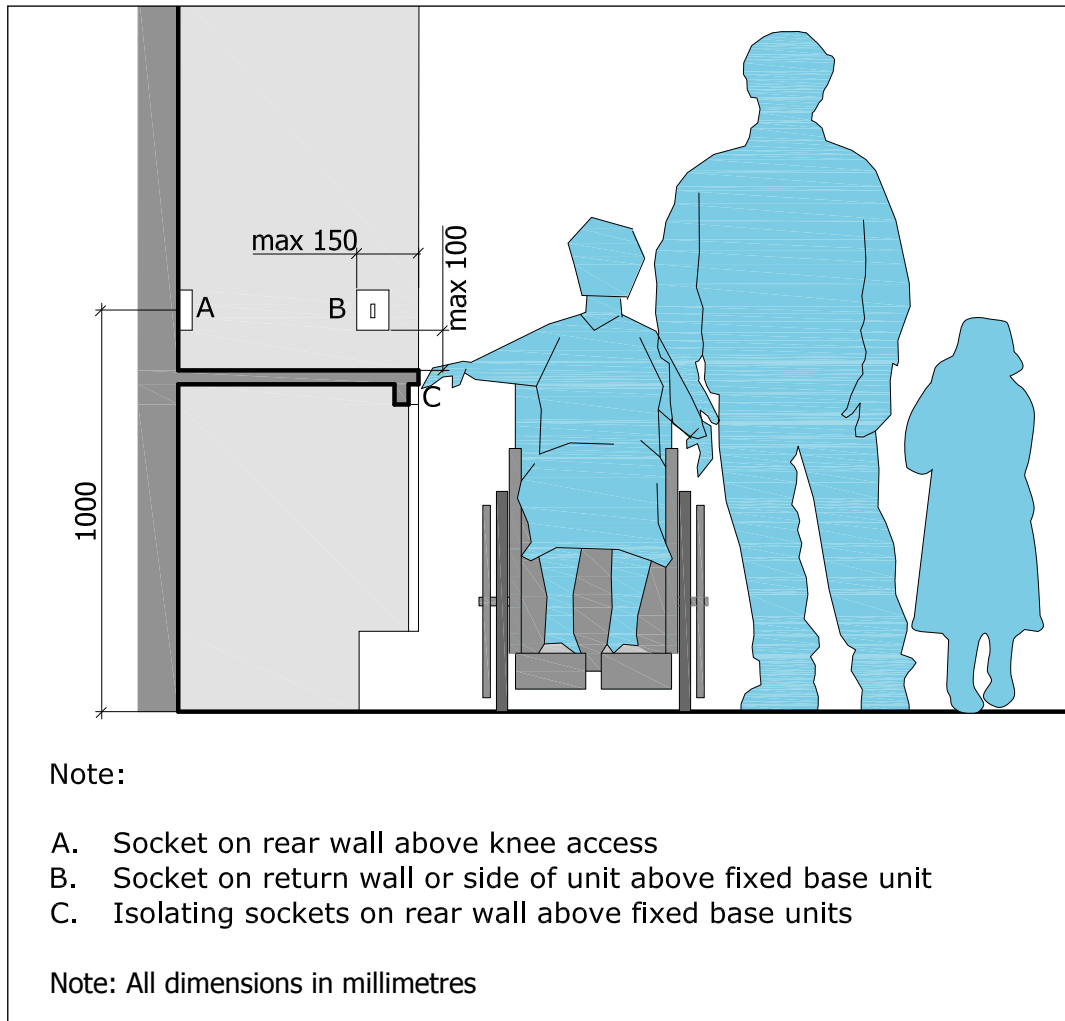
Where there is a clear knee space under a work surface, switches and sockets may be positioned on the wall at the rear of the work surface, no more than 1000mm above floor level. Where there is no clear space below a work surface, switches and sockets should be positioned on a return wall, no more than 100mm above the work surface or 150mm back from the front edge.

Switches for socket outlets positioned on the rear wall should be located on the front fascia as they will be much easier to operate in this location. However, socket outlets should not be positioned on the fascia as trailing leads and flexes would present a hazard in this location.

