



Bathrooms

Universal design

People who inhabit and visit the houses we live in come in all shapes and sizes, and range in age 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 may be safer and more accommodating to the diverse range of ages and abilities of people who live in and visit.

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.

Universal design is 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 and ability. “The Principles of Universal Design” are found on page 18.

Bolded terms throughout this fact sheet are defined in the Glossary on page 15.

Bathroom design

One of the latest design trends involves the creation of spacious bathrooms that incorporate a variety of features and flexibility of use (see figure 1). As a result, bathrooms become more adaptable and comfortable for individuals and families. We tend to spend more time in our bathrooms and we desire an attractive and comfortable space. Builders and homebuyers recognize the positive resale value of functional and beautiful bathrooms. The concept of universal design, whose objective is to meet all users’ needs, is incorporated into many bathroom features, such as bathtubs, showers, toilets, sinks, lighting and flooring. A bathroom that anticipates the needs of all the family members and visitors will become that much more valuable.

Effective universal design and construction can only occur when we truly appreciate how persons with disabilities engage the built environment. Universal design is only a subtle shift from what is typically done; designing for greater accessibility, then, is not a new way of designing, simply a more focused one. 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**.



Figure 1: Large accessible bathroom
Photo by Ron Wickman



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

Creating a bathroom that maximizes safety and convenience is the cornerstone of good design. Important considerations that will help identify bathroom design requirements include the following factors:

- Bathroom size
- Bathroom layout
- Framing
- Adaptability
- Ease of cleaning
- Safety

Bathroom size

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 bidet.

A trend for 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 a person's mobility or balance is limited, it is important to consider additional safety aspects, such as the placement of controls within easy reach and the presence of grab bars beside the toilet and near the bathtub or shower.

When designing a bathroom for someone who uses a walker or wheelchair, one should allow a sufficient manoeuvring space of 750x1,200 mm (30x47 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 2 and 3).

