CE 63e

Accessible Housing by Design—Kitchens

UNIVERSAL DESIGN

People who inhabit and visit the houses we live in come in all shapes and sizes, ranging from infants to seniors, with various ever-changing abilities and skills. As we grow up, grow old and welcome new people to our homes, our housing needs change. A house that is designed and constructed to reflect the principles of universal design will be safer and more accommodating to the diverse range of ages and abilities of people who live in and visit these homes.

Everyone appreciates having a kitchen that is safe, spacious and easy to use. The successful design of a universally accessible kitchen starts with identifying potential users and anticipating their needs.

KITCHEN DESIGN

People are demanding functional, usable and flexible kitchen designs that will work for their families. Core universal design concepts are being incorporated into many aspects of kitchen design including appliances, cabinets, lighting and flooring.

Also gaining in popularity is the concept of "**aging in place**." By providing design features that follow the principles of universal design and **FlexHousing™** and by incorporating flexibility and adaptability into kitchen design, the life and usability of a kitchen are increased and families, couples and individuals are able to stay in their homes and neighbourhoods as they grow and age.

DESIGN CONSIDERATIONS

A universally designed kitchen is comfortable and safe for all family members. It considers all the design elements of a kitchen:

An overview of the key concepts of universal design is provided in "The Principles of Universal Design" text box on page 13.

Bolded terms throughout this fact sheet are defined in the "Glossary" text box on page 12.

- its location in the house
- location of appliances and workspaces
- floor, wall and counter surfaces
- types of lighting
- ways to reduce noise, and
- overall use of colour and space.

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Ask yourself

- Are you a gourmet cook or do you prefer to microwave prepared food?
- Do you have a disability that affects the way you prepare food?
- Are there usually two or three cooks in the kitchen at one time?
- Does a caregiver do most of the cooking?
- Do you have a child you need to keep an eye on while preparing meals?
- Would a nearby space for homework be useful?

These are important considerations that will help you identify your kitchen design requirements. Your requirements should address the following factors:

- Efficient design
- Manoeuvring space
- Minimal effort
- Adaptability
- Ease of cleaning
- Audibility
- Safety.

Efficient design

Efficient design begins with general planning issues, such as the location of the kitchen within the home:

- Is the kitchen near the primary entrance?
- Is it close to the dining area?
- Is garbage easy to take out?

Traditionally, kitchen designers have focused on a compact **work triangle** formed by the sink, stove and refrigerator. In reality, we must expand the triangle to include all work areas as well as garbage disposal and the dishwasher. If your ability to move around the kitchen while carrying things is limited, it is even more important to consider these additional elements within the traditional work triangle.

> An efficient kitchen that maximizes independence and convenience is the cornerstone of good design.

Designing an efficient kitchen also involves keeping the work triangle compact. Logical, sequential, routine movements will define the way your family use the kitchen and will help you design a kitchen with a work triangle that meets your needs.

A U-shaped kitchen (see Figure 1) may be the most convenient layout for one or two people working in a