Where adjustable-height sinks, hobs, and work surfaces are provided, wall-mounted switches and socket outlets should be positioned where they will not obstruct movement of the work surface or frame.

Switch and socket housings should visually contrast with the wall or other mounting surface.

Refer also to **Section 4.7** in **Booklet 4: Internal environment and services.**

Checklist – Switches and socket outlets

- Ensure switches and sockets are clearly visible and within reach.

- Position switches and sockets no higher than 1000mm above floor level where a knee space is provided.

- Position switches and sockets towards the front of the work surface or on a return wall where there is no knee space.

- Avoid the potential for trailing leads and flexes.

- Carefully position switches and sockets adjacent to adjustable-height units.

- Make sure switch and socket plates visually contrast with the surrounding wall surface.

6.10 Windows

Windows are essential in buildings to provide natural lighting and ventilation. They also provide a visual link with the external environment, which can aid orientation and wayfinding within a building or site. A good view through a window can greatly enhance the usability and enjoyment of a room or space in a building.

The location, size, and number of windows in a room or building will depend on a number of factors, including the requirement for natural light and ventilation, thermal performance, security, safety, and privacy - balanced against the need to avoid glare and overheating from direct sunlight.

In rooms where it is important for people to be able to see clearly through a window, the position of the sill and any horizontal framing members should be carefully considered.

To enable people who are seated to enjoy an unobstructed view, the zone of a window between 900mm and 1200mm above floor level should be free of transoms, as shown in **Figure 6.11**.

Figure 6.11 Position of window transoms.

To maximise view for people in a seated position, avoid transoms between 900 and 1200 above floor level

Note: All dimensions in millimetres
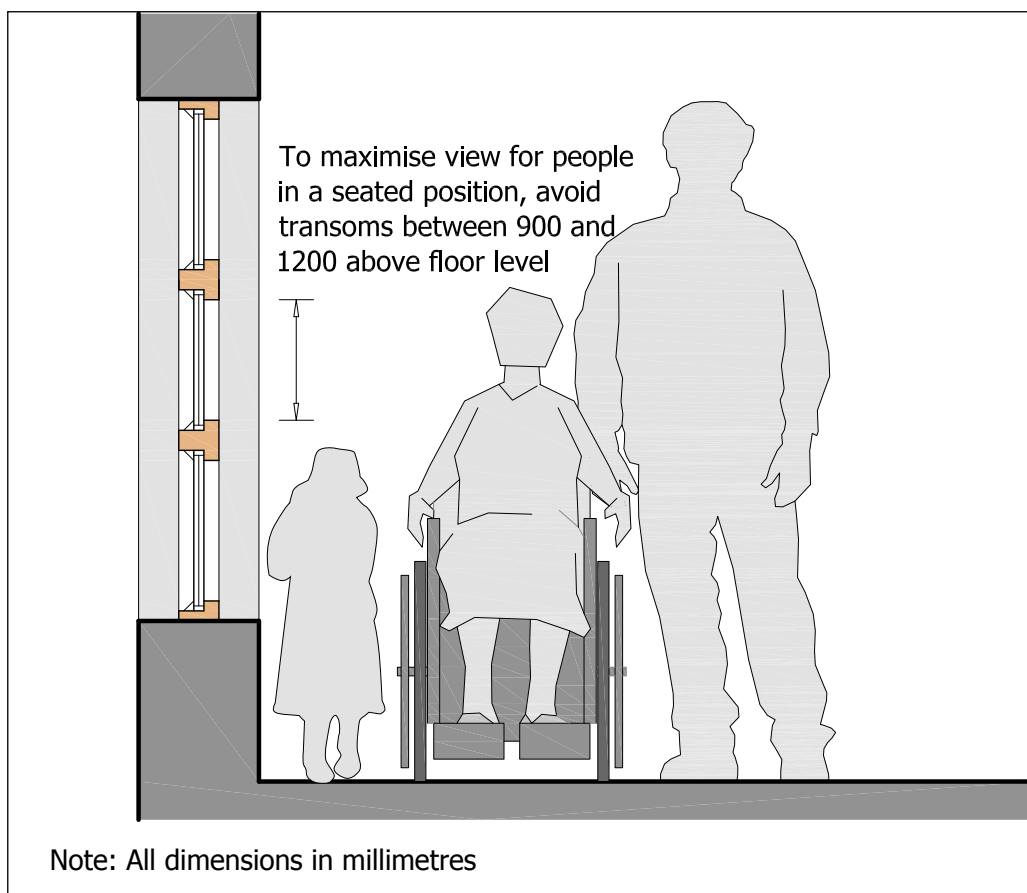
Where windows are designed to be opened manually, the approach and controls should be accessible. Windows should not open outwards onto circulation routes or where they may cause an obstruction or potential hazard. In toilets, bathrooms and kitchens, wherever windows are to be opened manually, they should be positioned where access is not obstructed by sanitary appliances, built-in units, or work surfaces.

