

Accessible Housing by Design—Bathrooms

UNIVERSAL DESIGN

Universal design is a concept designed to accommodate the functional needs of everyone: children, adults and seniors with or without activity limitations or disabilities.

One of the goals of universal design is to maximize the usability of environments.

Everyone appreciates having a well-designed bathroom that is safe, spacious, relaxing and easy to use.

The successful design of a universally accessible bathroom starts with identifying potential users and anticipating the needs of all family members and visitors who will use the bathroom.

BATHROOM DESIGN

One of the latest design trends involves the creation of spacious bathrooms that incorporate a variety of features and flexibility

of use. As a result, bathrooms become more adaptable and comfortable for individuals and families. The concept of universal design, whose objective is to meet all users' needs, is incorporated into many bathroom features such as bathtubs, showers, lighting and flooring.

An overview of the key concepts of universal design is provided in "The Principles of Universal Design" text box on page 17.

Bolded terms throughout this fact sheet are defined in the "Glossary" text box on page 16.



Photo by: Betty Dion

Figure 1 Large accessible bathroom

By providing flexibility in the selection of design features and incorporating adaptability into bathroom design, the life and usability of a bathroom is extended, which promotes the concept of “**aging in place.**”

This concept is increasingly popular with families and individuals who choose to stay in their homes and neighbourhoods as they grow and age. Planning for individuals’ changing needs and abilities allows for periodic bathroom customization based on changing requirements and reduces the need for future costly renovations.

A universally designed bathroom should be comfortable and safe for all family members. Give consideration to all of the design elements associated with the bathroom:

- size and location of the bathroom within the house;
- configuration of the toilet, bathtub and shower within the bathroom;
- type of tub or shower you prefer;
- floor and wall coverings;

- safety issues such as slip resistance of the floor, the presence of grab bars or support rails;
- storage requirements;
- types of lighting; and
- overall use of colour and space.

Planning for future needs is good practice. Principles of universal design and **FlexHousing™** also encourage flexibility, adaptability, safety and efficiency.

Ask yourself

- How many bathrooms do you have? How many people share the bathroom?
- Do you need to have easy and quick access to a bathroom?
- Do you and your family prefer to use the shower or a bathtub?
- Do you have a disability that has an impact on the way you use the bathroom?
- Do you require assistance using the bath or shower?
- Do you worry about a family member who lives with you or often visits who might fall in the bathroom?

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

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

Creating a bathroom that maximizes safety and convenience is the cornerstone of good design.

Efficient design

Begin with general planning issues such as the location of the bathroom within the home. Is there an accessible bathroom? Is there a bathroom on each floor? Is there only one bathroom serving a number of people? Is there a bathroom for visitors? Is there an ensuite bathroom?

Traditionally, bathroom designers have focused on the configuration of the bathroom fixtures within a small area. Homeowners are increasingly

looking for larger bathrooms, particularly in newer homes with both a shower and spa or bathtub, as well as a toilet, one or two vanities and maybe even a urinal or bidet.

This trend to larger bathrooms allows for easier manoeuvrability for people as they get older and may need to use a mobility device. However, people with very limited mobility may find they need to plan for support as they move around a larger bathroom. If you have limitations in your mobility or balance, it is important to consider additional safety issues such as the placement of controls within easy reach (see Figure 2) and the presence of grab bars beside the toilet and near the bathtub or shower.

Designing a safe bathroom also involves preventing falls. Falls frequently occur in the bathroom but they can be avoided with careful planning and selection of materials. Bathrooms should have a vertical grab bar mounted on the wall for people to hold onto as they get into and out of the bathtub or shower. Tubs and showers should have a non-slip surface and the bathroom should have adequate lighting and ventilation.



Photo by: Betty Dion

Figure 2 Bathtub with edge seating and accessible controls

DESIGN CONSIDERATIONS

Minimal effort

Designing for minimal effort is an important principle of the universal design concept. Planning for efficiency considers the location and relationship of the elements within the bathroom. This will result in the placement of related items together in the same location within the bathroom. Placing the storage for make-up and medicine near the vanity/sink area is logical. Placing towels and bathing supplies near the bath or shower reduces the need to walk around the bathroom while wet.

Flexibility and efficiency of effort can be achieved through such design considerations as providing storage options at a variety of heights, a range of lighting options, an adequate place to sit down in front of the washbasin, and a vanity with room for storing materials where they can be easily seen and reached. Extra storage space may be required by some people for equipment such as shower wheelchairs.