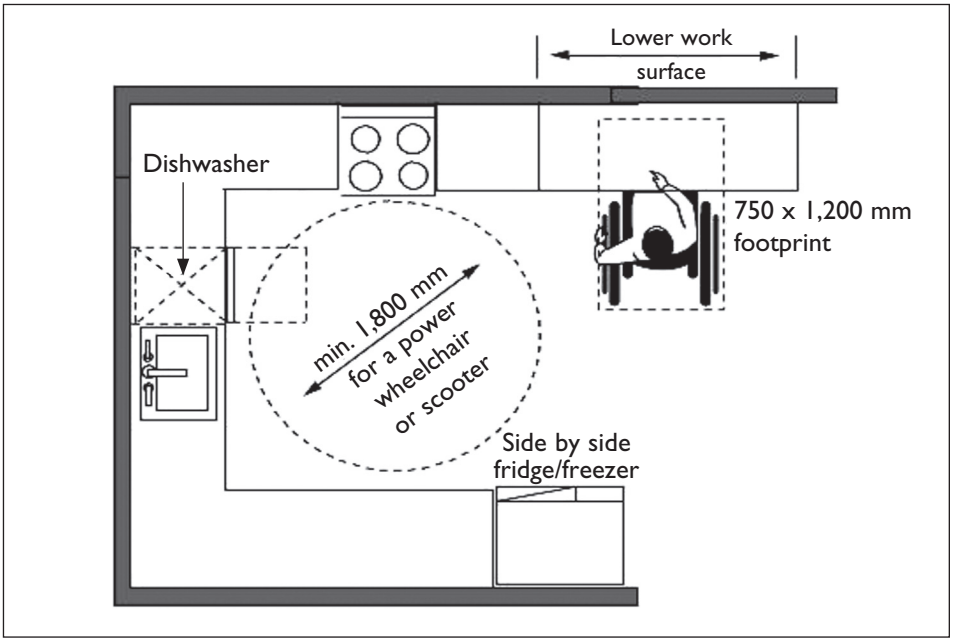

Diagram by: DesignAble Environments Inc.

Figure 1 U-shaped kitchen

kitchen, but having a work area that is accessible from outside the "U" is also advisable.

A galley-style kitchen requires less space and provides people with more than one entry and exit point (see Figure 2). However, a galley-style kitchen usually limits a person using a wheelchair to a side approach to counters and appliances and does not provide enough turning space.

An L-shaped kitchen, with or without an island, provides several work surfaces, including some outside the primary work triangle, which means people can work without bumping into each other (see Figure 3).

All kitchens have various routes, some that everyone uses and others that are only occasionally used. Primary throughways should be designed outside the expanded work triangle. Remember that dishwasher and refrigerator doors may be open when the family is racing through the kitchen.

An island creates alternate work areas. A sink and an electrical outlet in the island maximize usability and convenience for everyone.

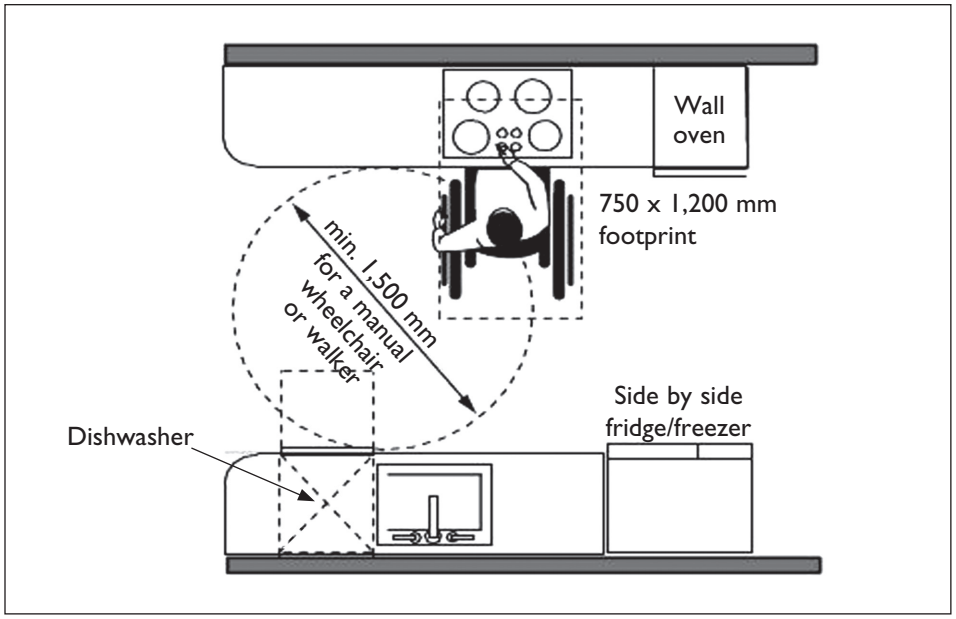

Diagram by: DesignAble Environments Inc.