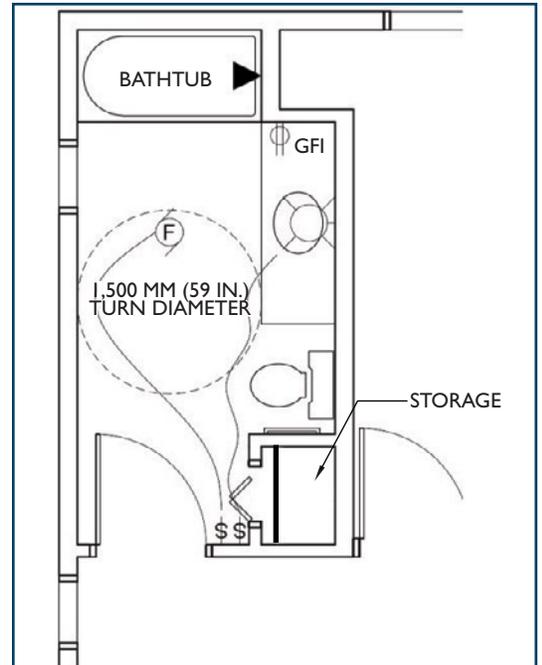


Figure 2: A small accessible bathroom
Diagram by Ron Wickman

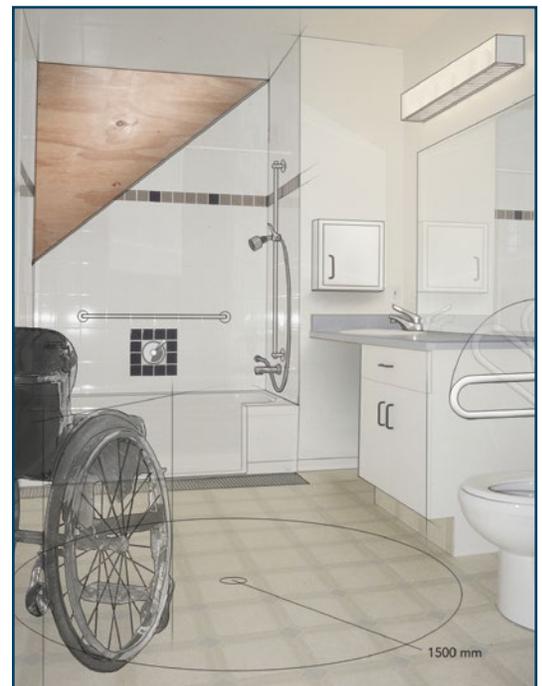


Figure 3: FlexHousing™ approach complete with a 1,500 mm (59 in.) turning circle and plywood backing on all bathroom walls
Photo by Ron Wickman



A minimum manoeuvring space of 1,500x1,500 mm (59x59 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 1,800x1,800 mm (71x71 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 4 and 5).

Figure 5 features a bathroom design that incorporates both a shower and a bathtub and provides sufficient manoeuvring space for either a side or angled approach to the toilet and access to the bathtub, shower and vanity. It is important to note that unlike public washrooms, which are typically designed to meet minimum requirements identified in the building code, residential bathrooms can be built to meet the specific requirements of a person with a disability who uses it.

Designing the bathroom as a wet room by 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.

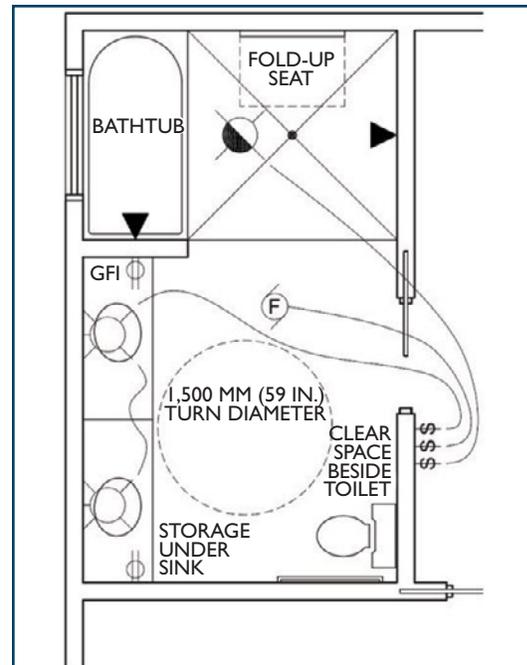


Figure 4: Bathroom with curbless shower and bathtub, two wash basins, toilet and storage space
Diagram by Ron Wickman

Bathroom layout

Planning for ease of use and safety 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 makeup 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, adequate place to sit down in front of the wash basin 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 or bath benches.



Figure 5: Bathroom with large curbless shower and bathtub. Note the ceiling track lift
Photo by Ron Wickman



Planning for a more positive universal bathroom space will include some users with more complex needs. Persons with cognitive limitations or who are missing one or more limbs will require a more strategic layout. The side of the body one might favour or use will determine the location of space beside a toilet. Also, some individuals would benefit by having the toilet near the shower area (see figure 6), a bidet seat on the toilet or a larger shower drain.

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.

Framing

In new house construction, framing a universally designed bathroom is straightforward. Framing all of the bathroom walls and ceiling with 19 mm (¾ in.) plywood, floor to ceiling, allows for the future installation of grab bars, handrails and ceiling lifts. Framing the floor of the **bathroom** with joists shorter than the rest of the home allows for construction of a wet room bathroom. All of this framing is significantly more difficult and expensive to complete in a house renovation.

Adaptability

Adaptable design is an approach to housing design that incorporates features at the design and construction phase that will allow homeowners to adapt their space to meet their changing needs. 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 (see figure 7); by providing a raised seat for the toilet and grab bars that fold down; by using drawers for storage; and even by preprogramming temperatures for the shower.