If the bathroom is large enough to include a washer and dryer, please see CMHC's *About Your House* fact sheet *Accessible Housing by Design—Appliances* for additional design suggestions.

Adaptability

Adaptability can be achieved by installing a shower head on a vertical slide bar so that it can be adjusted and set at a variety of heights; by providing a raised seat for the toilet and grab bars that fold down; by using drawers for storage; and even by pre-programming temperatures for the shower.

If only periodic access to knee space under the washbasin is required (such as in a visitable bathroom), moveable storage under the sink can provide knee space (see Figure 3).

Provide adequate manoeuvring space and support for a hoist should you require one or anticipate needing one in the future. See CMHC's *About Your House* fact sheet *Accessible Housing by Design—Residential Hoists and Ceiling Lifts* for further information.



Figure 3 Movable storage under the sink

Ease of cleaning

When making decisions about the selection of bathtubs, floors, toilets and showers, remember to take into consideration the surface finishes. For example, wall and floor surfaces in the shower should be designed to drain fully to prevent mold from growing. Adequate ventilation in the bathroom is extremely important to eliminate moist air and the potential for mold or mildew growth. Flooring should be slip resistant, yet easy to clean and maintain.

Minimal effort should be required to clean the bathroom. Plan to eliminate the presence of difficult-to-reach areas and select materials that do not need special cleaning supplies (see Figure 4).

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



Photo by: Norbert Koeck

Figure 4 Ease of cleaning

Safety

Safety hazards in the bathroom deserve the highest consideration. The bathroom is the site of many accidents and falls. A non-slip flooring surface is extremely important, especially when wet.

Bath mats on the floor should be avoided because they can be a tripping hazard and an obstacle for many people with mobility impairments. On the other hand, a non-slip mat in the bathtub is an excellent idea to prevent a slip or fall.

Burns can be another safety hazard in the bathroom, particularly for children and people who have reduced sensitivity or ability to feel temperature changes. Mixing valves that limit the water temperature to a maximum of 49°C (120°F) can be installed.

An excellent time to think about how to prevent falls is when you are redesigning or renovating your bathroom. Grab bars, non-slip surfaces, adequate lighting and ventilation should be integrated into your plans.

In order to avoid growth of *Legionella* bacteria, it is not recommended to lower the hot water tank temperature below 60°C (140°F).

Avoid sharp edges on surfaces in the bathroom to prevent injury in case of a fall and consider various lighting options. Installing grab bars is highly recommended.

Towel rails are not designed to provide support in the bathroom. Towel rails can, of course, be replaced by grab bars that can serve both functions.

Grab bars should be installed to suit the particular user or users. There is a wide variety of types of grab bars; some that fold down and others that are permanently installed (see “Grab bars” on page 9).

Manoeuvring space

When designing a bathroom for someone who uses a walker or wheelchair, you should allow

a sufficient manoeuvring space of 750 x 1,200 mm (30 x 47 in.) in front of or beside all fixtures including the bathtub, shower and storage spaces. It is especially important to consider the manoeuvring space in front of all of the controls, so that it is not necessary for someone to lean to reach them, which may result in a fall. Don’t forget to provide sufficient manoeuvring space in front of all windows and window controls (see Figures 5 and 6).

A minimum manoeuvring space of 1,500 x 1,500 mm (59 x 59 in.) within the bathroom will allow for turning around and approaching the bathroom elements. For power wheelchair or scooter users the required turning radius is larger, increasing the minimum manoeuvring space to 1,800 x 1,800 mm (71 x 71 in.), depending on the size of the mobility device. Room should also be provided for people who give assistance or care in the bathroom (see Figures 7 and 8).

Figure 8 features a bathroom design that incorporates both a shower and a double bathtub and provides sufficient manoeuvring space for either a side or angled approach to the toilet and access to the tub,

shower and vanity. Note the provision of storage space and the location of the controls for both the shower and bath which are within easy reach.

Other bathroom design components that increase usability:

- D-type handles on storage drawers;
- drawers that pull out fully and cupboards with pull-out shelving;
- hands-free faucets;
- reinforced walls that accommodate grab bars in customized positions;
- **resilient flooring** (rather than hard surfaces);
- lighting activated by motion detectors;
- shower head that can be adjusted to a variety of heights.