Figure 2 Galley-style kitchen

Appropriate size and location of both garbage bins and recycle bins in the kitchen is appreciated by everyone and reduces clutter.

For people with limited agility or mobility, a wheeled trolley can be useful for carrying food from the kitchen to the dining area.

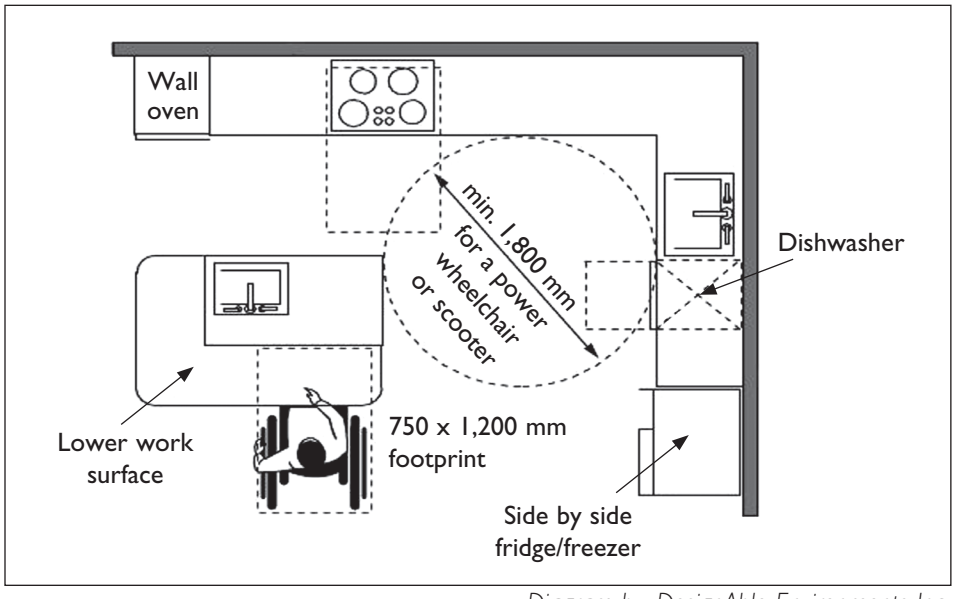

Diagram by: DesignAble Environments Inc.

Figure 3 L-shaped kitchen with an island

Also remember to consider window height. People should be able to see through windows when sitting and there should be easy access to window controls.

It is a good idea to reduce the number of doorways that open into a kitchen. All doors should have a minimum clear width of 810 mm (32 in.) and should be designed to maximize manoeuvring space.

Manoeuvring space

A design for someone who uses a walker or wheelchair should allow manoeuvring space of 750 x 1,200 mm (30 x 47 in.) in front of controls, work areas and appliances. This work area can be part of the overall required minimum manoeuvring space of 1,500 x 1,500 mm (59 x 59 in.) in the work triangle.

For power wheelchairs and scooters, which have a larger turning radius, the required minimum manoeuvring space is 1,800 x 1,800 mm (71 x 71 in.).

Minimal effort

Designing for minimal effort is an important principle of universal kitchen design. Planning for efficiency considers the location and relationship of all major elements within the kitchen. This will result in the placement of similar or related items in the same location within the kitchen.

Emptying the dishwasher is easier if the dishes and glasses are stored nearby. Baking is easier if baking supplies are close to a work surface and the oven. Meal clean-up is easier if the table is located close to sink, dishwasher and garbage.

Flexibility and efficiency of effort can be achieved through such design considerations as providing storage options at a variety of heights.

Planning for efficiency of effort and ease of use incorporates features such as more lighting, a place to sit down to work, a lower workstation, and storing materials where they can be easily seen and reached.

