2008

BARRIER-FREE DESIGN GUIDE

Design for Independence and Dignity for Everyone

Vision, Hearing, Communication, Mobility, Cognition

Alberta

Safety Codes Council

BARRIER-FREE DESIGN GUIDE

BASED ON THE ALBERTA BUILDING CODE 2006

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SAFETY CODES COUNCIL

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PREFACE

The Codes for barrier-free design exist to allow proper and safe access to buildings and facilities. To further assist with the interpretation and application of the barrier-free design requirements, the intent and objective for each article and sentence will be described. Designers and builders must comply with the requirements in the Code prior to construction to avoid errors and costly renovations. The Codes for barrier-free design exist to regulate a proper and safe outcome for accessibility.

Section 3.8 of the Alberta Building Code (ABC) 2006 sets forth the technical requirements for barrier-free design. Section 3.8 and other applicable Codes apply to all new construction, additions to existing buildings, and any buildings undergoing renovation or a change in use. The current requirements in the ABC are not applied retroactively to existing buildings.

The purpose for this Guide is to provide an explanation of the intents and objectives of each Code, as well as to make recommendations that are viewed as best practices where accessibility and safety are concerns to persons with disabilities and to seniors.

This Guide provides

- Alberta Building Code 2006 requirements in red text,
- National Fire Protection Association (NFPA) 72® National Fire Alarm Code® Handbook 2007 requirements, and Canadian Standards Association (CSA) requirements in blue text,
- the intent and objective for each Article or Sentence will be described in **black** text,
- examples to illustrate the elements of good barrier-free design,
- recommendations for barrier-free or universal designed residences, and
- design basics for people with physical, sensory and intellectual disabilities and seniors to further the understanding and need for well-designed accessible environments.

There are building types that are exempt from barrier-free requirements: single-family dwellings and industrial sites (e.g., warehouses, workshops and electrical substations). A complete list of exemptions can be found in Sentence 3.8.1.1.(1) of Division B, and a list of occupancy classifications [i.e., Group F, Division 1] are in Appendix 4 of this Guide.

Designated historical sites may also be exempt from meeting barrier-free requirements. An application for the inclusion of barrier-free access in a building designated under the Historical Resources Act must be submitted to the Minister of Culture and Community Spirit. The evaluation process involves consultation with the stakeholder group, evaluation of access requirements, identification of the unique character of the site, development of options to meet the intent of the Code and arrival at a solution that will work within the historical and economic scope of the project.

The Chief Building Administrator and the Administrator, Barrier-Free Policy will jointly review applications for relaxation of barrier-free requirements. The burden rests with the applicant to prove that the request for relaxation of requirements be granted by demonstrating that a) the specific requirements are unnecessary, or b) extraordinary circumstances prevent conformance.

The Government requires reasonable access to facilities for people with disabilities and seniors so that they have the same opportunities to be active, independent and safe within their chosen communities. This includes barrier-free

- entrances,
- safe paths of travel between facilities and public streets, pathways, sidewalks, parking areas, passenger loading and unloading zones and bus stops,
- safe paths of travel through facilities, and
- access to rooms or suites within facilities, including office areas, washrooms and recreational areas, such as swimming pools, ice rinks, theatres, etc.

In Section V, Residential Requirements, the concepts of universal design in residential environments are noted. The concept of universal design is to allow a built environment to have the ability to adapt and to accommodate the needs of any user of the space.

The Barrier-Free Council would like to hear from you. Please let us know if you find this Guide helpful. Your feedback and suggestions can be sent to

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The Barrier-Free Design Guide has been updated by Alberta Municipal Affairs with the assistance of the Safety Codes Council, the Barrier-Free Council and its stakeholders upon the request of the Barrier-Free Council. This Guide was developed to assist designers, builders and other Alberta Building Code users to meet and possibly exceed current barrier-free design standards and practices.

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GENERAL APPLICATION OF BARRIER-FREE DESIGN

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I GENERAL APPLICATION OF BARRIER-FREE DESIGN

Barrier-free design requirements apply to all buildings that are not exempt, and include the exterior property that is a part of the building site. Access from the exterior to the building and movement throughout the interior of the building shall be by a barrier-free path of travel.

Application of Barrier-Free Requirements

3.8.1.1. Application

1) The requirements of this Section apply to all buildings except

a) houses, including semi-detached houses, duplexes, triplexes, town houses, row houses and boarding houses, which are not used in social programmes such as group homes, halfway houses and shelters,

b) relocatable industrial accommodations,

c) buildings of Group F, Division 1 major occupancy, where only the requirements dealing with hearing sensory provisions would apply, and

d) buildings that are not intended to be occupied on a daily or full-time basis, including automatic telephone exchanges, pumphouses and substations, in which only the requirements dealing with hearing sensory disabilities would apply.

Barrier-free design requirements for people with disabilities and seniors apply to all buildings with the exception of single family homes (apartment suites included), unless used for social programs. Other exemptions include temporary facilities for housing a construction force, and some industrial facilities. Some industrial buildings, for example, pose a greater hazard to their occupants due to dangerous materials or hazardous processes. In some industries, particularly in forestry and metallurgy, the nature of the operation can make barrier-free design impractical. It is intended that Code requirements be applied with discretion to such buildings. If an industrial building also contains space for offices, showrooms or other such uses, it is reasonable to expect that barrier-free access be provided to these areas.

2) Buildings required to be barrier-free must comply with all requirements designed to assist persons with physical, sensory and developmental disabilities.

Designers must keep a variety of disabilities in mind as people with a variety of disabilities may be users of the building. The objective is to remove as many barriers as possible. However, a design or solution that may minimize or eliminate an obstacle for one disability group may become an obstacle for another disability group. For instance, the installation of a gently sloping curb cut/ramp with no lip for persons in wheelchairs removes one of the sidewalk/street reference points for persons who are blind or visually impaired. A steeper slope, a small lip and deep grooves running parallel with the slope of the ramp are often used to mark the street location, making the solution cane-detectable.

Occupancy Requirements

The application of barrier-free design is required for all areas of occupancy.

3.8.2.1. Areas Requiring a Barrier-Free Path of Travel

(See ABC Appendix A.)

1) Except as permitted by Sentences (2), (4) and (5), a barrier-free path of travel from the entrances required by Sentence 3.8.1.2.(1) and (2) shall be provided throughout all normally occupied floor areas. (See Article 3.3.1.7 for additional requirements regarding floor areas above or below the first storey to which a barrier-free path of travel is required.)

A barrier-free path of travel is required to all areas where the public and staff members can be expected to be. This includes sport arenas, pools and pool areas, conference rooms, community centres/halls, educational institutions, care facilities, semi-private residential units, hotels/motels and so on.

There are exceptions, as follows:

2) A barrier-free path of travel for persons using wheelchairs is not required

a) to service rooms,
b) to elevator machine rooms,
c) to janitors' rooms,
d) to service spaces,
e) to crawl spaces,
f) to attic or roof spaces,
g) to floor levels not served by a passenger elevator, a platform-equipped passenger-elevating device, an escalator, or an inclined moving walk,
h) to high-hazard industrial occupancies,
i) within portions of a floor area with fixed seats in an assembly occupancy where those portions are not part of the barrier-free path of travel to spaces designated for use by persons using wheelchairs,
j) within floor levels of a suite of residential occupancy that are not at the same level as the entry level to the suite,
k) within a suite of residential occupancy that has not been required by other provisions of this Code to be barrier-free, or
l) within those parts of a floor area that are not at the same level as the entry level, provided amenities and uses provided on any raised or sunken level are accessible on the entry level by means of a barrier-free path of travel.

3.8.2.1.(2)(l) refers to the provision of amenities and uses on differing floor levels. This clause is often interpreted to mean that if the same service can be accessed from both levels, such as the ability to order the same food from the restaurant while in the bar, then it is deemed accessible. However, the clause uses *and* not *or*, which means that both must be considered when evaluating the site for a barrier-free path of travel. For example, even though food can be served in the bar, the bar and restaurant have different uses. As well, if the different levels both offer dining but one level has a better view of the scenery, then the amenity is now different. The goal is to avoid discrimination, so barrier-free requirements apply.

3) Unless a barrier-free path of travel is not required in an assembly occupancy by Clause (2)(i), the number of spaces designated for use by persons using wheelchairs within rooms or areas with fixed seats shall conform to Table 3.8.2.1. and be dispersed

a) in each floor level of seating,
b) in each price range of seating, and
c) in each viewing section of seating.

(See Article 3.8.3.6.for the design requirements.)

4) Except as provided in Sentence (5), Sentence (1) does not apply to a storey that is not more than 600 m^2 in area and is above or below the first storey of a building that does not exceed two storeys in building height.

5) Sentence (1) does not apply to a storey above or below the first storey in a building of residential occupancy that is neither more than 3 storeys in building height nor more than 600 m^2 in building area and is not served by a passenger-type elevator or other platform-equipped passenger-elevating device.

Table 3.8.2.1.
Designated Wheelchair Spaces
Forming Part of Sentence 3.8.2.1.(3)

Number of Fixed Seats in Seating Area	Number of Spaces Required for Wheelchairs
2 – 100	2
101 – 200	3
201 – 300	4
301 – 400	5
401 – 500	6
501 – 900	7
901 – 1 300	8
1 301 – 1 700	9
each increment of up to 400 seats in excess of 1 700	one additional space

Even though Sentence (4) reads that a barrier-free path of travel does not apply to storeys above or below the first storey of a building not more than two stories high, and Sentence (5) does not require access to storeys in a building of residential occupancy no more than three storeys high or not exceeding 600 m^2 in building area and not served by any building transportation, it is encouraged that owners consider including access to all storeys that serve the public. Barrier-free design requirements need only be provided to the primary entrance and common areas within a barrier-free path of travel. (See Article 3.8.1.3.) However, it is recommended and encouraged that more than one accessible entrance be provided for safe egress in an emergency.

Barrier-free access to a second storey or a basement can be achieved by using design alternatives such as
a) providing a passenger-elevating device, which may be a stair lift or a vertical lift similar to an elevator (refer to Article 3.8.3.5.), or
b) providing a ramp that complies with Article 3.8.3.4. of the Alberta Building Code.

Commercial businesses, recreational facilities and all places where people assemble will greatly benefit from the application of barrier-free requirements. The rapidly increasing number of seniors and people with varying disabilities, even parents with strollers, need the opportunity to access services they have always frequented (e.g., restaurants, salons, financial institutions) or would like to frequent. Barrier-free access is required to all non-exempt suites and rooms of lodgings, as well to the bathrooms within the units. In addition, Article 7.2.1.8. says that hotels/motels must provide grab bars around bathtubs for safety.

Some examples of where barrier-free access is required:

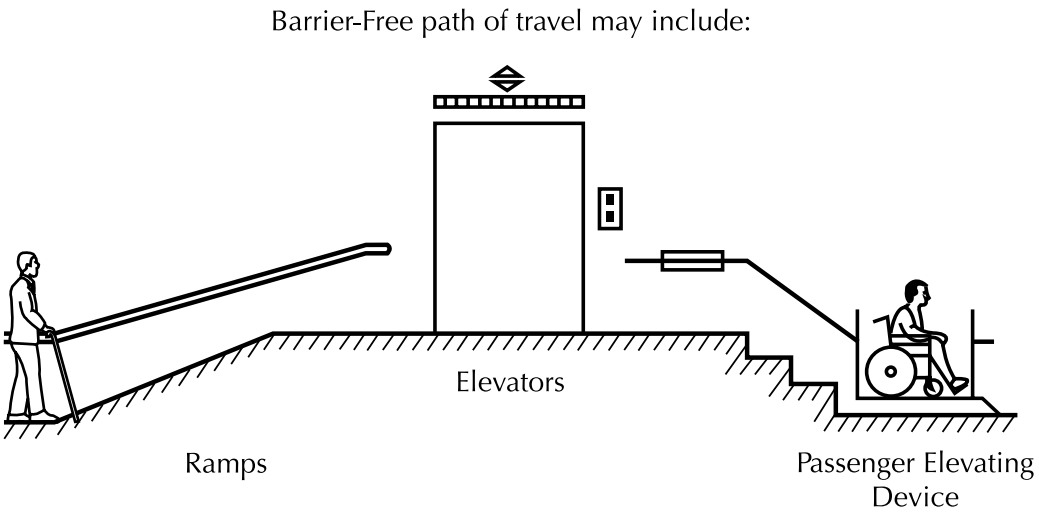
- within rooms or areas that serve the public or designated for use by visitors, including areas in assembly occupancies with fixed seats, display areas and merchandising departments,

- within rooms or areas for student use in assembly occupancies,
- within general work areas, including office areas,
- within general use or general service areas, including shared laundry areas in residential occupancies, recreational areas, cafeterias, lounge rooms, lunchrooms and infirmaries,
- within sleeping rooms in hospitals and nursing homes,
- into passenger elevators or elevating devices conforming to Article 3.8.3.5.,
- into washrooms described in Article 3.8.2.3.,
- to any facility required by this Section to be designed to accommodate persons with physical or sensory disabilities,
- onto every balcony provided in conformance with Sentence 9.5.2.2.(2), and
- to service counters used by the general public (e.g., ticket counters, refreshment stands, drinking fountains, cafeteria counters, check-out counters, bank service counters).