Windows located at first-floor level and above should be fitted with a restrictor device that prevents the window from being opened more than 100mm. This is to prevent the handle from being placed out of reach when the window is open and also to avoid the risk of any person having to lean too far through an open window in order to reach the handle to close it. Restrictor devices can be released in order to facilitate window cleaning and maintenance.

Handles and locks should be positioned between 800mm and 1000mm above floor level. All window handles should be operable with a single hand, preferably with a lever action, and should not require precise hand control. Twist-turn handles or knobs should not be used. The force required to lift a lever handle with a rounded or oval cross-section should be no greater than 5.5 Nm and 8 Nm to press down. The force required to both press down and lift a lever handle with a rectangular cross-section should be no greater than 4 Nm. (Nm is a measure of torque force, which is the force in Newtons (N) exerted over a distance of one meter (m), perpendicular to the angle of rotation.) Sideways-sliding windows should be capable of being opened and closed with minimal force.

The use of electrically-powered window-opening devices should be considered in all cases where handles are likely to be out of reach. Such devices may comprise wall-mounted switches or a hand-held remote-control unit. Where wall-mounted switches are provided, they should be clearly identified, should contrast visually with the surrounding surfaces, and should be positioned between 750mm and 1000mm above floor level.

Checklist – Windows

- Ensure window provision balances environmental performance with safety, security, privacy, and visual comfort.

- Avoid transoms between 900mm and 1200mm above floor level.

- Install window controls that are accessible, useable, understandable, and positioned between 800mm and 1000mm above floor level.

- Use lever handles that require minimal force to operate.

- Ensure windows do not present an obstruction or hazard when open.

- Ensure windows at first floor level and above do not open more than 100mm.

- Consider electrically-powered, remote-control devices for opening and closing windows that are out of reach.

A1   Definition of Universal Design

Universal Design

'Universal Design refers to the design and composition of an environment so that it can be accessed, understood and used to the greatest extent possible by all people, regardless of their age, size, ability or disability.'

Synopsis of the Disability Act, 2005.

A2   Human Abilities and Design

The following piece of text is an extract from European Ref: CEN/CENELEC Guide 6 'Guidelines for standards developers to address the needs of older persons & persons with disabilities'.

It states that: Physical, sensory and mental abilities vary from person to person and for individuals as they get older. Diversity is normal. Designers need to be aware of difference across the range of human abilities, and of associated design considerations.

(a) Physical abilities

This includes walking, balance, handling, pulling, pushing, lifting and reaching. Many activities involve simultaneous use of more than one of these skills. Physical strength and stamina may also affect people's abilities to perform these actions.

Walking

For some people walking on the level or up gradients is difficult. Some people may have a limited walking range, may have difficulty with turning movements or may use mobility devices such as crutches or a walker. They may need to stop frequently, to regain strength or catch breath. Design considerations include provision of handrails, seats at regular intervals, convenient set-down parking and adequate time for slower pedestrians at road crossings. Designers should also consider the needs of people walking and engaging in sign language when designing access to and from buildings plus within the buildings themselves.

Balance

Balance limitations can affect someone's gait or control of hand movements. Design considerations include handrails, regular seating, and providing controls within easy reach. A surface against which a person may stumble against or walk into should be designed to limit abrasion.