Other kitchen design components that increase usability include:

- Continuous countertops that allow pots, dishes and so on to slide along
- Hands-free faucets
- Wall-mounted oven at countertop height
- Countertop convection/ microwave oven
- Open shelving rather than cupboards with doors
- Space for using a wheeled trolley, and
- **Resilient flooring** rather than a hard surface.

Adaptability

Adaptability can be achieved by:

- installing **adjustable height counters**
- buying a refrigerator with a left-right-hinged reversible door
- installing adjustable shelving in cupboards, and
- installing drawers for storage rather than under-counter cabinets.

Ease of cleaning

When making decisions about new appliances, floors and countertops, remember to consider surface finishes. For example, glass cooktops tend to be easier to clean whereas stainless steel appliances show fingerprints and may require specialized cleaning products. Some countertop surfaces need yearly

maintenance with a sealer to protect them from staining and harbouring bacteria.

Kitchen cleaning products should be stored in easy-to-reach locations, preferably in drawers or baskets that slide out. If family members include children, people with Alzheimer's, people who are very forgetful or who have developmental disabilities, give careful thought to the storage and security of these products.

Audibility

Special thought should be given to the ways that people who are hard of hearing or deaf will be alerted to timer buzzers and smoke alarms. Appliances that provide information in two different formats (visual and audio signals for example) are widely available. See CMHC's *About Your House: Accessible Housing by Design—Appliances* for more information.

Efforts should be made to limit sources of noise, especially when the kitchen is used by persons who are hard of hearing. Soft, absorbent surfaces such as cork flooring can reduce noise in the kitchen. Also consider creating a quiet work area outside the main kitchen area as it may be helpful for people with learning disabilities or attention deficit hyperactivity disorder, and may reduce the busyness of the kitchen.

Safety

Safety considerations in the kitchen deserve the highest consideration. Small rugs and mats in the kitchen should be avoided because they are a tripping hazard and an obstacle for many people with mobility impairments.

There are situations where it is safest to limit access to appliances in the home, for example, when a member of the household suffers from Alzheimer's disease or dementia. If this is the case, consider installing an **override switch** that must be activated before using an appliance or outlet in the kitchen. Install the switch in a place that is inaccessible to those who might be at risk of injuring themselves.

Consider providing wall space in the kitchen for a notice board. Although a notice board is a useful feature for everyone, it is of particular benefit to people whose cognitive abilities are changing or who are losing their memory. Post reminders and safety notes on the board.

Plan for easy access to water, a fire extinguisher and the gas shut-off valve in case of emergency.

DESIGN ELEMENTS

The major design elements of a universal kitchen are:

- Countertops
- Cupboards, drawers and pantries
- Sinks and clean-up areas
- Food preparation areas
- Switches and controls
- Flooring materials
- Lighting

Countertops

Countertops are traditionally 920 mm (36 in.) high, but a countertop 860 mm (34 in.) high is more convenient for children, shorter people and people who use a wheelchair. If the person who uses the wheelchair is a child or a shorter person, they may appreciate 730 mm (29 in.) high counter and work areas.

Installing counters at a variety of heights (see Figure 4) is a universally accessible approach to meeting the needs of people of different heights and reach abilities, but remember, a traditional dishwasher requires a minimum counter height of 920 mm (36 in.) so the height of the counter should be carefully considered in that location. Adaptability can also be achieved by installing counters with electrically adjustable heights, which are available from a number of innovative kitchen designers.

A toe space of 100 mm (4 in.) under cabinets will enable a person who uses a mobility device to approach the counter more closely. A high toe space has the added benefit of raising the height of the bottom shelf in the lower cabinet or drawer, reducing the reach range.

Clear counter space should be provided beside all major appliances for food or dishes as they are taken out of the refrigerator, stove or cupboard.

There should be multiple work surfaces in the kitchen, at least one with a minimum size of 800 mm (31 in.) wide x 600 mm (24 in.) deep, at a height of 730–860 mm (29–34 in.), with a minimum footprint in front of 750 x 1,200 mm (30 x 47 in.) to accommodate someone who is seated.