The manoeuvring space within the bathroom should be considered for current and future needs. If assistance might be required through the use of a ceiling lift, the ceilings must be reinforced to support its installation. See CMHC’s “Accessible Housing by Design – Residential Hoists and Ceiling Lifts” for further information.

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 mould from growing. Adequate ventilation in the bathroom is extremely important to eliminate moist air and the potential for mould or mildew growth. Flooring should be slip resistant, yet easy to clean and maintain.



Figure 6: Toilet located near curbless shower area
Photo by Ron Wickman

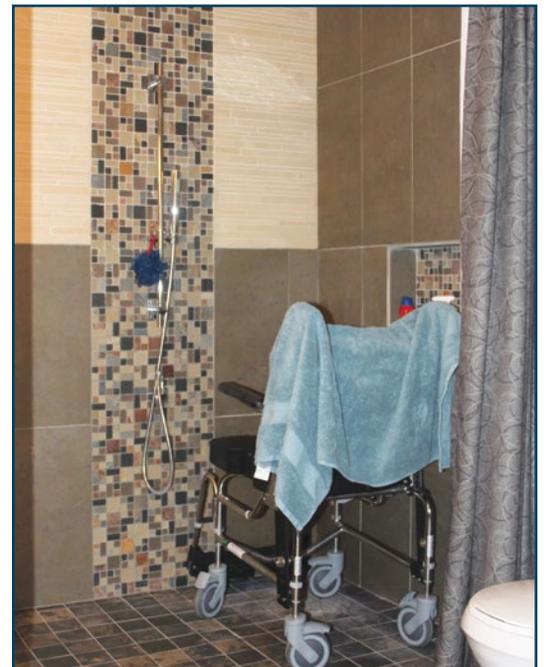


Figure 7: Adjustable shower head
Photo by Ron Wickman



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.

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 disease, individuals who are very forgetful or have developmental disabilities, careful thought should be given to storage. Consider door and drawer locks, and security of these products.

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. Adequate lighting and ventilation are also very important.

An excellent time to think about how to prevent falls is when the bathroom is being redesigned or renovated. Grab bars, non-slip surfaces, adequate lighting and ventilation should be integrated into the plans.

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. 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 recommended.

There are now towel rails that have been designed to also act as grab bars and can provide support in the bathroom. The reverse is also true, grab bars may be installed and can serve the function of a towel rail (see figure 8).

Grab bars should be installed to suit the particular user or users. There is a wide variety of types of grab bars; some that are permanently installed and others that fold down (see “Grab bars” on page 11).



Figure 8: Dual purpose towel rack and grab bar. Note the emergency pull cord just above the towel bar
Photo by Ron Wickman



Design elements

The elements of universal bathroom design are the following:

- Showers
- Bathtubs
- Toilets
- Vanities, drawers and storage
- Grab bars
- Doors
- Switches and controls
- Lighting
- Interior finishes
- Environmental controls

Showers

The custom-built, curbless, wheel-in shower is the best design to accommodate as many people as possible. Most prefabricated shower units are built to be 900x1,500 mm (36x59 in.) in dimension and they typically come complete with a curb. Even if this curb is only 25 mm (½ in.) high, most people who use wheelchairs would need to transfer into these shower units. A wheel-in shower should be at least 1,500x1,500 mm (59x59 in.) in dimension. It is often the case with bathroom renovations that space cannot be made for a 1,500x1,500 mm (59x59 in.) wheel-in shower, and the existing floor framing does not allow for a curbless shower. One very useful product for a bathroom renovation and shower area is a water dam. This is a flexible “sponge like” product that is fixed to the floor at the entrance to the shower area. It is one inch high, keeps the water in the shower area and easily flattens when stepped on or wheeled over (see figure 9).