Providing a large open tiled floor and wall area with drainage not only accommodates more than one person in the shower, but it also allows adequate space for someone using a shower bench or shower wheelchair, and who requires some assistance while bathing.

Sample Accessible Bathroom Layouts

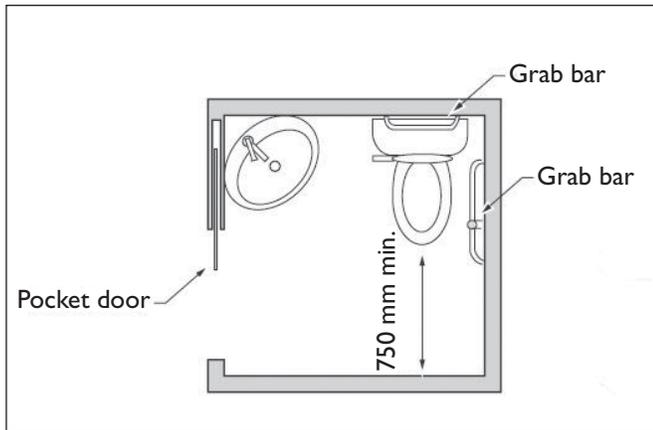


Diagram by: DesignAble Environments Inc.

Figure 5 A half-bath which is suitable for use as a visitable washroom

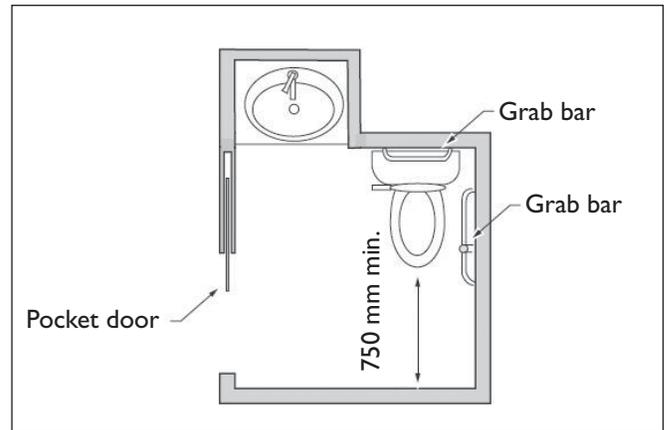


Diagram by: DesignAble Environments Inc.

Figure 6 A half-bath which is suitable for use as a visitable washroom

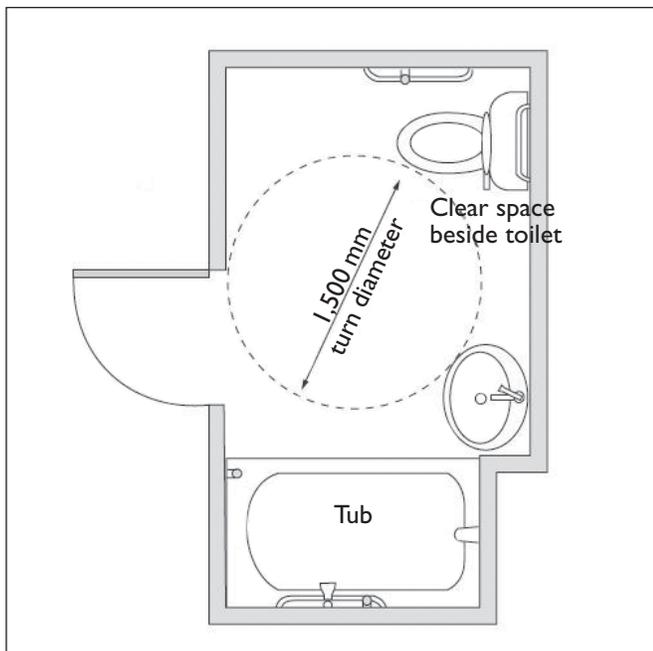


Diagram by: DesignAble Environments Inc.