Providing barrier-free access to amenities and facilities applies to, among other areas, food, beverage and entertainment facilities within restaurants; smoking and non-smoking areas permitted in accordance with local regulations; and window areas providing a view of an exterior attraction.

Accessibility, in general, is required in all normally occupied spaces.

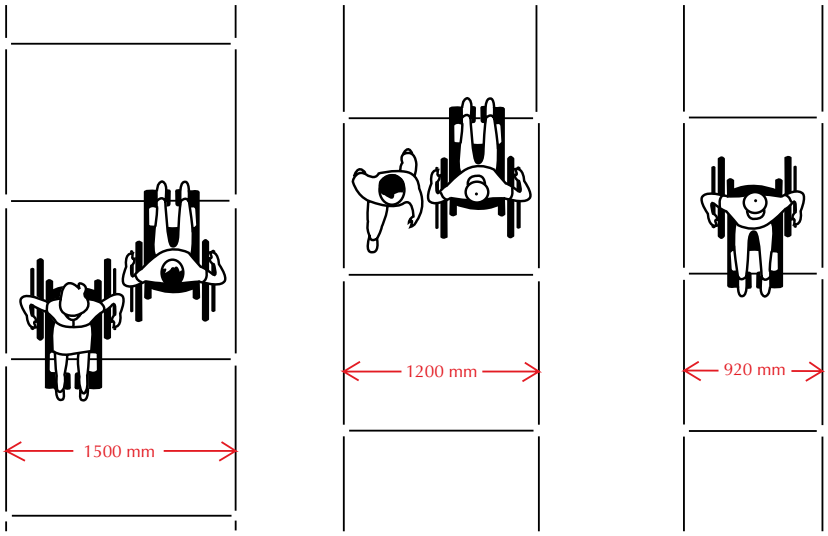
Barrier-Free Path of Travel



3.8.1.3. Barrier-Free Path of Travel

1) Except as required elsewhere in this Part or as permitted by Article 3.8.3.3. pertaining to doorways, the unobstructed width of a barrier-free path of travel shall be not less than 920 mm.

An unobstructed path of travel will minimize or eliminate the need of a person in a manual wheelchair or other manual mobility assistance device to require the assistance of another person to aid in his/her movement through a building. The minimum width that should be considered for the movement of a person using a wheelchair is 920 mm; however, this width will not allow a person or another wheelchair to pass a person in a wheelchair with ease. If possible, it is recommended that twice the required width for a barrier-free path of travel be designed and implemented, especially if the path of travel is long.

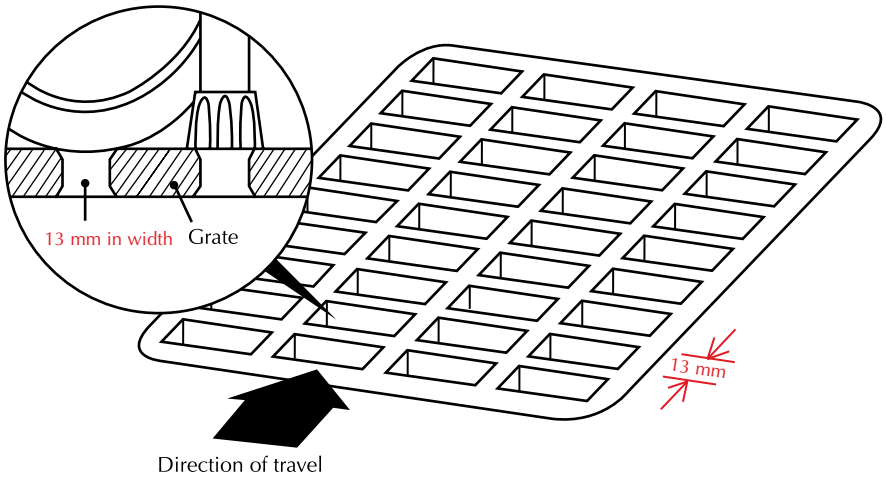


2) Interior and exterior walking surfaces that are within a barrier-free path of travel shall

a) have no opening that will permit the passage of a sphere more than 13 mm in diameter,
b) have any elongated openings oriented approximately perpendicular to the direction of travel,
c) be stable, firm and slip-resistant,
d) be bevelled at a maximum slope of 1 in 2 at changes in level not more than 13 mm, and
e) be provided with sloped floors or ramps at changes in level more than 13 mm.

If the gratings have elongated openings, they should be placed so the long dimension is perpendicular to the direction of travel. Grates must not have any opening larger than 13 mm in diameter (most walkers, canes, walking sticks and crutches have a diameter of 25 mm or greater). This would likely prevent a person from becoming trapped in a walking surface.

Openings larger than 13 mm may catch wheelchair wheels or canes.



3) A barrier-free path of travel is permitted to include ramps, passenger elevators or other platform-equipped passenger-elevating devices to overcome a difference in level.

In a barrier-free path of travel, the provision of ramps at a change in levels of greater than 13 mm will allow for seamless movement from one area to another. Floor surfaces, walks, ramps, stairs and curb ramps in a barrier-free path of travel shall be stable, firm and slip-resistant in order to help prevent injury. If a ramp is too steep for a person in a manual wheelchair or a person requiring the use of a walker to climb, then a platform-elevating device or an elevator is necessary to eliminate the need for individuals to gain assistance to negotiate levels.

3.8.1.4. Storeys Served by Escalators

1) In a building in which an escalator or inclined moving walk provides access to any floor level above or below the entrance floor level, an interior barrier-free path of travel shall also be provided to that floor level. (See Appendix A.)

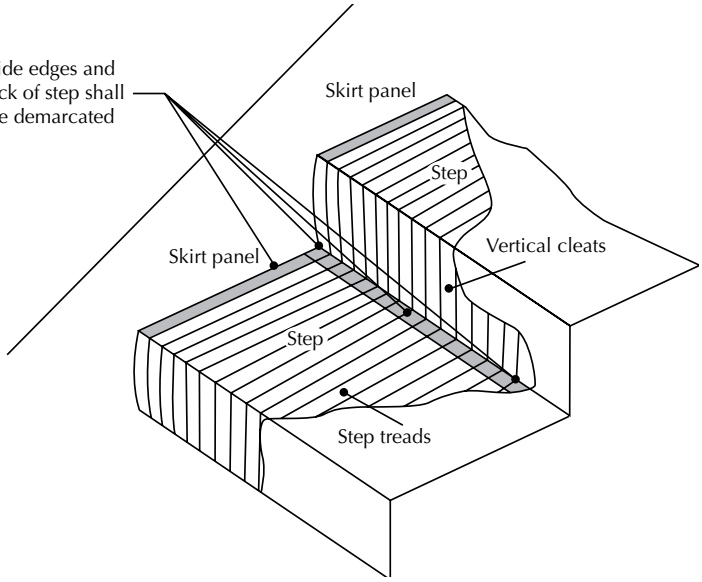
Malls and department stores often rely on escalators to move people from one storey to another. Where escalators are provided for the movement of people from one level to another, elevators or passenger-elevating devices must also be provided. On a sloping site, a person using a wheelchair might be able to gain access to another level by means of an exterior walkway; however, this arrangement does not meet the intent of the Code. A person using a wheelchair should not be required to travel outside the building to gain access to another level. Such buildings require elevators or platform-lifting devices, and their locations must be clearly indicated.

In creating a barrier-free path of travel for persons with visual disabilities, careful consideration shall be given to a visual and tactile/textural warning system on escalator steps and floor surfaces at the top and bottom of the escalator. This will help to orient the user.

ASME A17.1-2007/CSA B44-07 - Safety Code for Elevators and Escalators (Bi-national Standard, with ASME A17.1)

6.1.3.5.6 Step Demarcation.

There shall be demarcation lines on the step tread along the back of the step to delineate the division between steps. These lines shall be marked by a yellow strip a minimum of 38 mm (1.5 in.) in width and a maximum of 50 mm (2 in.). [See 6.1.3.5.1(b).]There shall be demarcation lines on the step tread along the sides of the step. These side lines shall be yellow and at least 13 mm (0.5 in.) wide and shall not exceed 50 mm (2 in.). [See 6.1.3.5.1(b).]



Barrier-Free Relaxations

2.2.1.4. Division C

1) The Chief Building Administrator may grant relaxation of one or more of the requirements of this Section if an owner can demonstrate to the satisfaction of the Director that

a) the specific requirements are unnecessary, or

b) extraordinary circumstances prevent conformance.

An owner must be able to demonstrate that compliance with the barrier-free design requirements is unnecessary or unachievable when s/he applies for special consideration and exemption from compliance from the province. At that time, the Chief Building Administrator and the Administrator, Barrier-Free Policy will jointly review the application, and relaxation will only be granted if one of the previous two conditions is satisfied.

Note: *The permission to waive a barrier-free path of travel for access by persons using wheelchairs to certain specified areas of a building is not intended to waive accessibility requirements for persons with other disabilities. For example, persons with visual or hearing disabilities who do not require the use of a wheelchair can be expected to be able to move throughout a building.*

SITE DEVELOPMENT

II

Exterior design considerations must ensure a seamless and safe path of travel from the parking area to the building entrance. This path of travel should be functional and safe. The design elements that should meet or exceed the Code follow.

Parking

3.8.2.2. Access to Parking Areas

2) If more than eleven parking stalls are required by the planning regulations, made pursuant to the Municipal Government Act, parking stalls for use by persons with physical disabilities shall be provided in conformance with Table 3.8.2.2.

The Municipal Government Act requires that accessible parking be available for persons with disabilities. Table 3.8.2.2. shows the number of stalls currently required to be designated for use by persons with disabilities. However, it is recommended that an additional number of stalls be considered when the purpose or use of the building facilities may cause an increase in the number of seniors or persons with disabilities who require accessible parking, e.g., medical services, restaurants.

Note: *Since 2000, Alberta has issued 28,000+ parking placards. This brings the number issued to over 100,000 by December 2006. Based on known numbers, this increase means that there are more people requiring accessible parking spaces than there are accessible spaces available.*

One criteria for the issuance of a placard is that a person cannot walk more than 50 m.

Table 3.8.2.2.
Designated Parking Spaces
Forming Part of Sentence 3.8.2.2.(2)

Number of Parking Stalls Required	Number of Designated Stalls Required for use by Persons with Disabilities
11 – 25	1
26 – 50	2
51 – 100	3
for each additional increment of 100 or part thereof	one additional stall

Article 3.8.3.2. describes the dimensions and characteristics of the parking areas, that shall be constructed as a hard surface (such as asphalt or concrete) to create an acceptable surface for wheelchairs and other mobility devices to manoeuvre upon.

Access To and From Parking

3.8.2.2. Access to Parking Areas

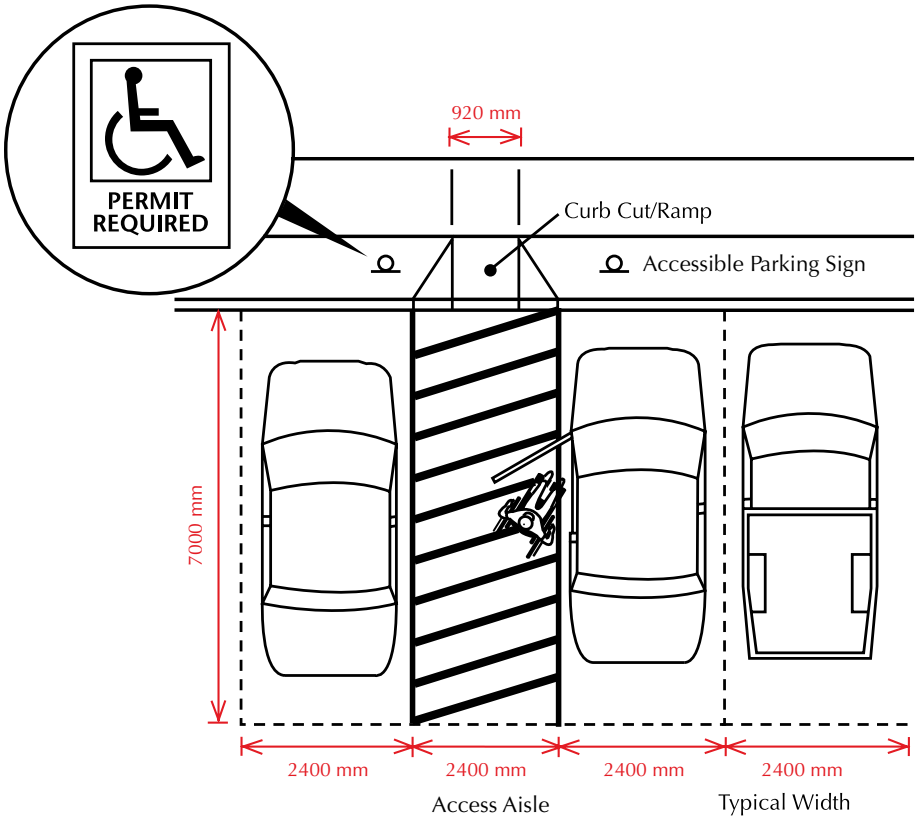
1) A barrier-free path of travel shall be provided from the entrance described in Article 3.8.1.2. to

a) an exterior parking area, if exterior parking is provided,

b) at least one parking level, in a parking structure, and

c) every level of the parking structure served by a passenger elevator.