The universally designed accessible shower is increasingly appearing in “wet rooms” or “spa bathrooms” in Canadian homes. They are large tiled or safety flooring areas with one or more shower heads and appropriate drainage. These showers accommodate more than one person, children, persons who use a mobility device. A wet room design adds very little extra cost and truly affords all independence in how they cleanse themselves.

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. A linear trench drain rather than a circular drains allows the shower floor to be evenly sloped which is easier to move on for persons who use wheelchairs.



Figure 9: Water dam at entrance to shower area
Photo by Ron Wickman



Shower controls should be located so that they are easily reached at a maximum height of 1,200 mm (47 in.). A hand-held pliable shower hose increases flexibility and usability. The hose should be a minimum 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 10).

Shower heads at a variety of heights and positions are increasingly being installed by builders. Multi-function shower heads that spray in a fine aerated mist or a vigorous revitalizing massage are also a good idea.

Shower controls should be intuitive and easy to use by everyone. Colour and texture contrast can be used to reinforce information on the controls.

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.

Shower curtains can be used to manage water in the shower area. Ensure to use a non-rusting (stainless steel or aluminum) shower rod complete with shower curtain carriers. Most importantly the washable curtain should have a weighted hem and hang 25 mm (½ in.) off of the floor.

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.

An adjustable-height change table that is 1,800 mm (72 in.) in length and 1,500 mm (59 in.) in width is the most universal solution. This would be for adults who cannot independently change themselves.

Bathtubs

Some 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 or air jets, some with hand grips built in, some made with soft sides and even some that can be modified so that a section of the bathtub wall can be easily removed in order to make stepping into and out of the bathtub easier and safer.

In selecting a bathtub, the first consideration is to assess the person's 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 the person 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 a medical supply store for further information.

Waterproof bath seats offer another option and are especially useful in view of their portability. Bath seats should be placed in the tub within reach of the controls, be non-slip and free of hazards.



Figure 10: Shower controls and grab bars in curbless shower area
Photo by Ron Wickman



Walk-in bathtubs

Another option is to consider bathtubs with doors that allow for easy entry. This option is popular among people who prefer a bath to a shower and with limited balance and agility (see figure 11).

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

One should consider that it will be necessary to remain in the tub while it fills up and until the water has drained.



Figure 11: Walk-in bathtub complete with door
Photo by Ron Wickman

Toilets

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

Manoeuvring and generous transfer 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 a person approaches the toilet while using a wheelchair, he or she may approach from the side, the front or angled from the side. Consider that person's personal preference and space requirements (see figure 12).

The **CSA B651 standard** specifies a range of heights for the toilet seat from 400 mm to 460 mm (16 in. to 18 in.). Children and some people who use a 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. Persons with weakness in their leg muscles may miss the toilet in an attempt to sit. Care must also 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. Ideally, the height of the toilet and of the wheelchair used by a person wanting to transfer should be the same.



Figure 12: A toilet with sufficient transfer space adjacent
Photo by Ron Wickman



The toilet should be installed with its centre line between 460 mm to 480 mm (18 in. to 19 in.) from the wall. This ensures that grab bars are within reach for those transferred onto the toilet and there is room for a commode chair.

The flush control should be located within easy reach, on the open transfer side of the toilet farthest from the wall. 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 extremely useful item that can be added to an existing toilet is a bidet seat. This toilet seat comes complete with a remote control and allows persons with limited hand mobility or persons without arms to independently use a toilet that sprays water for cleaning followed by hot air for drying (see figure 13).



Figure 13: Toilet seat with built-in water sprayer and dryer
Photo by Ron Wickman

Vanities, drawers and storage

The key to proper height placement of the countertop is to keep the counter to a minimum thickness. This maximizes the ability to keep the countertop low enough for those users in wheelchairs to reach into the sink; the countertop can also be high enough to allow the same users in wheelchairs to get underneath the counter. The front edge of the counter can also be in a contrasting colour to assist individuals with limited vision. A bar located in front of the counter could assist those individuals with balance issues standing at the sink.