Handling

A significant minority of people are left-handed. Some people may have restricted use or no use of one or both hands, or may have limits on strength or precision. Facilities and components should be designed to be suitable for use with either hand or with one hand only. Handling includes gripping, grasping and manipulation. Each of these has a different purpose with specific design considerations. For instance, components should be designed to be easily held. The circumference of the supporting structure and stability are critical. Manipulation involves the moving, turning and twisting of components with a hand or hands. For those who have limited manipulation abilities, size and shape and ease of movement are critical. Another option to consider is to design for manipulation by using a pushing, pulling or pressing action using a clenched fist, or by using the wrist or the elbow.

Strength and endurance

Strength and endurance may be required on sloping paths and floors, stairways and long travel distances, when sustained effort may be needed.

For those with limited endurance, frequent resting-places are essential.

People generally find it easier to push a component, than to pull it. This is particularly so if the individual uses a wheelchair. Self-closing devices on manual doors can be difficult for some people to operate, particularly if the doors are required to resist wind forces. For these reasons, doors that open and close automatically are preferred.

Lifting

Activities such as opening a vertically sliding sash window and an upward opening access gate, should be designed to be easily operated with minimal force.

Reaching

Design has a role to play in ensuring that key components in a building or environment are in easy reach, bearing in mind the range of people's sizes and abilities. Having components within easy reach is particularly important for those with more severe limitations in mobility. The reach range is dependant on the height and arm length of the person, use of the arms, and the balance and mobility of the upper body. A 'comfortable reach range' has been defined as one that is appropriate to an activity that is likely to be frequent and in need of precise execution and that does not involve stretching or bending from the waist. Putting things within comfortable reach can ensure use by a greater number of people. An 'extended reach range' has been defined as one that is appropriate to an activity that is likely, neither to need precision nor to be frequent and that can involve stretching or bending from the waist.

(b) Sensory abilities

Speech

Some conditions affect the capacity for or quality of speech. Two-way communication can be facilitated by environments designed to minimise barriers to hearing low or indistinct speech.

Hearing

People differ in their capacity to hear sound, to determine its direction, its source, to discern pitch, frequency, volume and variation and to separate out different sounds. Hearing quality is important for communication, for information, and for detection of hazards such as traffic. Many people with hearing difficulties

use a hearing aid which amplifies all sounds caught by the microphone, making communications very difficult in noisy environments. Keeping background noise level low is essential. The selection of structural and surface materials can make a substantial difference in audibility. Auditoriums, meeting rooms and reception areas can benefit from additional sound enhancement such as a loop system. The careful design of illumination can assist in communication such as lip reading and sign language. Provision of visual information and visual alarm systems can communicate information to those who have hearing difficulties or who cannot hear. Designers should also consider the colour and size of rooms and even the furnishing arrangement as this is very important for visually based communication. Also the use of vibration as means of sensing others should be considered.

Sight

Vision allows an individual to be aware of the luminance of surfaces, objects, form, size and colour. For people who are blind or who have a visual difficulties, the provision of suitable tactile walking surface indicators and tactile or acoustic warnings at hazardous locations, should provide information on using the built environment and should limit the risk of injury. The built environment can be designed for orientation by providing sound cues and tactile cues. An easily discernible system of 'way finding' should also be considered. For people with limited, but low vision, effective visual contrast between surfaces or objects helps to identify critical locations. Warning markings on glass surfaces, and markings on the edges of stair treads, help minimise hazards.

Differences in friction between one floor surface, or one stair tread surface, and the next should be avoided. Therefore, adjacent surfaces that display different standards of slip-resistance, or that depend on raised surfaces, should be carefully considered

Touch

In selecting surfaces in the built environment that people will need to touch (such as handrails, handles, knobs and controls, tactile information), it is important to select materials that avoid distress, injury or allergies. Surfaces should be free of abrasions. Metals that may cause adverse reactions when touched should be avoided.

(c) Mental abilities

Mental abilities include cognition, intellect, interpretation, learning and memory. People differ in their knowledge, their capacity to understand, reason, or interpret information. Designing for differences in these capacities helps provide a usable environment for the population at large, from the very young to the old, and people of diverse abilities. Means of communication in the environment should be designed to be immediately and easily understood, and correctly interpreted. As people age, some experience loss of memory or find it increasingly difficult to absorb new information, so changes in the environment should be carefully considered before implementation.