People with reduced vision should avoid countertop surfaces with busy patterns and many prefer to have a solid colour that will provide some contrast with their appliances and dishes. Some people select contrasting edging on the countertop to help in identifying the edge (see Figure 5).

A backsplash in a contrasting colour can also help people with low vision better identify the extent and configuration of the counters.

Rounded or bull-nose edges on counters increase safety by eliminating the danger of sharp corners.

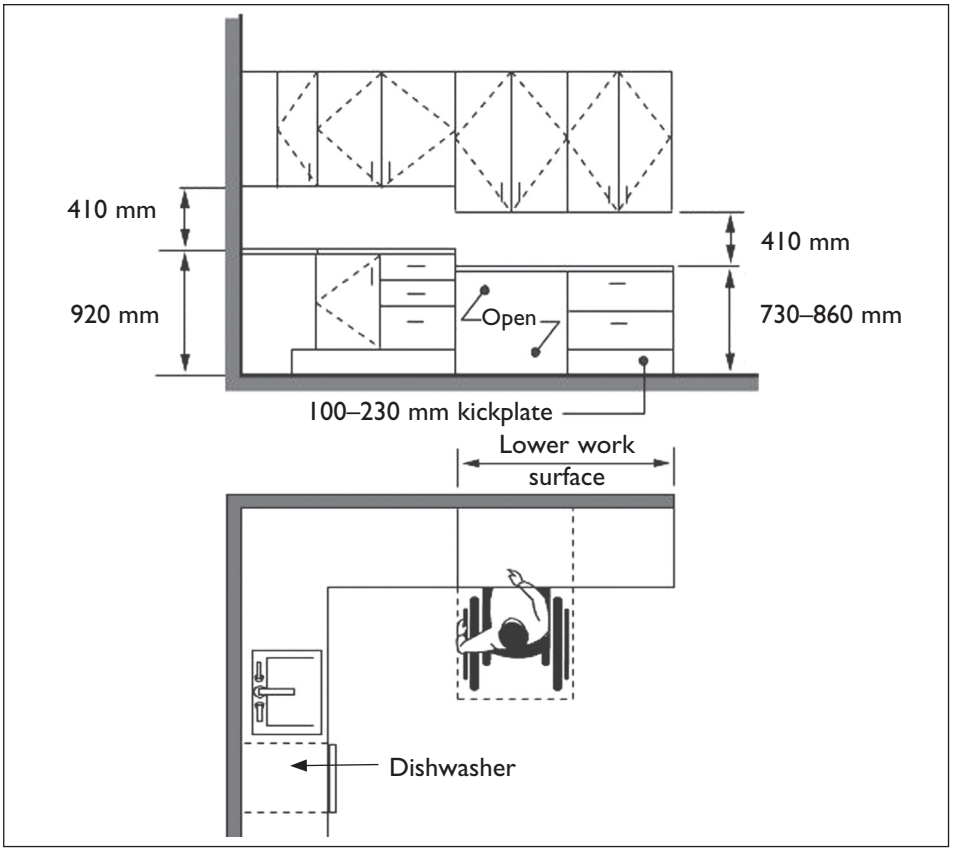

Diagram by: DesignAble Environments Inc.

Figure 4 Lowered work area

Cupboards, drawers and pantries

Storing related things in the same cupboard where they are easy to find is especially important for people with limited mobility and a visual impairment.

A large pantry with swing-out doors or large drawers allows food and condiments to be stored where they can be easily reached at a variety of heights (see Figure 6).

Upper cupboards should be installed with the bottom edge 410 mm (16 in.) above the countertop, instead of the more traditional 460 mm (18 in.), to ensure that the lower shelf is within reach of someone seated. Cupboards should not be installed less than 410 mm (16 in.) above the counter, as this reduces storage space for appliances on the counter.