Figure 7 A small accessible bathroom

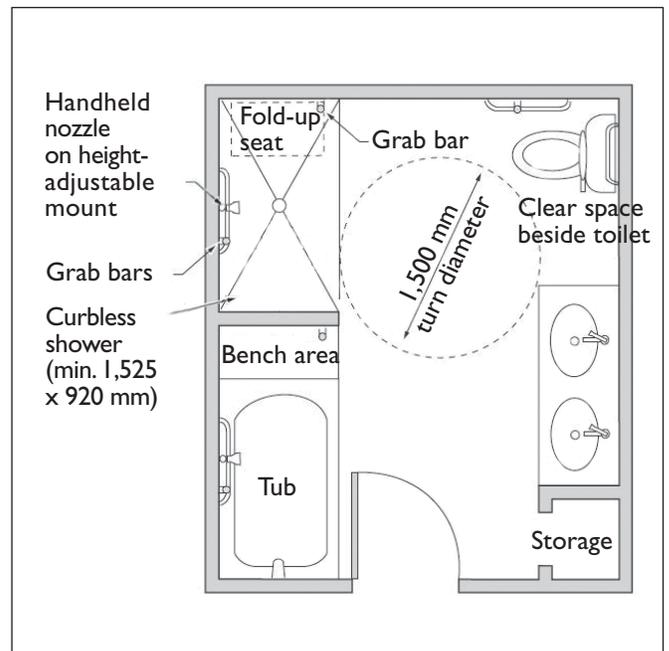


Diagram by: DesignAble Environments Inc.

Figure 8 Bathroom with shower and tub, two washbasins, toilet and storage space

DESIGN ELEMENTS

The elements of universal bathroom design are:

- Lighting
- Flooring materials
- Switches and controls
- Doors
- Vanities, drawers and storage
- Grab bars
- Toilets
- Showers
- Bathtubs

Lighting

A range of different lighting levels constitutes one design element in creating a relaxing spa-like atmosphere in the bathroom. It is also a universal design approach. A night light in the bathroom is an excellent feature.

It is also possible to install a light that gradually adjusts the rate of illumination. When you awake in the middle of the night, a motion detector activates the light, which slowly brightens so you are not overwhelmed.

Adjustable directed or **task lighting** also allows you to have extra illumination in key areas of the bathroom such as the vanity or shower area.

Ambient lighting should be provided to maintain an even level of illumination throughout the bathroom. (Fluorescent lighting offers the most diffused light and reduces glare.) People with visual impairments may require greater luminance to maximize their vision.

Where possible, take advantage of opportunities to maximize natural lighting, but be careful to avoid glare. Glare-free surface treatments and a soft matte paint finish are preferred by most people, especially persons with visual impairments or dementia. These finishes reduce glare and complement illumination levels, creating a more relaxing atmosphere.

Flooring materials

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

A wide selection of different flooring surfaces exists. Marble floors should be avoided as they are very slippery, especially when wet. Vinyl flooring is available in sheets or 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. A ceramic tile floor is waterproof, easy to clean and easy to wheel on.

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. A heated floor should be considered for added comfort.

Switches and controls

Switches and controls should all be located within easy reach and be easy to operate.

An electrical outlet should be strategically located within the reach of someone both standing and seated, either near the sink or vanity area. Other controls and switches, including the switch for the ventilation fan should be located at a maximum height of 1,200 mm (47 in.) from the floor.

Doors

It is also a good idea to think about the manoeuvring space required for the door. Adequate space should be provided inside the bathroom to allow you to close the door when you are inside. Likewise, space is required to allow you to easily open the door to exit (see Figures 5 to 8).

All doors should have a minimum clear width of 810 mm (32 in.) and should be designed to maximize manoeuvring space. Pocket doors can be used, particularly in smaller bathrooms, but they may not provide adequate noise protection. Furthermore, the hardware to open pocket doors may be difficult to operate for some people with limited dexterity.

Vanities, drawers and storage

Many bathrooms have two sinks or washbasin areas in the vanity. A universal design approach might be to install them at different heights. When a washbasin 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 leg burns. Alternatively, the drainage pipes can be insulated.

Vanities at a height of 860 mm (34 in.) are more convenient for children, people who are shorter and people who use a wheelchair. If the person who uses the vanity is taller, he or she may appreciate a vanity at a height of 910 mm (36 in.).

Adaptability can also be achieved by installing a vanity with electrically **adjustable height counters**, which are available from a number of innovative bathroom designers. There should be knee space provided at the vanity for someone who uses a wheelchair, scooter or chair.

Knee space should be at least 800 mm wide x 600 mm deep (31 x 24 in.), 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.).

A **FlexHousing™** approach would be to install cupboard doors that swing open and retract back in under the vanity (see Figure 9).