Design considerations that take account of mental abilities

Aural and visual messages should be simple, clear and have immediate impact. Figures, symbols and simple words are likely to be the most effective. Symbols should be instantly recognisable as representing images seen and activities undertaken in everyday life.

Way finding should be simple, such as tactile, graphic, audible or architectural cues that are easy to follow. Signage should be large and clear. Way-finding maps should be clear, indicate the person's whereabouts in the building or facility, and be free from extraneous information.

(d) Age and size

Accommodating the developing child

It is important to create environments that are safe, accessible and useable for children. Individual components should be safe and useable as age-appropriate. Learning to manage risk is an essential part of a child's development.

Accommodating ageing adults

Life span within the human population is increasing. More and more we expect to maintain an economic and social life within both the public and private domains as we age. However, many human faculties are in decline as we age, such as mobility, dexterity, stamina, strength, hearing, sight, or memory. Familiarity with a particular environment is important.

Diversity of size

The population contains a diversity of sizes and heights, from children, to the diversity in the height of fully-grown adults. The positioning of components and the heights of building elements such as steps should recognise the diversity of height. Increased weight and girth is now also a feature of the population.

Ref: CEN/CENELEC Guide 6 'Guidelines for standards developers to address the needs of older persons and persons with disabilities'.
http://www.cen.eu/cen/Sectors/Sectors/ISSS/About_ISSS/Documents/cclcgd006.pdf

A3   Further Reading

National and international standards and codes of practice

AS 1428.1-2001 Design for access and mobility. General requirements for access – New building work.

AS 1428.2-1992 Design for access and mobility. Enhanced and additional requirements – Buildings and facilities.

AS 1428.3-1992 Design for access and mobility. Requirements for children and adolescents with physical disabilities.

AS 1428.4-2002 Design for access and mobility. Tactile indicators.

BS 4800: 1989 Paint colours for building purposes (whilst the colours in this standard cannot be seen on CD-ROM or online the text can still be used).

BS 5395-1:2000 Stairs, ladders and walkways – Part 1: Code of practice for the design, construction and maintenance of straight stairs and winders.

BS 5588-8:1999 Fire precautions in the design, construction and use of buildings – Part 8: Code of practice for means of escape for disabled people.

BS 5776:1996 (incorporating amendment No.1) Specification for Powered stairlifts

BS 6440:1999 (Incorporating amendment No.1) Powered lifting platforms for useby disabled persons – Code of practice.

BS 6440:1999 Powered lifting platforms for use by disabled persons – Code of practice (partially superseded by BS EN 81-40:2008. The remainder of BS 6440:1999 will eventually be superseded by EN 81-41: 2009 Safety rules for the construction and installation of lifts – Special lifts for the transport of persons and goods – Part 41: Vertical lifting platforms intended for use by persons with impaired mobility).

BS 6465-1:2006+A1:2009 Sanitary installations. Code of practice for the design of sanitary facilities and scales of provision of sanitary and associated appliances.

BS 6571-4: 1989 Vehicle parking control equipment – Part 4: Specification for barrier type parking control equipment.

BS 7036-1:1996 Code of practice for Safety at powered doors for pedestrian use – Part 1. General.

BS 7036-4:1996 Code of practice for Safety at powered doors for pedestrian use – Part 4. Low energy swing doors.

BS 7997:2003 Products for tactile paving surface indicators – Specification.

BS 8300:2009 (Incorporating amendment No.1) Design of buildings and their approaches to meet the needs of disabled people – Code of practice.

BS 8493:2008 (+A1:2010): Light reflectance value (LRV) of a surface – Method of test.

BS 8501:2002 Graphic symbols and signs – Public information symbols (AMD 16897).

BS EN 115:1995 Safety rules for the construction and installation of escalators and moving walkways.

BS EN 15838:2009 Customer contact centres, Requirements for service provision.

BS EN81-70:2003 Safety rules for the construction and installation of lifts – Particular applications for passenger and good passengers lifts – Part 70: Accessibility to lifts for persons including persons with disability.