There must be a well-lit, distinguishable, barrier-free path of travel from the parking areas to the building entrance. The entrance should be the one normally used by building occupants. The use of lighting, contrasting and continuous colour, change in texture and/or handrails all help to identify the path. Floors within parking structures served by elevators must also be accessible and designed with safety in mind. Two-storey parking structures under 600 m^2 need not have elevators or provide access to the basement or second storey. If parking spaces designated for individuals with disabilities cannot be located close to the elevator or an accessible entrance, then it is necessary that a barrier-free and safe path of travel is designated. The accessible parking level shall allow a minimum 3 000 mm height clearance to accommodate larger vehicles (e.g., full-size vans, SUVs, trucks) used by drivers or passengers who have a disability.



4) A parking stall intended for use by persons using a wheelchair shall

a) be at least 3.7 m wide,

b) have a firm, slip-resistant and level surface, and

c) be clearly marked as being for the use of persons with disabilities only.

(See Appendix A.)

The ABC requirement for a single parking stall is 3 700 mm wide for a car or minivan, but where possible it is recommended that a single stall be 4 000 mm wide to better accommodate a wheelchair transfer on a roadway or in a parking lot. When there are two or more accessible parking stalls together, then each stall may be 3 700 mm wide ONLY if an access aisle of an additional 1 500 mm wide is located between two accessible parking stalls to allow for a wheelchair transfer. Additionally, each accessible parking stall, including parallel parking spaces, should be 7 000 mm in length.

A full-size van requires a single accessible parking stall to be a minimum 4 600 mm in width since access to and from the vehicle is often from the side of the vehicle with a mechanical platform lift that requires more space to operate.

Accessible passageways may take the form of walks, ramps, etc. A barrier-free and safe path of travel must be provided to the building entrance from sidewalks, roadways or parking areas.

Signage for Accessible Parking Stalls

CAN/CSA-B651-04 Accessible Design for the Built Environment

5.2.2 Signs for Designated Parking

5.2.2.1 Designated Spaces

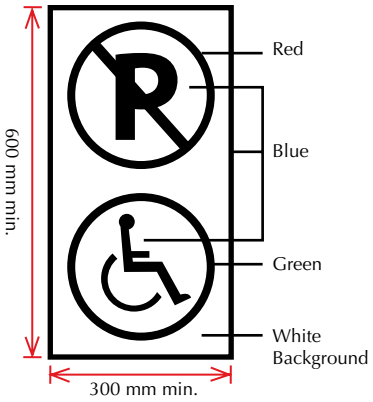
Designated parking spaces shall be identified by
(a) a vertically mounted sign; and
(b) the International Symbol of Access painted on the pavement (see Figure 49).

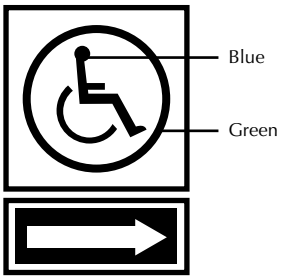
Commentary:

Where the location of the designated parking spaces is not obvious or is distant from the approach viewpoint, directional signs should be placed along the route leading to them (see Figure 57(b)).

The vertical sign should be located so that it is visible to a driver of a vehicle approaching the space, but does not create a protrusion hazard.

Parking stalls for use by persons with disabilities must be identified with the International Symbol of Accessibility and should include the words *Permit Required*.





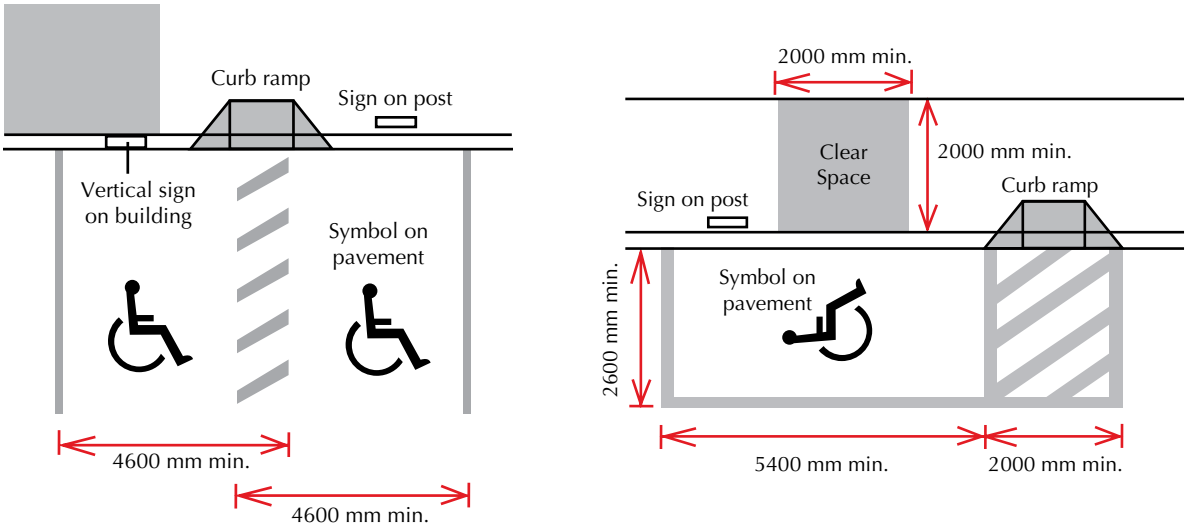
5.2.2.2 Vertical Signs

Vertical Signs shall be
(a) at least 300 mm wide × 450 mm high;
(b) have the centre of the sign 1 500 to 2 500 mm from the ground;
(c) incorporate the International Symbol of Access (see Figure 49); and
(d) comply with Clause 3.4.

Commentary:

The vertical sign should be officially recognized by the local jurisdiction or be the sign from the Transportation Association of Canada's *Manual of uniform traffic control devices for Canada* (Ottawa: Transportation Association of Canada, 1998) (see Figure 57(a)).

A vertical sign should be located to make an accessible parking stall readily visible to a driver approaching the stall. Where the location of designated parking areas for persons with disabilities is not obvious or is distant from the approach viewpoints, directional signs shall be placed along the route leading to the designated parking stalls. (See Figure 58.)



5.2.2.3 Pavement signs

The sign on the pavement shall be
(a) the International Symbol of Access (see Figure 49);
(b) located in the centre of the parking space;
(c) at least 1 000 mm in length; and
(d) in a colour strongly contrasting with the background pavement.

Parking stalls have sometimes been identified with the entire area painted blue, and the accessibility symbol in yellow, to increase visibility. However, this is an unsafe practice because the paint is not slip-resistant under dry or wet conditions. Only the symbol in yellow needs to be located on the pavement of the stall to identify it as an accessible parking stall.

Passenger Loading Zones

3.8.2.2. Access to Parking Areas

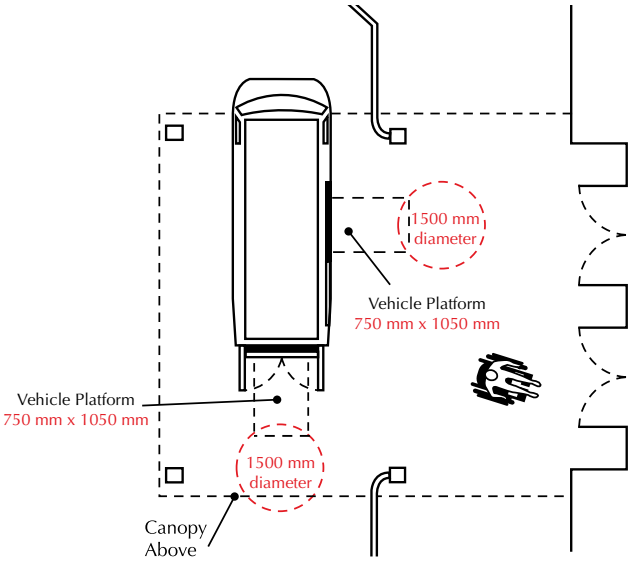
3) If an exterior passenger loading zone is provided, it shall have

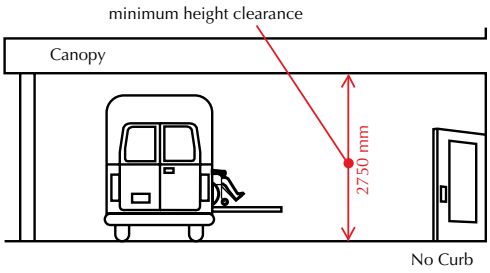
a) an access aisle not less than 1 500 mm wide and 6 000 mm long adjacent and parallel to the vehicle pull-up space,

b) a curb ramp, where there are curbs between the access aisle and the vehicle pull-up space, and

c) a clear height of not less than 2 750 mm at the pull-up space and along the vehicle access and egress routes.

Where a passenger loading zone is provided, accommodations should be made for side or rear (un)loading operations. The majority of vehicles serving people with disabilities are equipped with side-operating platforms that are 760 mm wide by 1 050 mm long and can discharge patrons at sidewalk level. An area of 1 500 mm × 1 500 mm is required beyond the platform to allow a person in a wheelchair to turn around and move in a new direction. A minimum height clearance of 2 750 mm needs to be provided for most van-type transporters. [Municipalities that have specialized transport vehicles may require a minimum of 3.2 m height clearance. In addition, these vehicles need at least 9 m in length to safely pull up parallel to a sidewalk to safely (un)load passengers.]



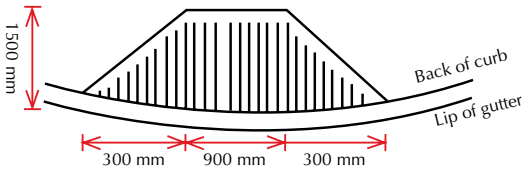


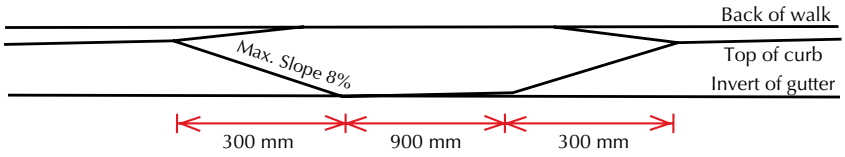
Curbs

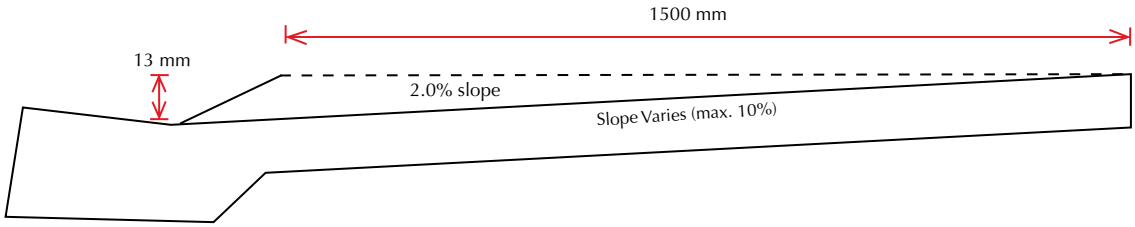
Sidewalk curbs are often used as wheel rests for vehicles, causing the vehicle to intrude onto the barrier-free path of travel on the sidewalk, and creating a hazard for persons with disabilities, seniors or others who may use mobility devices, and parents with strollers. Therefore, wheel stops should be used to prevent vehicles from intruding onto the walk or path.

Curb Ramps

Curbs of any kind, and curb ramps, will be more easily detected by persons whose vision is impaired, persons who are blind or persons with cognitive impairments if colour or texture is used to distinguish the curb from the surrounding surfaces.