Upper cupboard systems are available that can be electrically raised or lowered. In addition, there are shelving and rack systems that can be installed in existing cupboards, which enable the entire rack to be pulled out and down, increasing the usability of the upper cupboards for everyone (see Figure 7).

Installing lower cabinet drawers that pull out fully to display their contents for easy retrieval is an excellent approach (see Figure 8).

Photo by: Mary Jo Peterson

Figure 5 Multi-height counters with contrasting edging

Photo by: Betty Dion

Figure 6 Pantry with swing-out doors and pull-out shelving

Photo by: Betty Dion

Figure 7 Pull-down upper shelves and swing-up under-the-counter shelves

Photo by: Betty Dion

Figure 8 Pull-out drawers

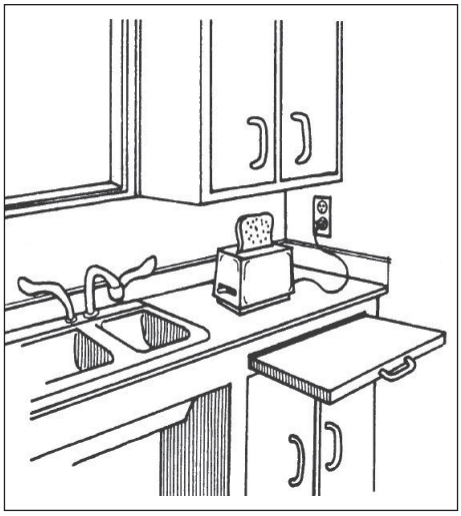

Figure 9 Pull-out shelf with "D"-type handle

Figure 10 Accessible kitchen with cupboard doors that open to provide knee space under the sink and a pull-out shelf under the wall-mounted oven

Another strategy for providing accessible storage is using a series of small and large drawers instead of cupboards. Cupboards and drawers should have "D"-type pull handles, which are easier for people with reduced mobility or agility to use (see Figure 9).

Touch-and-release drawers and cupboards are universally accessible to everyone, including people with limited dexterity.

People with reduced vision may prefer to have handle colours that contrast with the background colour. A contrasting colour for the interior of drawers and cupboards may also increase visibility for people with limited vision.

A drawer or shelf that pulls out beneath a wall oven or microwave with a side opening door can be used as a **heat-resistant surface**. This reduces the necessity of carrying hot pans and can provide a place for hot items to cool before they are moved. These drawers or shelves can also provide additional work surface in smaller kitchens (see Figure 10).

Pantry cupboards with doors that open fully, using **180-degree hinges**, allow everyone to easily see the contents and to reach the shelves. In addition, internal lighting adds greater visibility for people searching for items in pantries and cupboards.

Household members with food sensitivities should have dedicated pantry and work areas for their preferred foods.

Consider using open-shelf storage or cupboards with glass doors if someone in the household is experiencing changes in cognitive ability or memory loss. The ability to see the contents of the shelves and cupboards can make the kitchen easier to use for many.

Sinks and cleanup areas

Two sink areas should be considered in busy kitchens and in kitchens where there are people working at various heights.

Locating an accessible sink in a corner location is not recommended as it restricts access to the surrounding area and limits the usability of the counter areas.

When a sink will be used from a seated position, a shallow sink with the drain offset to the rear is recommended. This will allow sufficient knee space and will result in the drainage pipes being out of the way, eliminating the hazard of someone burning their legs. Alternately, the drainage pipes can be insulated rather than offset.

The visual continuity of the kitchen cupboards can be maintained with cupboard doors under the sink. The doors can be opened and slid back under the counter to create adequate knee space (see Figure 10).

An accessible sink should provide knee space clearance —750 mm (30 in.) high, 800 mm (31 in.) wide and 600 mm (24 in.) deep— to allow someone using a wheelchair to wheel under the sink.