Countertops with sinks generally work better than wall hung or pedestal sinks. The countertop provides storage space for the placement of medical items, equipment and bags (see figure 14). If the countertop is more than 915 mm (36 in.) wide, base cabinets with drawers can be included in the bathroom. This provides even more storage space.

Sinks should be shallow enough to allow persons in wheelchairs to get in underneath. Also, it is important to keep users legs from coming into contact with exposed hot pipes. To prevent potential burns to legs, the pipes can be insulated or a protective panel can hide exposed pipes. A third option is to offset the sink pipes as far back up against the wall, where one's legs could never come into contact with exposed pipes.



Figure 14: Counter and sink with offset drain
Photo by Ron Wickman



Storage space that is lost to provide wheelchair access underneath the sink can be made up with a full height cupboard complete with pull-out shelves. Medicine cabinets must also be mounted to be within easy reach of someone sitting in a wheelchair.

Many bathrooms have two sinks or wash basin areas in the vanity. A universal design approach might be to install them at different heights (see figure 15). 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 915 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 cabinet designers (see figure 16). 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 by 600 mm deep (31x24 in.), at a height of 730x860 mm (29x34 in.), with a minimum footprint in front of 750x1,200 mm (30x47 in.).

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. Pull-out faucet hoses help keep the sink clean. Faucet controls can also be mounted at the side of a sink to allow for easier access for those individuals who cannot reach far.

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. Also, storing items helps to reduce clutter and distractions for persons with cognitive limitations.

Installing drawers that pull out fully, to display their contents for easy retrieval, is an excellent approach. Cupboards and drawers should have D-type pull handles that are also colour contrasted to their background, which is easier for people with reduced mobility, agility or sight to use. A contrasting colour for the interior of the drawers and cupboards may also increase accessibility for people with limited vision.



Figure 15: Vanity with two counters at different heights
Photo by Ron Wickman



Figure 16: Electronic adjustable-height counter
Photo by Ron Wickman



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 and within a reach of 500 mm (20 in.). It should also be usable 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.

The preferred solution for bathroom mirrors is to bring the mirror right down to the top of the countertop; this allows both individuals who are standing or who are in a wheelchair to effectively use the mirror. The lower edge must be mounted at a maximum height of 1,000 mm (39 in.). A magnifying mirror located in a bathroom is especially useful for persons with visual limitations. A full length mirror also helps everyone see their full body.

Grab bars

Grab bars are fixtures that assist persons to transfer onto and back off a toilet. They can also be used around bathtubs, shower areas, counters and walls to assist people with balance issues. A good rule is to that too many grab bars is better than not enough. Today, grab bars are designed to fit in with any decor of a residential bathroom. It is a good idea to use grab bars that are slip resistant.

Grab bars should be 30 mm to 40 mm (1 ¼ in. to 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 a person's weight. A space of 35 mm to 45 mm (1 ⅜ in. to 1 ⅝ in.) is recommended between the grab bar and the wall, with sufficient clearance above the grab bar to allow a person to grasp it.

The **CSA B651 standard** requires that grab bars be mounted so they provide a minimum support of 133 kg (approximately 290 lb.). 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 19 mm (¾ in.) plywood on all the walls of the bathroom is the most universal solution.

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 17). Another advantage of fold-down grab bars is that they can be folded up out of the way for use by other family members. 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 305 mm (12 in.) above the toilet seat. They should extend at least 50 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.