Building Regulations (Part M Amendment) Regulations 2010 (S.I. No. 513 of 2010).

Citizens Information Board – Accessible information for all (2009).

DD 266:2007 (Draft for Development) Design of accessible housing – Lifetime home – Code of practice.

I.S. EN 1991-1-1:2002 – Eurocode 1: Actions on structures Part 1-1: General actions – densities, self weight, imposed loads for buildings (including Irish National Annex: 2005).

I.S. EN 81-1: 1999 Safety rules for the construction and installation of lifts – electric lifts (Amd 1) (+A3:2009).

I.S. EN 81-2:1999 Safety rules for the construction and installation of lifts – hydraulic lifts (Amd 1) (+A3:2009).

I.S. EN 81-70:2003 Safety rules for the construction and installation of lifts – Particular applications for passenger and good passenger lifts. Accessibility to lifts for persons including persons with disability (Amd A1:2005).

I.S. EN 997:2003 (+A1:2006) WC pans and WC suites with integral trap (AMD Corrigendum 14805) (AMD 16965).

IEC 60118-4:2006 Electroacoustics. Hearing aids. Induction loop systems for hearing aid purposes. Magnetic field strength (ISBN 978 0 580 50047 3).

International standard for Induction loops. IEC 60118-4.

Irish Code of Practice on Accessibility of Public Services and Information Provided by Public Bodies www.nda.ie/website/nda/cntmgmtnew.nsf/0/3DB134DF72E1846A 8025710F0040BF3D/$File/finaldrcode_nda.htm

Key cards should conform to EN 1332. For further information on key cards please see: http://www.universaldesign.ie/useandapply/ict/itaccessibilityguidelines/ smartcards/guidelines/smartcardguidelines/cards

Lifetime Homes Standard: http://www.lifetimehomes.org.uk

Norwegian Universal design of building standard, 2009.

Passenger Lift Design: The Machinery Directive 2006/42/EC; Lifts should conform to BS 6440.

National and international reference documents

2020 Vision – Sustainable Travel and Transport: Public Consultation Document. Department of Transport.

Bus Based Park and Ride – A Pilot Scheme. A Report to: Dublin Transportation Office. The TAS Partnership Limited, 2002.

City of London 2006 Facility Accessibility Design Standards. London, Canada, 2006 Promoting Safe Egress and Evacuation for people with Disabilities - National Disability Authority.

Gallaudet DeafSpace Design Guidelines 2010.

Department of Transport & the National Disability Authority Guidelines for Accessible Maritime Passenger Transport http://www.nda.ie/website/nda/ cntmgmtnew.nsf/0/45AA46D1F77D7EF2802576DC005C5954?OpenDocument

Department of Transport, UK 'Traffic Signs Manual'.

Dublin City Council (2007) Variation (No. 21) of the Dublin City Development Plan 2005 – 2011. Available from: http://www.dublincity.ie/Planning/ DublinCityDevelopmentPlan/VariationstotheDevelopmentPlan/Documents/ AdoptedVariationNo21Spec.pdf.

Guidance on the use of tactile paving surfaces. Department for Transport, UK.

Guidelines for an accessible public administration. Towards full participation and equality for people with disability. Office of the Disability Ombudsman, Sweden.

Inclusive Mobility. Department for Transport, UK.

International Best Practices in Universal Design. A Global review. Canadian Human Rights Commission, 2006.

Irish Wheelchair Association: Best Practice Access Guidelines 2010.

Joseph Rowntree Housing Trust.

Parking for disabled people. Department for Transport, UK.

Promoting Safe Egress and Evacuation for people with Disabilities - National Disability Authority.

Rail Park and Ride Strategy for the Greater Dublin Area. Dublin Transportation Office, 1994.

Regulation of Bus services outside the Greater Dublin Area. Department of Transport.

"Sign Design Guide and Inclusive mobility," Oxley, P. (2003), Inclusive Mobility. Department for Transport, UK. www.mobility-unit.dft.gov.uk

Smarter Travel 'A Sustainable Transport Future' – A New Transport Policy for Ireland 2009 – 2020. Department of Transport.

List of Illustrations

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