Note: *Curb ramps shall NOT be located in front of or to the side of the designated or adjacent stall because the vehicle will block access to the curb ramp leading to a barrier-free path of travel. In a vehicle pull-up space, the curb ramp shall be located between stalls. If it is a parallel parking space, the curb ramp shall be located behind or in front and to the side of the allotted space.*

A median that runs the length of a street or parking lot can prevent a person using a wheelchair or other mobility aid from ease of travel, safe travel or taking a shortcut. The provision of curb ramps for access to a sidewalk or across the median might be necessary. The curb ramp should be at least 760 mm wide and 1 500 mm long.

Exterior Walks and Ramps

3.8.3.2. Exterior Walks

1) Exterior walks that form part of a barrier-free path of travel shall

a) have a cross slope of not more than 1:50,

b) be not less than 1 100 mm wide,

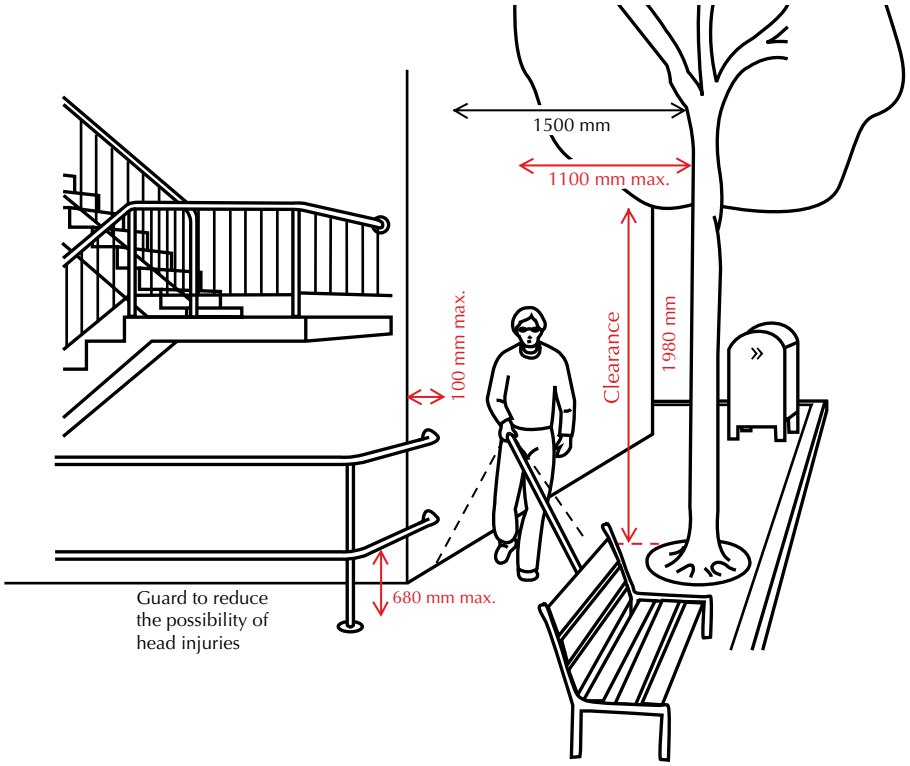
c) have a level area conforming to Clause 3.8.3.4.(1)(c) adjacent to an entrance doorway,

d) have a curb not less than 75 mm high wherever there is a vertical drop more than 75 mm from the walk surface and there is no wall, railing, or other barrier to provide protection,

e) have a surface not less than 1 100 mm wide of a different texture and contrasting in colour to that surrounding it, if the path of travel is level and even with adjacent surfaces,

f) be free from obstructions for the full width of the walk to not less than 1 980 mm, except that handrails are permitted to project not more than 100 mm from either or both sides into the clear area, and

g) be designed as a ramp where the slope of the walk is more than 1 in 20.



The ABC requires that one exterior walk must be barrier-free. However, all designated public access routes should be designed to meet the needs of persons with disabilities and seniors. The surface of a walkway must have a hard and even surface that will permit a safe, continuous and uninterrupted barrier-free path of travel. Uneven surfaces can be hazardous to seniors, people with visual disabilities, people with physical disabilities, seniors, and to any ambulant person. Pre-cast units, such as brick pavers, concrete slabs or tiles, should not be used. However, if they are used, care must be taken to ensure that all joints are as flush as possible, with 6 mm being the preferred upper acceptable limit. In all cases, the selected material must be slip-resistant.

An exterior walk must be at least 1 100 mm wide. This minimum width requirement allows a person using a wheelchair to pass an ambulatory person with ease. The preferred width that would allow a person using a wheelchair to pass another person in a wheelchair is 1 500 mm. Every 30 m, the walkway must be widened to 1 500 mm for a length of 2 000 mm. A level area of at least 1 500 mm by 1 500 mm is to be provided in front of or adjacent to the entrance.

To assist persons with visual disabilities, the surface of the walk should be easily discernible from the surrounding areas. Pathways across parking lots and large plazas can be identified by the use of different textures and contrasting colours. Uneven surfaces are a hazard to people with visual disabilities.

Gratings, manhole covers, electrical vaults and other access covers shall be placed adjacent to walkways unless prevented by site constraints. If these covers must be in walkways, the gratings shall have a maximum clear opening of 13 mm (although, due to the ventilation requirements, the gratings on electrical vaults may be larger). The long dimension of the openings shall lie perpendicular to the path of travel.

Joints in sidewalks or between bricks or stones shall not exceed 13 mm in width and 6 mm in depth, and shall be flush with the adjoining surfaces. A level surface shall be maintained behind cross ramps for smooth pedestrian and wheelchair travel.

Any part of a path that has a slope steeper than 1 in 20 in a barrier-free path of travel must be designed as a ramp. A curb on the ramp helps to prevent the front guide wheels of a wheelchair from accidentally going over the edge where the drop off exceeds 75 mm. A 75 mm curb is required to help guide a person who has a visual impairment or is blind and may use a cane.

The requirement to have an area free from obstructions is primarily to aid persons with visual impairments and persons who are blind or elderly who may require the use of a mobility aid. Examples of obstructions are directional signs, tree branches and guy wires. Overhead objects (e.g., signage, tree branches/limbs, free-standing staircases/escalators) should be at a height or 1 980 mm or greater to avoid becoming a hazard.

Ramps

3.8.3.4. Ramps

1) A ramp located in a barrier-free path of travel shall

a) have a width of not less than 870 mm between handrails,

b) have a slope of not more than 1 in 12, (See Appendix A.)

c) have a level area not less than 1 500 by 1 500 mm at the top and bottom and at intermediate levels of a ramp leading to a door, so that on the latch side the level area extends not less than

i) 600 mm beyond the edge of the door opening where the door opens towards the ramp, or

ii) 300 mm beyond the edge of the door opening where the door opens away from the ramp

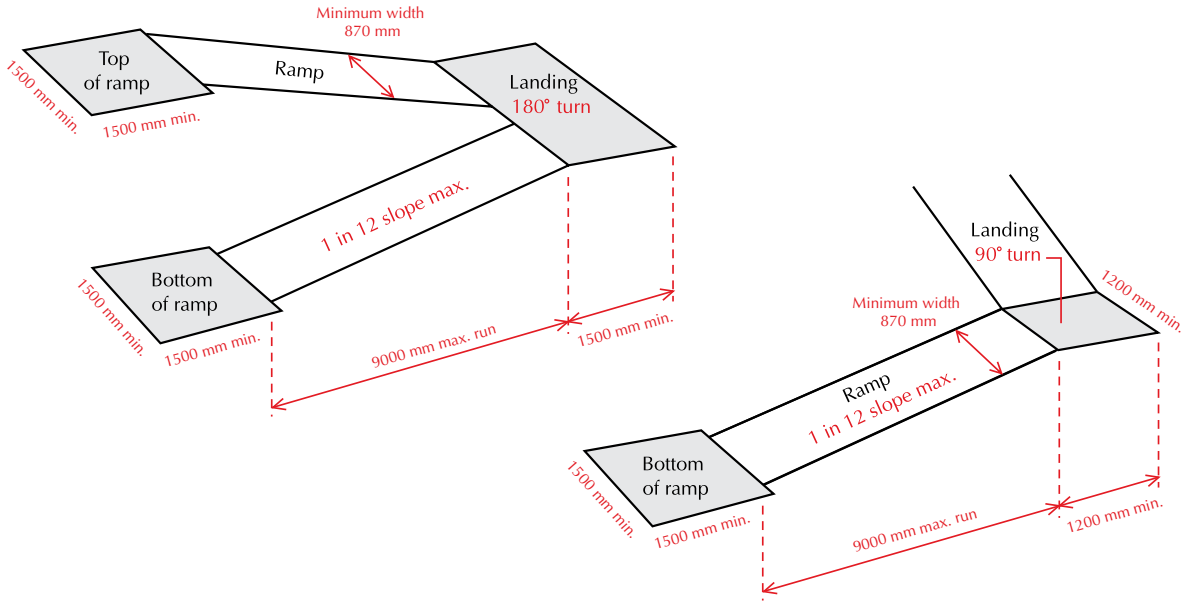
(See Appendix A.)

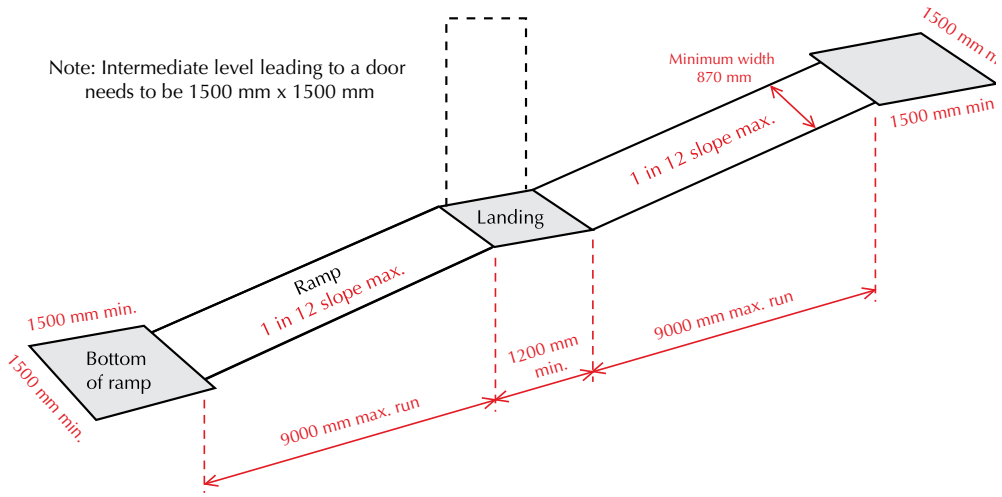
d) have a level area not less than 1 200 mm long and at least the same width as the ramp at intervals of not more than 9 m along its length,

e) except as permitted by Sentence (2), be equipped with handrails and guards conforming to Articles 3.4.6.4. and 3.4.6.5.,

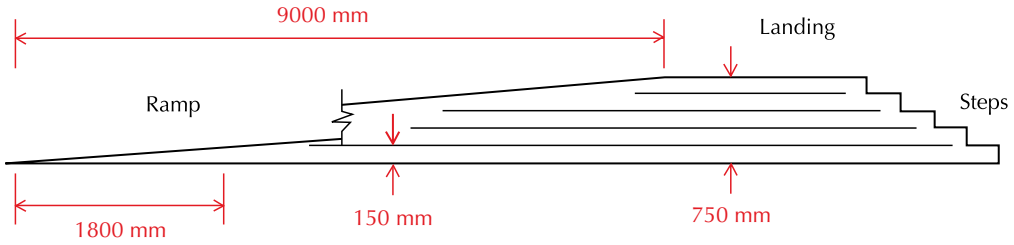
f) have a level area not less than 1 200 by 1 200 mm where a ramp makes a 90˚ turn,

g) have a level area not less than 1 500 by 1 500 mm where a ramp makes a 180˚ turn.

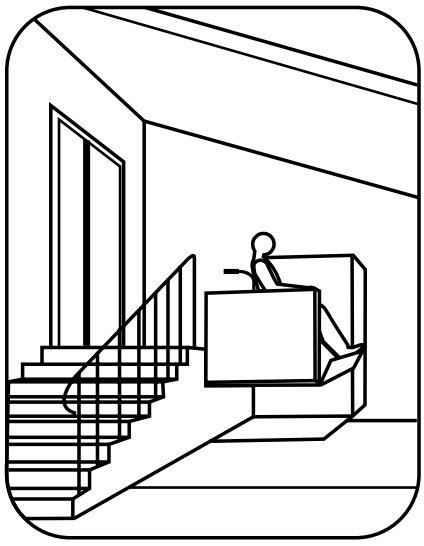




Ramps with a gradient of more than 1 in 10 may be difficult for someone with limited upper body strength and/or mobility, or for an elderly person who uses a mobility aid, to manage. Even though they pose less of a problem for people using motorized wheelchairs, such ramps can be unsafe to descend for every person, especially if covered by snow and ice. Although Article 3.8.3.4. permits slopes on ramps of 1 in 12 for distances of up to 9 m, gradients of 1 in 20 are safer and less strenuous for the user.