Figure 9 A FlexHousing™ approach, cupboards with retracting doors

A faucet controlled by a single lever or a motion detector is most convenient. 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.

Faucets at the washbasin should be lever-handled and should clearly indicate the hot and cold controls; this style is particularly useful for people who have cognitive limitations. There are even faucets that provide a change in the colour of the water depending on its temperature.

It is important to provide adequate storage for people while seated at the vanity. A set of drawers beside the sink is particularly useful.

Storing related things in the same drawer or cupboard where they are easy to find is appreciated by everyone but is especially important for someone with limited mobility or a visual impairment. Some people who use incontinence supplies need to have easy access to storage near the toilet and sink area.

Installing drawers that pull out fully, to display their contents for easy retrieval, is an excellent approach. Cupboards and drawers should have a D-type pull handle, which is easier for people with reduced mobility or agility to use. Touch-and-release drawers are universally accessible to everyone, including people with limited hand dexterity. People with reduced vision may prefer to have handles that contrast with their background. A contrasting colour for the interior of drawers and cupboards may also increase visibility for people with limited vision.

The medicine cabinet or storage area for pharmaceutical supplies should be installed with the shelves at a maximum height of 1,400 mm (55 in.), if it is to be reached by someone using a wheelchair. It should

not be located beyond the reach range (approximately 500 mm or 20 in.) and it should be capable of being opened by someone with limited dexterity. If there are children in the home or people who should not have access to the cabinet, it is recommended that a locking device be installed.

A full-length mirror is ideal. If there is a mirror over the vanity, it should be mounted with its lower edge at a maximum height of 1,000 mm (39 in.).

People with reduced vision should avoid bathrooms with busy patterns; many people prefer to have solid colours that provide some contrast. Some people select contrasting edging or a raised edge on the sink to help in identifying margins.

Grab bars

Grab bars should be 30–40 mm (1 ¼–1 ½ in.) in diameter and should have a non-slip surface. Grab bars must be installed into a wall with sufficient support (into studs or reinforced walls) to carry your weight. A space of 35–45 mm (1 ⅜–1 ⅝ in.) is recommended between the grab bar and the wall, with sufficient clearance above the grab bar to allow you to grasp it.

The **CSA Standard B651** requires that grab bars be mounted so they provide a minimum support of 133 kg (approximately 290 lbs). An excellent approach during construction is the structural reinforcement of the walls surrounding bathtubs and toilets for grab bar installation, thereby preventing the need to remove the tiling and walls at a later date. This approach also allows for customized location of the grab bars to suit the user. Using 16-mm (½-in.) plywood, reinforce the areas behind and beside the toilet, starting at a height of 450 mm (18 in.). Reinforce the three walls around a bathtub or shower stall up to a height of 1,200 mm (47 in.).

Grab bars near the toilet

Grab bars should be provided beside the toilet for support. Fold-down grab bars are particularly helpful in installations where there is no wall beside the toilet (see Figure 10). Another advantage of fold-down grab bars is that they can be folded up out of the way for use by other family members.



Photo by: Lisa Blanchard

Figure 10 Fold-down grab bars do not restrict usage of the facilities

Most people prefer a horizontal grab bar on the side and back walls although others might prefer a fold-down grab bar due to space limitations.

Grab bars beside a toilet should be mounted at a height between 750–850 mm (30–33 in.), depending on individual preference. They should extend at least 450 mm (18 in.) in front of the toilet seat to allow them to be grasped while transferring from a wheelchair.

The grab bar behind the toilet should also extend horizontally at least 600 mm (24 in.) in length.

Grab bars in the shower

A vertical grab bar at the entrance of the shower area should be mounted at least 80–120 mm (3–5 in.) from the outside edge of the shower enclosure and with its lower end at a height of 600–650 mm (24–26 in.) from the floor. It should extend at least 1,000 mm (39 in.) in length to ensure it can be easily grasped by everyone. To ensure universal accessibility, the shower controls should be intuitive to use, easy to operate and be easily reached.

Grab bars near the bathtub

Getting safely into and out of the bathtub, especially for older people and people with balance limitations can be a challenge.

Bathtubs are one of the most common locations for falls in the home. A vertical grab bar on the wall beside the bathtub is highly recommended for everyone. It should be a minimum of 1,200 mm (47 in.) in length and mounted immediately inside the bathtub enclosure.