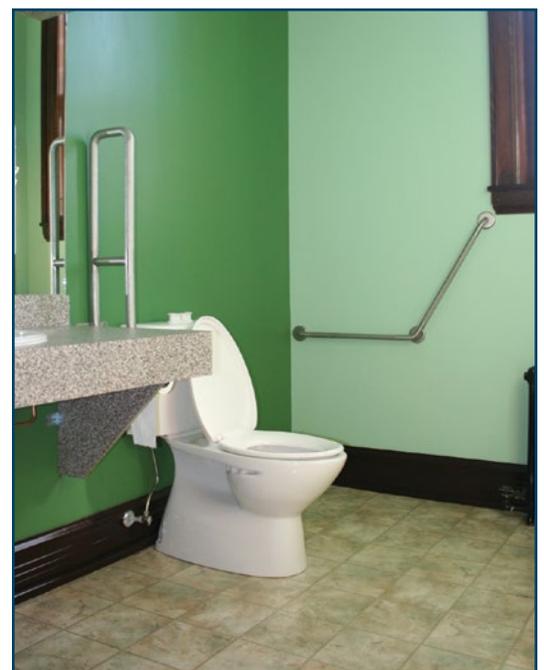


Figure 17: Fold-down grab bar does not restrict usage in the bathroom
Photo by Ron Wickman



Grab bars in the shower

A vertical grab bar at the entrance of the shower area should be mounted at least 80 mm to 120 mm (3 in. to 5 in.) from the outside edge of the shower enclosure and with its lower end at a height of 600 mm to 650 mm (24 in. to 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. It must be remembered that floor to ceiling wood backing on all shower walls will allow for the most strategic placement of grab bars to meet an individual's needs, for now and in the future.

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 18. For more information, see CMHC's *Research Highlight* "Evaluation of Optimal Bath Grab Bar Placement for Seniors."

A horizontal grab bar installed to meet a person's needs should be placed at a height between 180 mm to 280 mm (7 in. to 11 in.) above the rim of the bathtub (see figure 18). Another common installation is a vertical grab bar in a location that can be reached while seated in the bathtub.

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 the door to be closed from the inside. Also, for doors that swing outside the bathroom, consider installing a D-type handle, 140 mm (6 in.) long, on the door so that it may be pulled close once inside. Likewise, space is required to allow the door to be easily opened to exit.

All doors should have a minimum clear width of 810 mm (32 in.) and should be designed to maximize manoeuvring space. It is highly recommended to use 915 mm (36 in.) doors for all rooms of a home. Pocket doors can be used, particularly in smaller bathrooms, but the hardware to open pocket doors may be difficult to operate for some people with limited dexterity. It is important to research pocket door hardware because easier to use hardware does exist. If possible, it would be best to test any hardware prior to installation. Door hardware should be operable with one hand that does not require fine finger control, tight grasping, pinching or twisting of the wrist.



Figure 18: Bathtub with grab bars, adjustable-height shower head and a ceiling track lift above
Photo by Ron Wickman



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 or the apron in front of the vanity counter.

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. Locating a light switch outside of a bathroom can benefit persons who are deaf or hard of hearing; the light switch can be used when a knock on the door is not enough.

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. The universal approach to lighting design is to address the needs of people as they age. Three basic issues to consider for aging eyes include the need for increased intensity, uniform, balanced lighting, and controlled glare.

Increased intensity is often straightforward; however, we still need to consider the other goals of uniform, balanced lighting, and minimizing glare. Fixtures and light sources should be positioned such that “islands” of brightness with dark shadows are not created. Look for a mix of ambient, task and accent lighting that works in harmony with users of the space. It is also possible to install a light that gradually adjusts the rate of illumination. Dimmer switches are also an option. Adjustable directed or **task lighting** also allows one to have extra illumination in key areas of the bathroom, such as the vanity or shower area.

Uniform, balanced lighting is important because changing eyes do not adjust to changing light conditions as quickly. This is an important consideration as we move from one space to another. Try to balance lighting throughout the room and compensate for extra-bright areas, while eliminating dark corners. A night light in the bathroom is also an excellent feature for increased safety.

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, especially persons with visual limitations or dementia. These finishes reduce glare and complement illumination levels, creating a more relaxing atmosphere.