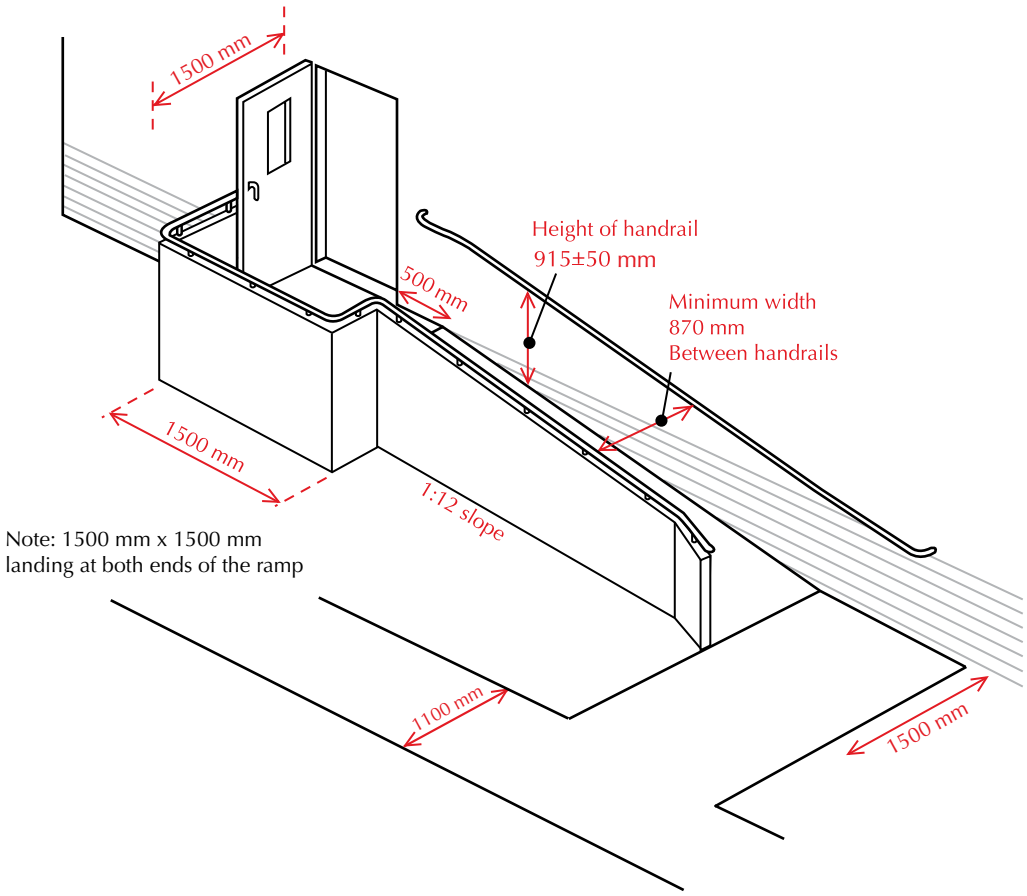
RAMPS	
Length (mm)	**Rise (mm)**
1 000	83
1 800	150
2 000	166
3 000	250
3 600	300
4 000	333
5 000	416
5 400	450
6 000	500
7 000	583
7 200	600
8 000	667
9 000	750



A 15 mm wide strip that is contrasting in colour and texture shall be used at the top of ramps to warn users of a change in elevation. Ramps in a barrier-free path of travel must have a minimum unobstructed width of 870 mm and a maximum slope of 1 in 12.

A level landing of at least 1 500 mm by 1 500 mm is required at the top and bottom of the ramp. Intermediate landings shall be provided at intervals of not more than 9 m. This allows for an opportunity for a person to stop and rest if necessary. These landings should be at least the width of the ramp and 1 200 mm in length.

Where ramps are used and are not part of a barrier-free path of travel, the maximum gradient may exceed 1 in 12 and is dependent on the type of occupancy involved. (See Article 3.4.6.6.) Where alternate routes are provided for persons with disabilities, signs are required to give directions.



3.4.6.6. Ramp Slope

(See also Article 3.8.3.4.)

1) Except as required for aisles in Article 3.3.2.5., the maximum slope of a ramp shall be

a) 1 in 10 in any assembly occupancy, care or detention occupancy or residential occupancy,

b) 1 in 6 in rooms or floor areas classified as mercantile occupancy or industrial occupancy,

c) 1 in 8 in any other floor area, and

d) 1 in 10 for an exterior ramp.

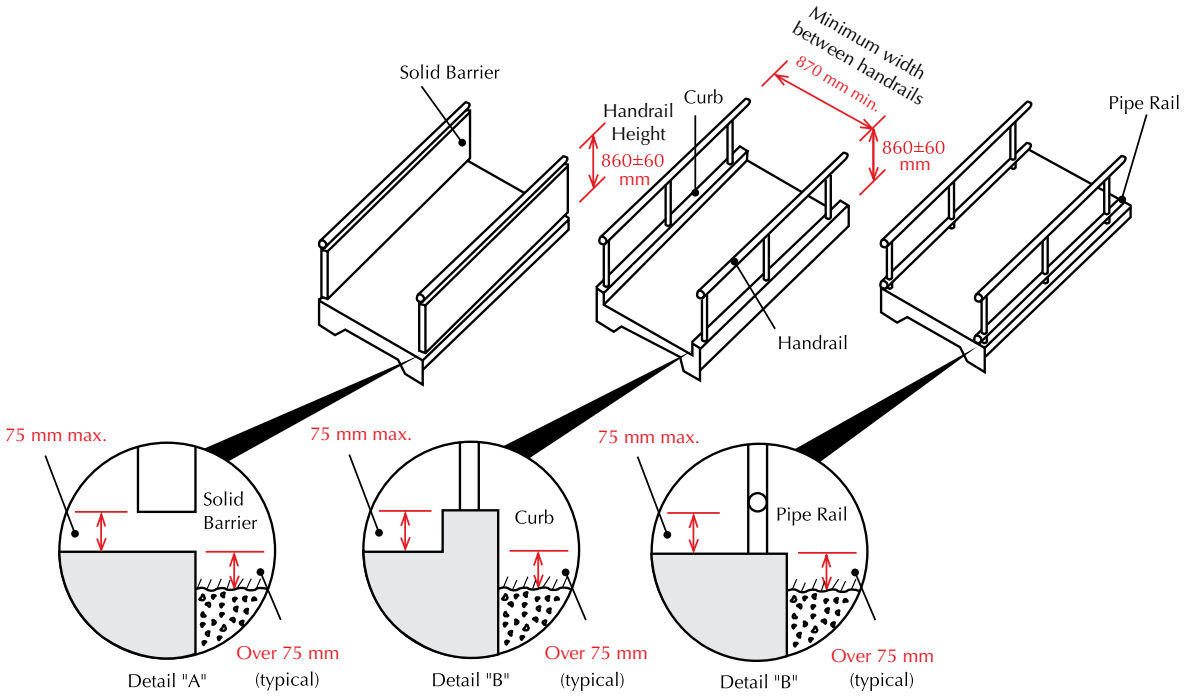
Protection at Sides of Ramps

A variety of provisions can be used to prevent people using wheelchairs or other mobility aids from accidentally going over the edge of a ramp. Curbs are often combined with handrails and guards.

3.8.3.4. Ramps

2) The requirement for handrails in Clause (1)(e) need not apply to a ramp serving as an aisle for fixed seating.

3) Floors or walks in a barrier-free path of travel having a slope steeper than 1 in 20 shall be designed as ramps.

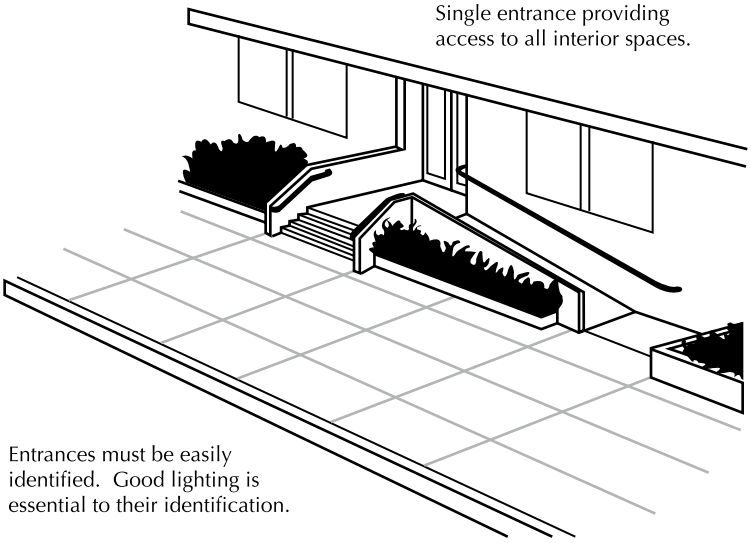


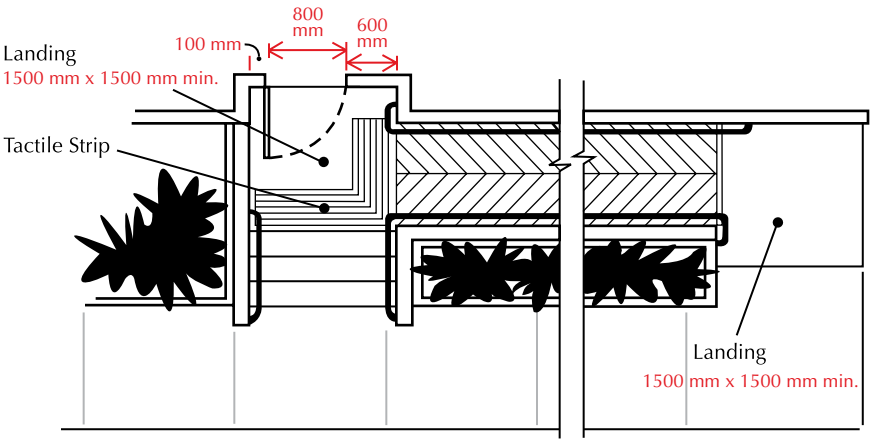
CIRCULATION

III

There must be unobstructed movement within a building, its facilities and other spaces, including its exterior property.

Accessible Entrances





3.8.1.2. Entrances

1) In addition to the barrier-free entrances required by Sentence (2), not less than 50% of the pedestrian entrances to a building in Sentence 3.8.1.1.(1), including walkways leading to the entrances from a public thoroughfare and from on-site parking areas, shall be barrier-free. (See Appendix A.)

In new construction, the identified primary entrance of the building shall be designated as the primary barrier-free entrance. The requirements for an acceptable barrier-free doorway are found in Article 3.8.3.3. Should there be a ramp that leads to the accessible entrance, the requirements are found in Article 3.8.3.4. Access must extend from the edge of the property to the entrance. (See Article 3.8.1.3.)

In an effort to increase building security, fewer entrances are available for use by the public. This can create difficulties for persons who require an accessible entrance because the Code only requires that 50% of the entrances need to be barrier-free. In cases where the only accessible entrance may be secured, it can mean that the public entry is not barrier-free. Even if a staff entrance is accessible, it shall not be the designated barrier-free entrance for public use, as this creates a social barrier.

Clear and sufficient signage is required to indicate the way to and location of all doors designated for use by the public with physical disabilities or mobility issues.

2) A suite of assembly occupancy, business and personal services occupancy or mercantile occupancy that is located in the first storey of a building, or in a storey to which a barrier-free path of travel is provided, and that is completely separated from the remainder of the building so that there is no access to the remainder of the building, shall have at least one barrier-free entrance.

Some buildings are divided into areas that are not interconnected on the inside. Individual barrier-free entrances must then be provided to these facilities from the outside. For example, a strip shopping centre can have a number of shops, offices or restaurants that are only accessible from the outside. The entrances to all these facilities must be barrier-free in order to minimize or eliminate obstacles that would require assistance to accessing necessary services and social or recreational opportunities.

3) A barrier-free entrance required by Sentences (1) or (2) shall be designed in accordance with Article 3.8.3.3.

4) At a barrier-free entrance that includes more than one doorway, only one of the doorways is required to be designed in accordance with the requirements of Article 3.8.3.3.

Even though one doorway is required to be barrier-free, it is recommended that a second doorway be made accessible in case the primary entrance becomes impassable. (Adjacent doors in a bank of doors are considered to be a single entrance.)

5) If a walkway or pedestrian bridge connects two barrier-free storeys in different buildings, the path of travel from one storey to the other storey by means of the walkway or bridge shall be barrier-free.