Grab bars should be installed to suit the particular user or users. Most people prefer a horizontal grab bar along the side walls although others might prefer two grab bars, one horizontal and one vertical to assist in getting out of the tub, as illustrated in Figure 11. For more information, see CMHC's *Research Highlight: Evaluation of Optimal Bath Grab Bar Placement for Seniors*.



Photo by: Betty Dion

Figure 11 Bathtub with grab bars, adjustable height shower head and a bath bench

A horizontal grab bar installed to meet your needs should be placed at a height between 180–280 mm (7–11 in.) above the rim of the bathtub. Another common installation is a vertical grab bar in a location that you can reach while seated in the bathtub.

Toilets

The market offers a wide range of toilets; it is important to select one that meets your needs. A low water volume or dual-flush toilet is an excellent sustainable option.

A back support on the toilet will provide stability and assist those with balance limitations. Some toilets have an automatic flushing feature. Some people who use wheelchairs prefer a wall hung toilet as it provides additional manoeuvring space below the toilet.

Manoeuvring space at a toilet must be carefully considered. If there is someone in the household who needs some assistance or may require it in the future, it is important to provide adequate space for the caregiver, either in front of the toilet or beside the toilet. Additionally, if you approach the toilet while using a wheelchair, you may approach

from the side, the front or angled from the side. Consider your personal preference and space requirements (see Figure 12).



Photo by: Betty Dion

Figure 12 A toilet with back support and sufficient transfer space adjacent

The **CSA Standard B651** specifies a range of heights for the toilet seat from 400–460 mm (16–18 in.). Children and some people who use wheelchair and transfer independently prefer a lower height as it is easier to use. Alternatively, many older people prefer a toilet that is a little higher as it is easier for them to get up and down. Care must be taken not to have a raised toilet seat for someone at a height where their feet do not touch the floor as this may affect their ability to balance.

The toilet should be installed with its centre line between 460–480 mm (18–19 in.) from the wall. This ensures that grab bars are within reach for those transferred onto the toilet.

The flush control should be located within easy reach, on the open transfer side of the toilet. The placement of the tissue dispenser should also be carefully considered so that it is easy to find and does not interfere with the use of the grab bar. It should also be within easy reach, not requiring that someone lean too far over to the side or reach back. An excellent idea for people who have limited hand function is a toilet that sprays water for cleaning followed by hot air for drying (see Figure 13).



Photo by: Betty Dion

Figure 13 Toilet with built-in water sprayer and dryer

In some tiled bathrooms with a drain in the floor, there is a flexible shower hose located beside the toilet for ease of cleaning.

Some homeowners have chosen to install a urinal in their bathroom to better suit their needs. Grab bars can be installed on the walls to further increase its usability.

Showers

The universally designed accessible shower is increasingly appearing in “wet rooms” or “spa bathrooms” in Canadian homes. They are large tiled areas with one or more shower heads and appropriate drainage. These showers accommodate more than one person, children, persons who use a mobility device and even the family dog.

The floor should have positive drainage, and the water should flow to the drain via gravity. The drain should be located to the side where people will not be standing or wheeling on it.

Shower controls should be located so that they are easily reached at a maximum height of 1,200 mm (47 in.). A handheld pliable shower hose increases flexibility and usability. The hose should be a minimum



Photo by: Betty Dion

Figure 14 Accessible shower with fold-up bench, easy-to-reach controls and adjustable shower head height

of 1,500 mm (59 in.) long or even longer if it is to be used by someone seated on a shower bench or seat (see Figure 14).

Shower heads at a variety of different heights and positions are increasingly being installed by builders.

Shower controls should be intuitive and easy to use by everyone. Water temperature can be controlled before it reaches the shower or bathtub and should be set at a maximum temperature of 49°C (120°F). Colour and texture can be used to reinforce information on the controls.

Wheel-in showers are preferred by people who shower from a seated position, on a shower wheelchair or a bath seat.

Caregivers also appreciate the increased space. A wheel-in shower should be at least 750 x 1,500 mm (30 x 59 in.) and should be equipped with both a vertical and horizontal grab bar. Care must also be taken to provide adequate clear manoeuvring space of 900 x 1,200 mm (35 x 47 in.) outside of the shower area.

Some people may use a portable shower seat; others may prefer a fold-down bench, which should be firmly anchored. The seat should allow easy access to the controls and be constructed with a non-slip surface, which is particularly important in view of the slippery nature of soaps and shampoos.