Glare can be controlled through the proper selection of fixtures and the location of light sources so the bulbs are not exposed to view. **Ambient lighting** should be provided to maintain an even level of illumination throughout the bathroom; directing lighting at the ceiling and having it reflect into the room can be quite effective. Indirect lighting over wall cabinets and toe-kicks provide illumination without ceiling glare.



Interior finishes

Floor finishes in residential bathrooms should be level, non-slip and durable. A colour contrasting border on the wall and floor assists those persons with visual limitations understand the boundaries of the room. Floor and wall finishes must be non-glare and non-pattern. Colour contrast improves accessibility for persons with visual limitations; counter edges, door handles, grab bars and light switches should contrast in colour to surrounding surfaces. Colour contrast bands should also be used around accessories, such as toilet paper dispensers, light switches and towel racks. Towel racks should be mounted as securely as grab bars to support people should they lose their balance.

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.

Environmental controls

Most people with disabilities take more time in attending to personal care in what typically is a larger bathroom; so creating a comfortable space is a top priority.

Heating a larger bathroom can be an issue. Consider added heat with a separate room heater, electric in-floor heating or an infrared lamp. Several types of heated towel warmers are available on the market, designed for compatibility with the home's heating system.

Special thought should be given to the ways that people who are hard of hearing or deaf will be alerted to timer buzzers or smoke alarms. Efforts should be made to limit sources of noise, especially when the bathroom is used by people who are hard of hearing.

In accessible bathroom design, it is a good idea to consult with a health professional, such as an occupational therapist. It also helps to consult with an architect, an interior designer or another design professional who is familiar with the design of accessible residences. During the design, one should work with the designer and occupational therapist to determine the most positive bathroom layout and best placement of grab bars.



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 B651 standard: Canadian Standards Association CSA B651 Accessibility of the Built Environment standard.

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

Wet room: A universally designed bathroom space completely waterproof housing a large curbless shower area.



Additional resources

Books

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

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

Boyle Hillstrom, S. (2005). *Design Ideas for Bathrooms*. Upper Saddle River, NJ: Creative Homeowner.

CMHC. (1995). *Housing Choices for Canadians with Disabilities*. Ottawa, ON, Canada: CMHC.

Dobkin, I. L., and M. J. Peterson (1999). *Gracious Spaces: Universal Interiors by Design*. New York: McGraw-Hill.

Frechette, L.A. (1996). *Accessible Housing*. New York: McGraw-Hill.

Goldsmith, S. (2000). *Universal Design: A Manual of Practical Guidance for Architects*. Oxford, England: Architectural Press.

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Jacobs, J. C. (2002). *Accessible Bathroom Design: Tearing Down the Barriers*. Suisun City, CA: JIREH Publishing Company.

Jordan, Wendy A. (2008). *Universal Design for the Home: Great Looking, Great Living Design for All Ages, Abilities, and Circumstances*. Beverly, Massachusetts: Quarry Books.

Leibrock, C., and J. E. Terry (1999). *Beautiful Universal Design: A Visual Guide*. New York: John Wiley & Sons.

Mace, R. (1996). *Residential Remodeling and Universal Design: Making Homes more Comfortable and Accessible*. Darby, PA: Diane Publishing Co.

Peterson, M. J. (1996). *Universal Bathroom Planning: Design that Adapts to People*. Hackettstown, NJ: National Kitchen & Bath Association.

Pierce, Deborah (2012). *The Accessible Home: Designing for All Ages and Abilities*. Newtown, CT: The Taunton Press.

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 2016)

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

Enter “bathroom” in the search box.

Institute for Human Centered Design (May 2016)

<http://humancentereddesign.org/>

IDEA Center for Inclusive Design and Environmental Access (June 2016)

<http://idea.ap.buffalo.edu/>

Home for Life (May 2016)

<http://www.homeforlife.ca/>

Livable Housing Australia (May 2016)

<http://livablehousingaustralia.org.au/>



The Principles of Universal Design

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 some 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.