6) If an entrance is equipped with a security system, both visual and audible signals shall be used to indicate when the door lock is released.

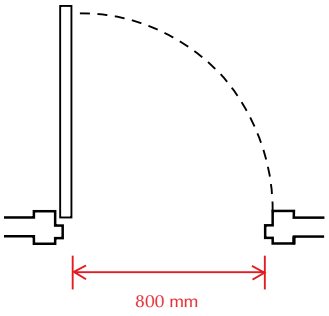
Doorways

It is preferable that every doorway in a barrier-free path of travel shall have a clear opening width of a minimum of 850 mm when the door is fully opened (i.e., 90°) to allow a larger wheelchair or scooter access in and out of the space. The door must also be easy to open (a force of 2.2 kg – 3.6 kg/5 lb – 8 lb) for people with mobility, dexterity and visual disabilities. In addition, the design of a doorway must allow for unrestricted access—entry to AND egress from a space—by ensuring that at least 600 mm of clear space exists on the latch side of the door to allow a person in a wheelchair or those using other mobility aids ease of movement and safety.

3.8.3.3. Doorways and Doors

1) Every doorway that is located in a barrier-free path of travel shall have a clear width not less than 800 mm when the door is in the open position. (See Appendix A.)

2) Every doorway into rooms within a suite of residential occupancy shall have a clear width not less than 800 mm when the door is in the open position. (See Appendix A.)



Minimum clear opening at doorway

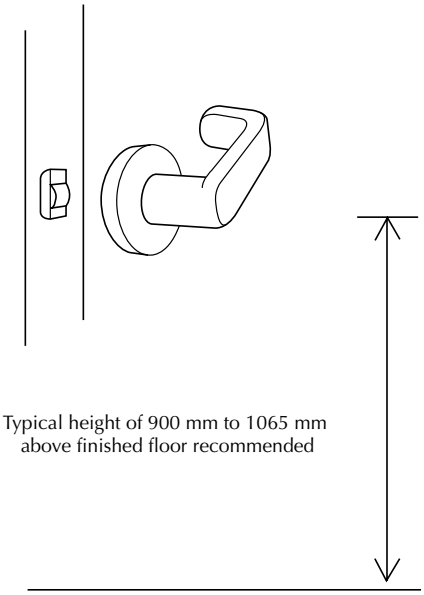
Sentence 3.8.3.3.(2) states that every doorway within a residential unit designated as barrier-free must have a minimum width of 800 mm when the door is in a fully open position. However, it is recommended that every doorway be at least 850 mm wide when the door is in a fully open position to allow the access of wider wheelchairs and scooters in/out of each room. A 900 mm doorway is preferred to allow for the same unrestricted movement of a wheelchair or other mobility device when a door does not fully open.

3) Door operating devices shall be of a design which does not require tight grasping and twisting of the wrist as the only means of operation. (See Appendix A.)

Lever handles are preferred by people with limited strength or limited ability to grasp with their hands and/or to turn their wrists/arms. Knob-type handles are difficult to manipulate. Lever handles with the ends turned toward the door are less of a hazard than are other handle designs with sharp or abrupt edges, because people with visual disabilities often trail wall or door surfaces with their hands.

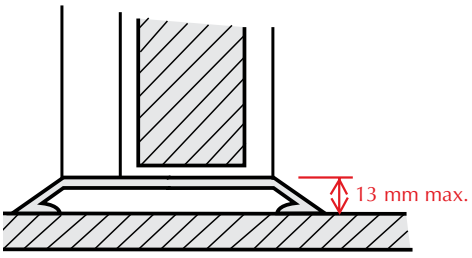
Door hardware should be installed between 900 mm and 1 065 mm above the finished floor.

Typical Lever Handle



Typical height of 900 mm to 1065 mm above finished floor recommended

4) A threshold for a doorway as referred to in Sentences (1) or (2) shall not be more than 13 mm higher than the finished floor surface and shall be bevelled to facilitate the passage of wheelchairs.



Threshold

It is preferred that raised thresholds in doorways be avoided. However, where they are necessary or unavoidable, they must not exceed 13 mm in height above the finished floor surface. If the threshold is higher than 6 mm, it must be bevelled to provide smooth transition from area to area. Also, the threshold must be identified by an alternate colour or brightness to indicate a change in level from area to area. This helps prevent people who use mobility aids (such as walkers), people with visual disabilities, and seniors from tripping.

5) Except as permitted by Sentences (6) and (12), every door that provides a barrier-free path of travel through an entrance referred to in Article 3.8.1.2. shall be equipped with a power door operator that allows persons to activate the opening of the door from either side if the entrance serves

a) a hotel,

b) a building of Group B, Division 2 major occupancy, and

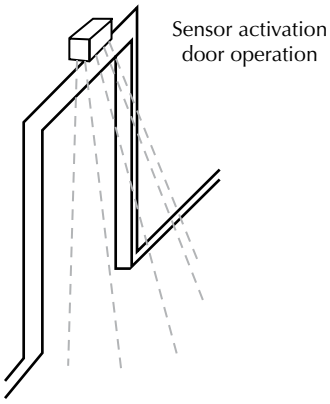
c) a building of Group A, D or E major occupancy more than 500 m^2 in building area. (See Appendix A.)

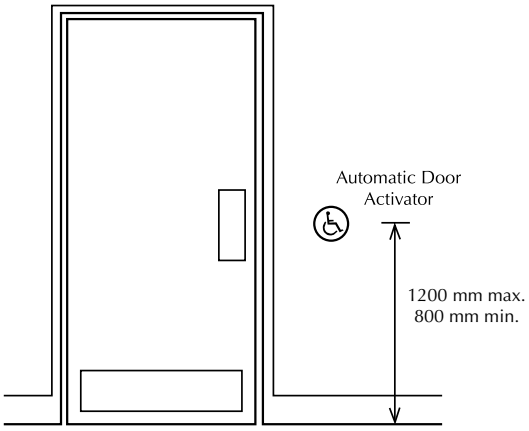
6) The requirements of Sentence (5) do not apply to an individual suite having an area less than 500 m^2 in a building having only suites of assembly occupancy, business and personal services occupancy or mercantile occupancy, if the suite is completely separated from the remainder of the building so that there is no access to the remainder of the building.

7) Except as permitted by Sentence (8) and except for a door with a power door operator, a closer for a door in a barrier-free path of travel shall be designed to permit the door to open when the force applied to the handle, push plate or latch-releasing device is not more than

a) 38 N in the case of an exterior door, or

b) 22 N in the case of an interior door.



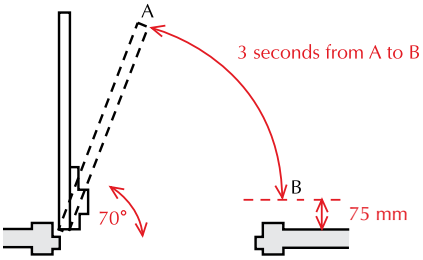


A power-operated door is required to be installed at entrances of buildings where the public is expected to assemble, in a care facility that any number of persons may need assistance, or in any building of major occupancy 500 m^2 or greater.

Door closers must permit the opening of an exterior door with a maximum force of 38 N (3.9 kg/8.5 lb push/pull) and for an interior door a maximum force of 22 N (2.3 kg/5 lb push/pull) or less. The exception is doors to dwelling units.

8) Sentence (7) does not apply to a door at the entrance to a dwelling unit, or where greater forces are required in order to close and latch the door against the prevailing difference in air pressure on opposite sides of the door. (See Appendix A.)

9) Except for a door at the entrance to a dwelling unit, a closer for an interior door in a barrier-free path of travel shall have a closing period of not less than 3 s measured from when the door is in an open position of 70° to the doorway, to when the door reaches a point 75 mm from the closed position, measured from the leading edge of the latch side of the door. (See Appendix A.)



Even though the ABC states that 3 seconds is sufficient, the preference is that closers will have a set delay of 8 – 10 seconds before they begin to close. This is to ensure that persons who use wheelchairs or other mobility devices and seniors may pass through the doorway safely.

10) Unless equipped with a power door operator or within a suite, a door in a barrier-free path of travel shall have a clear space on the latch side extending the height of the doorway and not less than

a) 600 mm beyond the edge of the door opening if the door swings toward the approach side, and

b) 300 mm beyond the edge of the door opening if the door swings away from the approach side.

(See Appendix A.)

Power-operated doors activated by a motion detector, infrared sensor or a pressure plate meet the Code requirement. In cases where security is required, the doors may be activated by a key card or remote. The doors will be identified by visible signage with the international symbol for accessibility. The devices must be installed on an adjacent wall or a floor-mounted post at least 1 200 mm back from the door in order to allow proper access and not impede the mobility or safety of a person using a wheelchair or other mobility device.

In the event of a power failure, power-operated doors must have the ability to be operated manually. Where such doors exist related to vestibules, both the exterior and interior doors of a vestibule should be power operated, as a person relying upon one set of doors to be power operated will also rely upon the second set to be power operated.

Note: *It is preferable to have the second or subsequent set of doors with a delayed opening of 2 – 3 seconds to allow an elderly person, or one requiring mobility aids, to approach and walk through the door without the possibility of having the door close upon him/her.*

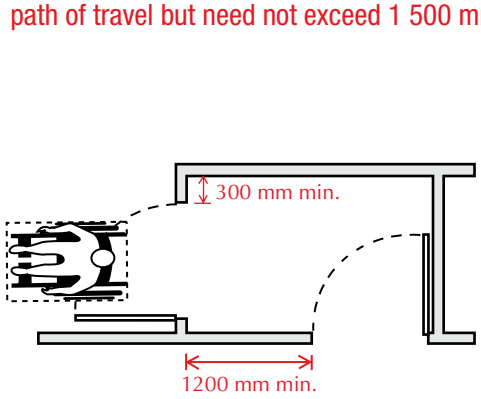
11) A vestibule located in a barrier-free path of travel shall be arranged to allow the movement of wheelchairs between doors and shall provide a distance between 2 doors in series of not less than 1 200 mm plus the width of any door that swings into the space in the path of travel from one door to another.

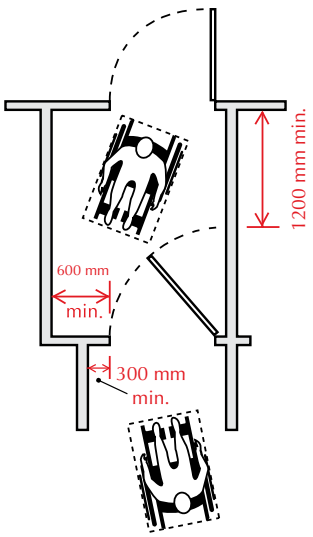
12) Only the active leaf in a multiple leaf door in a barrier-free path of travel need conform to the requirements of this Article.

13) Except as provided in Clause 3.8.3.4.(1)(c), the floor surface on each side of a door in a barrier-free path of travel shall be level within a rectangular area

a) as wide as the door plus the clearance required on the latch side by Sentence 3.8.3.3.(10), and

b) whose dimension perpendicular to the closed door is not less than the width of the barrier-free path of travel but need not exceed 1 500 mm.





3.8.3.3.(11) requires the distance between 2 doors in a series to be no less than 1 200 mm. It is preferable that each set of doors in a series have at least a 1 600 mm clearance to prevent a person in a wheelchair or scooter from becoming trapped within the vestibule. Where automatic doors exist related to vestibules, both the exterior doors and interior doors of a vestibule should be power operated, as a person relying upon one set of doors to be power operated will also rely upon the second set to be power operated.

Entrances shall be identified by the use of contrasting colours for door frames, handles, awnings, etc. Entrances and vestibules should be well lit. Additionally, entrances from the exterior of the building and related vestibules shall be illuminated with evenly distributed and high levels of lighting.

Corridors

3.3.1.9. Corridors

1) The minimum width of every public corridor shall be 1 100 mm.

2) Except as required by Sentence 3.3.3.3.(2) the minimum unobstructed width of a corridor used by the public or a corridor serving classrooms or patients' sleeping rooms shall be 1 100 mm.

3) Except as permitted by Sentence (4), obstructions located within 1 980 mm of the floor shall not project more than 100 mm horizontally into an exit passageway, public corridor, a corridor used by the public or a corridor serving classrooms or patients' sleeping rooms, in a manner that would create a hazard for a person with a visual disability traveling adjacent to the walls.

4) The horizontal projection of an obstruction referred to in Sentence (3) is permitted to be more than 100 mm provided the clearance between the obstruction and the floor is less than 680 mm. (See Appendix A.)