Some children and adults with disabilities prefer to have a change table on which they can lie while getting dressed or being assisted in dressing. The table should be a minimum of 1,500 mm (59 in.) in length and 800 mm (31 in.) in width and should be installed to support the weight of the user.

A smaller shower enclosure with a fixed shower seat is often installed in smaller bathrooms. Care should be taken to avoid the tripping hazards created by sliding doors or a high curb or threshold. Many of these showers are prefabricated as a moulded enclosure with integrated support handles. These support handles should be carefully checked to ensure they will support the weight of a person. Consider adding a vertical grab bar on the outside of the shower enclosure to provide stability while entering.

Bathtubs

Many people enjoy a soak in a hot bath, especially people who wish to relax or relieve muscle pain. There are many different types of bathtubs, some very large, some with water jets, some with hand grips built into the tub, some made with soft sides and even some that have a side door for entry.

In selecting a bathtub, the first consideration is to assess your needs and preferences. It is important for safety purposes to have a non-slip surface, grab bars and a flat-bottomed tub to provide stability.

Grab rails or hand grips in prefabricated bath enclosures should be checked to ensure they have adequate reinforcement to support a person's weight.

There are a wide variety of mechanisms or lifts that can be used in the bathtub to lower and raise you in the water. Many of these are designed with a bath seat that swivels to allow for ease of use. Check with an occupational therapist or your medical supply store for further information.

Waterproof bath seats offer another option and are especially useful in view of their portability. Many hotels and motels have bath seats available for use by their customers. Bath seats should be placed in the tub within reach of the controls, be non-slip and free of hazards.

Walk-in bathtubs

Another option is to consider bathtubs with doors that allow for easy entry. This option is popular among people with limited balance and agility, older people, and those who often prefer a bath to a shower.

The bath has a door that is equipped with a locking system, which is lever-operated, and ensures a safe seal to prevent any water leakage.

The lengths of walk-in baths vary from 1,070–1,320 mm (42–52 in.) and have widths from 660–760 mm (26–30 in.). There are even some models that will convert an existing bathtub into a walk-in bath.

VISITABLE HOMES

Visitable housing is an emerging approach to house design that promotes the inclusion of a basic level of accessibility into all housing, and enables everyone to get in and out of the house and be able to use the bathroom.

Such an approach will not only accommodate visitors to your home who may be elderly or disabled, but it will also better accommodate the reality of changing ability that we all experience as we grow older (see Figure 15).

A visitable house incorporates three basic access features:

1. A zero-step entry
2. All main floor interior doors (including bathrooms) feature a clear opening width of 810 mm (32 in.)
3. At least a **half-bath**, but preferably a **full bath** on the main floor

For the bathroom to be usable, it must feature a clear floor space of at least 750 x 1,200 mm (30 x 47 in.) that is not impeded by the door swing.

Many communities are considering visitability features as part of new development projects.



Photo by: Betty Dion

Figure 15 The entrance to a visitable home

ADDITIONAL RESOURCES

Books

Barrier Free Environments Inc. (1991). *The Accessible Housing Design File*. New York: John Wiley & Sons.

Behar, S., and Leibrock, C. (1993). *Beautiful Barrier-Free: A Visual Guide to Accessibility*. New York: Van Nostrand Reinhold.

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CMHC. (1992). *Housing Choices for Canadians with Disabilities*. Ottawa, ON, Canada: CMHC.

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Taunton Press. (2003). *Renovating a Bathroom*. Newtown, CT: Taunton Press.

Wormer, A. (2001). *The Bathroom Idea Book*. Newtown, CT: Taunton Press.

Websites

AARP—Home Improvements (June 2010)

<http://www.aarp.org/home-garden/home-improvement/>

Enter “bathroom” in the search box.

Bob Vila (June 2010)
www.bobvila.com

Enter “accessible solutions” in the search box.

Glossary

Adjustable height counters: countertops, sinks, cooktops and cabinets that can be raised or lowered at the touch of a button, making them accessible to people who are seated, or who are 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 changing lifetime.

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

CSA Standard B65 I: Canadian Standards Association CSA B65 I Accessibility of the Built Environment standard.

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

Half-bath/Full bath: a half-bath is a bathroom with only a toilet and a sink, a full bath has a toilet, sink and a tub and/or shower.

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

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

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.

About Your House

Accessible Housing by Design—Bathrooms

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