A faucet controlled by a single lever or a motion detector is the most convenient. A lever faucet and a pull-out hose with a spray nozzle provides convenience for everyone, especially if there is a soap dispenser incorporated into the faucet design (see Figure 11). This provides flexibility and ease of use for all family members. It is a good idea to avoid gooseneck faucets as they can splash excessively.

Food preparation workstations

An accessible workstation integrated into the design of a kitchen is most advantageous for people who work from a seated position. A workstation where someone can prepare food and have easy access to accessories in that same area is efficient and convenient.

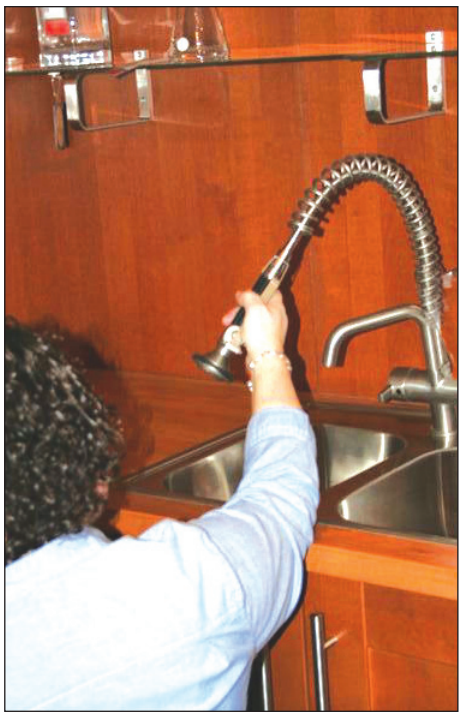

Photo by: Betty Dion

Figure 11 Pull-down sprayer faucet

An accessible workstation is equally appreciated by a child who wants to participate in kitchen activities.

The workstation should have at least one accessible counter or pull-out shelf, accessible storage within easy reach, as well as an electrical outlet and sink.

There should also be **task lighting** if this is going to be a primary work area.

Switches and controls

Electrical outlets should be strategically located at the front of counters within the reach of someone seated and others with a limited reach range (see Figure 12). However, careful consideration should be given to locating outlets out of the reach of children. For added safety you could consider installing an **override switch**.

Other controls and switches, including the switch for the vent hood over the cooktop, should be located at a maximum height of 1,200 mm (47 in.) from the floor.

Switches and controls should be easy to operate. Try to avoid controls that require the use of two different motions to operate in order to accommodate people who have the use of only one hand; whether they are wheeling a wheelchair, carrying a baby, using a cane for support or have only one arm.

Flooring materials

Durability, ease of cleaning, comfort and a safe, non-slip surface are some of the prime considerations when selecting flooring. Slip resistant flooring should be assessed both dry and wet.

Avoid marble or waxed floors as they are slippery, especially when wet. Cork provides an interesting alternative as it is **resilient**, comfortable and easy to wheel on. Vinyl flooring is available in sheets and tiles and is low maintenance. However, it must be installed on a plywood surface, and as a result, there will be some emissions from the glue, vinyl and plywood. Low-emission glues are now available.

Photo by: Betty Dion

Figure 12 Lower switches and controls

A ceramic tile floor is a harder surface, but it is easy to clean and wheel on.

If someone in your house is prone to dropping things or falling, be sure to choose a resilient flooring material, such as cushioned vinyl or cork.

Whatever type of flooring material is selected, ensure the flooring is installed so that it is level with adjacent flooring to avoid having a lip or rise where the different flooring materials meet.

Lighting

Ambient lighting creates an even level of illumination throughout the kitchen. Fluorescent lighting offers the most diffused light and reduces glare. Lighting levels should be adjustable, supplemented by **task lighting** in key work areas and for specific workstations and islands.

It should be noted that people over the age of 60 typically require two to three times as much light for reading compared to people 20 years old. People with visual impairments may require even more light. Installing lighting inside the pantry and cupboards and task lighting beneath the upper cabinets will help everyone, but particularly people with limited vision.