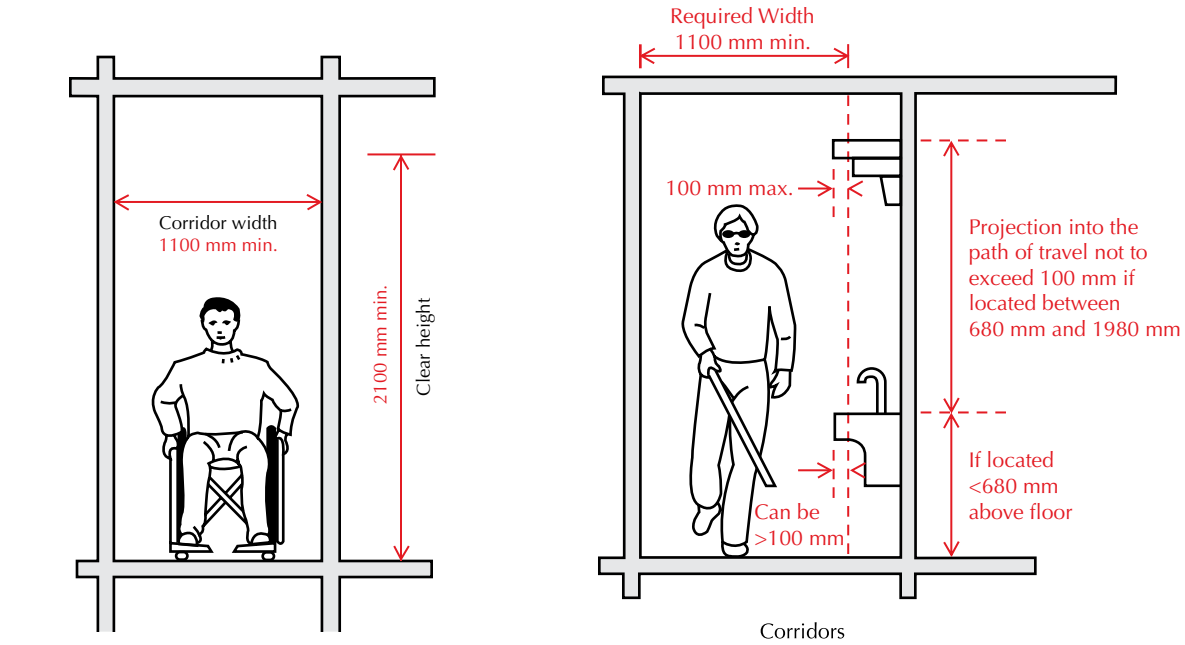
5) If a corridor contains an occupancy, the occupancy shall not reduce the unobstructed width of the corridor to less than its required width.

6) If a public corridor conforming to Clause 3.4.2.5.(1)(d) contains an occupancy,

a) the occupancy shall be located so that for pedestrian travel there is an unobstructed width not less than 3 m at all times adjacent and parallel to all rooms and suites that front onto the public corridor, and

b) the combined area of all occupancies in the public corridor shall be not more than 15% of the area of the public corridor.

7) Except for a dead end corridor that is entirely within a suite or as permitted by Sentences 3.3.3.3.(1) and 3.3.4.4.(6), a dead end corridor is permitted provided it is not more than 3 m long.



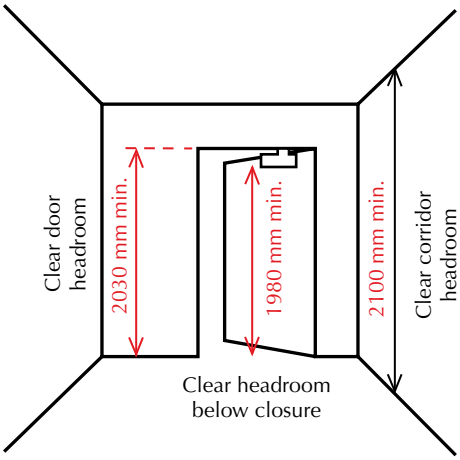
The sweep of a cane used by people with visual disabilities normally detects obstructions that are within 680 mm of the floor. Any obstruction above this height would not be detected with a cane and could create a hazard when the object (e.g., a water fountain, a fire extinguisher, a wall-mounted telephone, a bench, a wall-mounted waste receptacle) projects more than 100 mm into the path of travel.

Overhead Hazard

Headroom Clearance

3.3.1.8. Headroom Clearance

1) Except within the floor area of a storage garage, the minimum headroom clearance in every access to exit shall conform to the requirements in Article 3.4.3.4. for exits. (See also Sentence 3.3.5.4.(5).)



Walks, halls, corridors, passageways, aisles or other circulation spaces shall have a minimum of 2 100 mm of headroom (e.g., clearance from light fixtures, hanging plants, signage). If the overhead clearance is reduced, or open areas under hanging stair landings and escalators exist, then a cane detectable barrier (e.g., planters, fencing, benches, railings) extending within the entire associated floor area shall be used. It is preferred that the open areas beneath hanging stair landings and escalators be enclosed.

3.4.3.4. Headroom Clearance

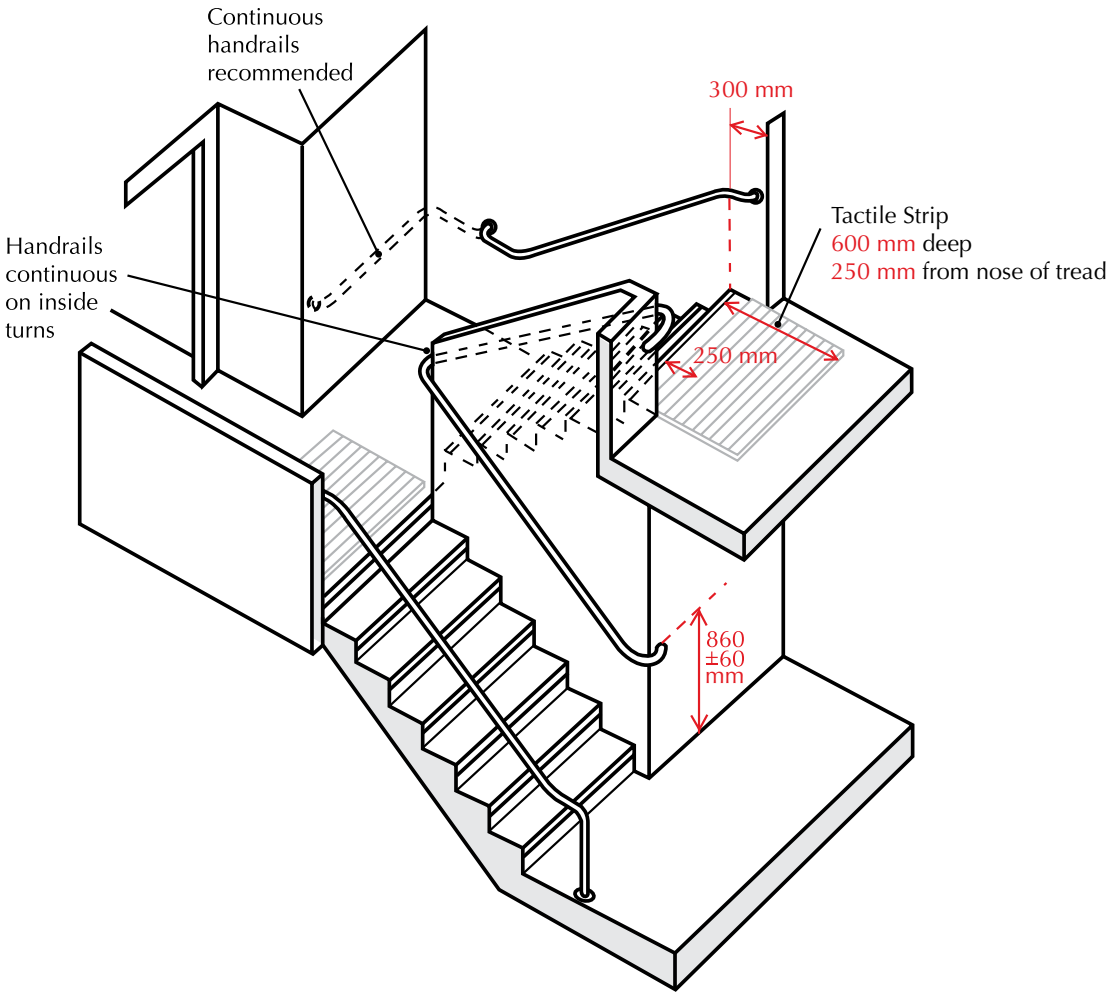
1) Except as permitted by Sentences (3) to (4), every exit shall have a headroom clearance of not less than 2 100 mm.

2) The headroom clearance for a stairway shall be measured vertically above any landing or the nosing of any stair tread.

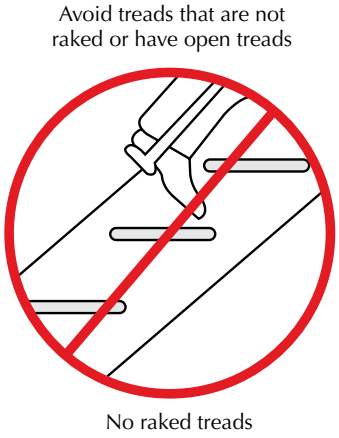
3) Except as permitted by Sentence (4), the headroom clearance for doorways shall not be less than 2 030 mm.

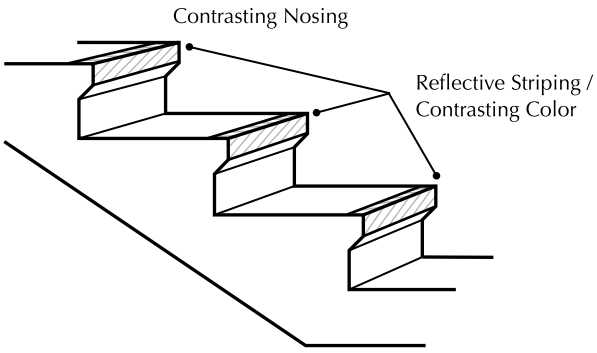
4) No door closer or other device shall be installed that will reduce the headroom clearance of a doorway to less than 1 980 mm.

Stairs, Handrails and Guards



Stairs





3.4.6.1. Slip Resistance of Ramps and Stairs

1) The surfaces of ramps, landings and treads

a) shall have a finish that is slip resistant, and

b) if accessible to the public, shall have either a colour contrast or a distinctive pattern to demarcate the leading edge of the tread and the leading edge of the landing, as well as the beginning and the end of a ramp.

2) Treads and landings of exterior exit stairs more than 10 m high shall be designed to be free of ice and snow accumulations.

Slipping usually occurs when a person travels from a higher slip-resistant surface to a lower slip-resistant surface (e.g., from cement to marble). Travelling from a rainy outdoor environment to indoor flooring can also cause slipping. Tripping hazards can also occur when a person goes from marble to carpet.

Types of Slip-Resistant Flooring:

Marmoleum, slip-resistant linoleum, slip-resistant porcelain tile, perforated/patterned steel, fibreglass grating, rubber asphalt (recycled tires) and outdoor carpet are all slip resistant.

3.4.6.2. Minimum Number of Risers

1) Except as permitted by Sentence 3.3.2.14.(1), every flight of interior stairs shall have not less than 3 risers.

In a path of travel from one area to another, designs that include stairs with fewer than three risers must be avoided. With only one or two risers, the perception of a change in elevation is difficult. Three risers make a more definite statement.

Restaurants that use elevated areas to define spaces shall provide properly designed barrier-free ramps to these areas or provide equally interesting spaces on the entrance level for those using wheelchairs.

3.4.6.7. Treads and Risers

1) Except as permitted for dwelling units and by Sentence 3.4.7.5.(1)15 for fire escapes, steps for stairs shall have a run of not less than 280 mm between successive steps.

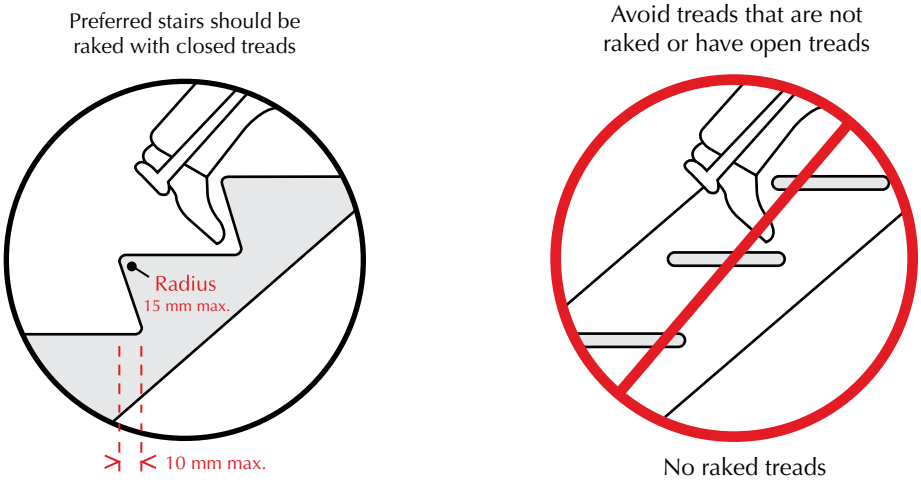
2) Steps for stairs referred to in Sentence (1) shall have a rise between successive treads not less than 125 mm and not more than 180 mm.