Where possible, take advantage of opportunities to maximize natural lighting, but be careful to avoid glare. Glare-free surface treatments and a matt paint finish are preferred by many people with visual impairments as these finishes reduce glare and complement illumination levels.

ADDITIONAL RESOURCES

Websites

American Association of Retired Persons—AARP
(May 2010)
www.aarp.org
Enter "universal design" in the search box.

Ball State University: WELLComeHome—Universal Kitchen Design
(May 2010)
http://www.bsu.edu/wellcomehome/friendly_kitchen.html

Virginia Tech—Center for Real Life Kitchen Design
(May 2010)
http://www.ahrm.vt.edu/center_for_real_life_kitchen_design/index.html

Vision Australia—Accessible Design for Homes
(May 2010)
http://www.visionaustralia.org.au/%5Cinfo.aspx?page=724

Glossary

180-degree hinges: door hinges that permit full-door opening by enabling the door to lie flat against the adjacent surface.

Adjustable height counters: countertops, sinks, cooktops and cabinets that can be raised or lowered, making them accessible to people who are seated, taller or shorter.

Aging in place: the ability to remain in one's home safely, independently and comfortably, regardless of age, income or ability level throughout one's lifetime.

Ambient lighting: the overall illumination of an environment through the use of lamps, overhead fixtures, sunlight and any previously existing light.

FlexHousing™: a practical approach to designing and building housing that allows residents to convert space to meet their changing needs.

Heat-resistant surface: a material that strongly resists the flow of heat through itself and is resistant to burning.

Override switch: a lock-out feature that prevents accidental activation or entry into an appliance. Deactivating the lock-out feature does not, in and of itself, activate the device—it simply enables the user to take the normal steps for activation or entry.

Resilient flooring: flooring that has a relatively firm surface, yet can reshape itself back to its original surface profile after it is compressed.

Task lighting: focusable lighting is typically employed to increase illumination above ambient levels.

Work triangle: space that connects the three major work areas of a kitchen: the cleaning area (sink), the cooking area (range or cooktop) and the cold storage area (refrigerator).

The Principles of Universal Design

Universal design is defined as:

"The design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design."

The concept is an evolving design philosophy.

Principle 1: Equitable use

This principle focuses on providing equitable access for everyone in an integrated and dignified manner. It implies that the design is appealing to everyone and provides an equal level of safety for all users.

Principle 2: Flexibility in use

This principle implies that the design of the house or product has been developed considering a wide range of individual preferences and abilities throughout the life cycle of the occupants.

Principle 3: Simple and intuitive

The layout and design of the home and devices should be easy to understand, regardless of the user's experience or cognitive ability. This principle requires that design elements be simple and work intuitively.

Principle 4: Perceptible information

The provision of information using a combination of different modes, whether using visual, audible or tactile methods, will ensure that everyone is able to use the elements of the home safely and effectively. Principle 4 encourages the provision of information through all of our senses—sight, hearing and touch—when interacting with our home environment.

Principle 5: Tolerance for error

This principle incorporates a tolerance for error, minimizing the potential for unintended results. This implies design considerations that include fail-safe features and gives thought to how all users may use the space or product safely.

Principle 6: Low physical effort

This principle deals with limiting the strength, stamina and dexterity required to access spaces or use controls and products.

Principle 7: Size and space for approach and use

This principle focuses on the amount of room needed to access space, equipment and controls. This includes designing for the appropriate size and space so that all family members and visitors can safely reach, see and operate all elements of the home.

To find more *About Your House* fact sheets plus a wide variety of information products, visit our website at www.cmhc.ca. You can also reach us by telephone at 1-800-668-2642 or by fax at 1-800-245-9274.

Priced Publications

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FlexHousing™: The Professional's Guide	*Order No. 61844*
Healthy Housing™ Renovation Planner	*Order No. 60957*

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