3) Treads and risers in every exit stair, except a fire escape stair, shall have uniform run and rise in any one flight, and shall not alter significantly in run and rise in successive flights in any stair system. (See Appendix A.)

4) Except as permitted by Sentence (6), the leading edge of a stair tread shall have either a radius or a bevel between 6 mm and 10 mm in horizontal dimension.

5) The front edge of stair treads in exits and public access to exits shall be at right angles to the direction of exit travel.

6) If resilient material is used to cover the leading edge of a stair tread, the minimum radius or bevel required by Sentence (4) is permitted to be reduced to 3 mm.



Nosings on stairs should be of a contrasting colour or colour tone of the respective risers and treads, and should be distinguishable whether approaching the stairs from the top or bottom.

Handrails

3.4.6.4. Handrails

1) A stairway shall have a handrail on at least one side, but if it is 1 100 mm or more wide, it shall have handrails on both sides.

2) If the required width of a ramp or flight of stairs is more than 2 200 mm, one or more intermediate handrails continuous between landings shall be provided, and located so that there will not be more than 1 650 mm between handrails.

3) Handrails shall be continuously graspable along their entire length and shall have
- a) a circular cross-section with an outside diameter not less than 30 mm and not more than 43 mm, or
- b) non-circular cross-section with a graspable portion that has a perimeter not less than 100 mm and not more than 125 mm and whose largest cross-sectional dimension is not more than 45 mm.

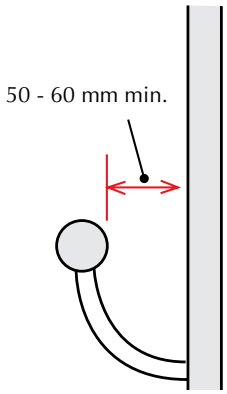
4) Handrails on stairs and ramps shall not be less than 865 mm and not more than 965 mm high, measured vertically from a line drawn through the outside edges of the stair nosing or from the surface of the ramp, except that handrails not meeting these requirements are permitted provided they are installed in addition to the required handrail.

5) Except where interrupted by doorways or newels at changes in direction., at least one handrail shall be continuous throughout the length of the stairway or ramp, including landings. (See Appendix A.)

6) Handrails shall be terminated in a manner which will not obstruct pedestrian travel or create a hazard. (See A-3.4.6.4.(5) in Appendix A.)

7) At least one handrail at the side of a stairway or ramp shall extend horizontally not less than 300 mm beyond the top and bottom of the stairway or ramp. (See A-3.4.6.4.(5) in Appendix A.)

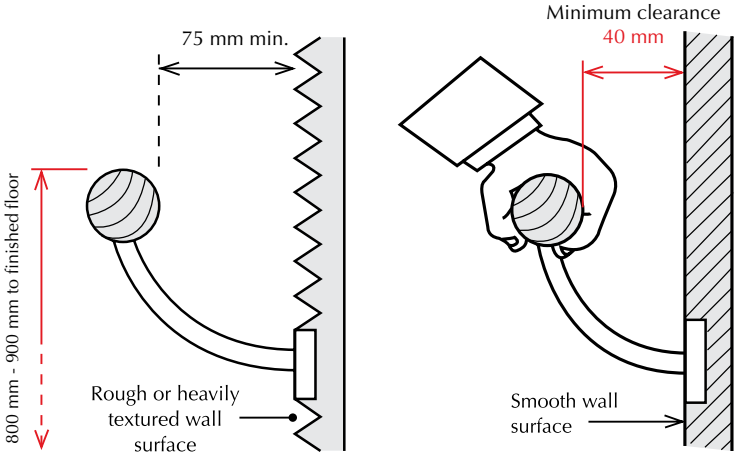
8) The clearance between a handrail and any surface behind it shall not be less than
- a) 50 mm, or
- b) 60 mm if the surface behind the handrail is rough or abrasive.



9) Handrails and their supports shall be designed and constructed to withstand the loading values obtained from the nonconcurrent application of
- a) a concentrated load not less than 0.9 kN applied at any point and in any direction for all handrails, and
- b) a uniform load not less than 0.7 kN/m applied in any direction to handrails not located within dwelling units.

10) A ramp shall have handrails on both sides.

The concept of a graspable handrail is very important because its purpose is to provide assistance, stability, safety or act as a guide to the elderly, people with visual disabilities, people with physical disabilities or if a person is a little unsteady, tired or injured. The handrail should be circular and the diameter of the cross-section shall be 30 mm – 43 mm to ensure that most hands can wrap the railing snugly.



9.8.7.2. Continuity of Handrails

(See Appendix A.)

1) Except as provided in Sentence (2), at least one required handrail shall be continuous throughout the length of the stair or ramp, including landings, except where interrupted by

a) doorways, or

b) newel posts at changes in direction.

2) For stairs serving a single dwelling unit, at least one required handrail shall be continuous throughout the length of the stair or ramp except where interrupted by

a) doorways,

b) at landings, or

c) newel posts at changes in direction.

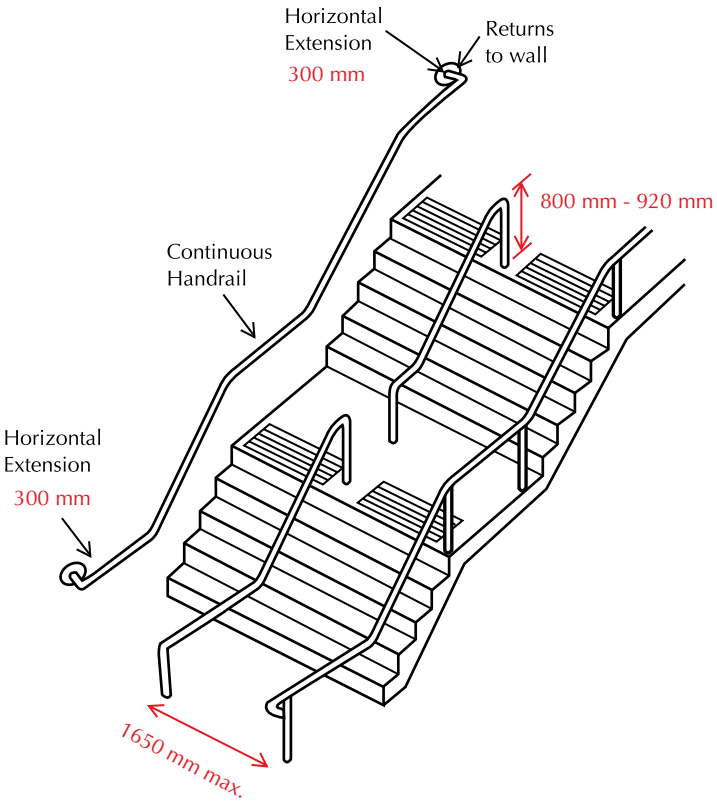
People with visual disabilities rely on handrails to guide them on stairways. A continuous handrail also provides assistance when climbing steps/stairs. It provides stability and a feeling of security for the elderly, particularly when they walk down the stairs.

9.8.7.3. Termination of Handrails

1) Handrails shall be terminated in a manner that will not obstruct pedestrian travel or create a hazard. (See Appendix A.)

2) Except for stairs and ramps serving only one dwelling unit, at least one handrail at the sides of a stair or ramp shall extend horizontally not less than 300 mm beyond the top and bottom of each flight or ramp. (See Appendix A.)

It is strongly recommended that a continuous handrail terminate by returning the ends into the wall. Where there is no wall, the rail should terminate in the ground to provide an effective surface for cane detectability. This greatly reduces the potential hazard for people with visual disabilities.



Elevators and Passenger-Elevating Devices

Elevators and passenger-elevating devices are mechanical devices for moving people safely and efficiently from one level to another. This section deals with the safe movement of those using wheelchairs, scooters or other mobility aids from one elevation to another.

The order of preference for the installation of elevating/movement devices is
1. passenger elevators (minimum 6 600 kg weight capacity),
2. ramps (design preference: 1 in 12),
3. platform lifts (minimum 4 400 kg weight capacity).

Note: *Stair chair lifts are NOT acceptable.*

3.8.3.5. Passenger-Elevating Devices

1) Where passenger elevators are used in a barrier-free path of travel, features described in Appendix E of CSA-B44, "Safety Code for Elevators" shall be included in their design and construction.

Elevators

The following standards were developed by the Canadian Standards Association (CSA) to evaluate elevating devices. Reference the latest version of the Elevating Devices Codes Regulation prior to design and/or installation of the passenger-elevating device. In particular, review the harmonized codes in ASME A17.1-2007/CSA-B44-07, "Safety Code for Elevators and Escalators"

Note: *Elevators must be designed, installed and maintained according to the ASME A17.1/CSA B44.*

2) A platform-equipped passenger-elevating device used in a barrier-free path of travel shall conform to the elevating devices regulations made pursuant to the Safety Codes Act.

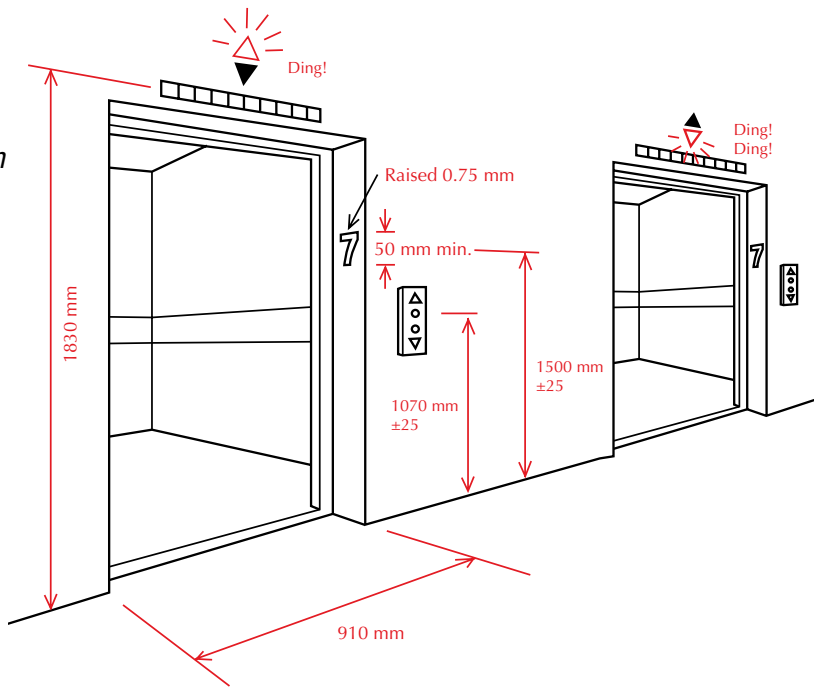
Lifts

CAN/CSA-B355-00 (R2005) - "Lifts for Persons with Physical Disabilities – Supplement #1 and Update #3," (Commercial and Public Buildings).

Note 1: *Lifts must be designed, installed and maintained according to CSA-B355.*

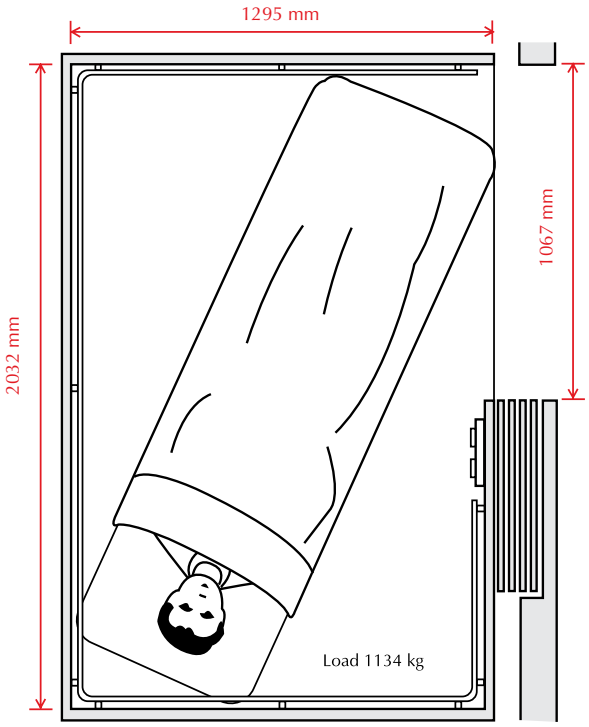
Note 2: *The Exemption Regulation 351/2003 exempts elevating devices that serve privately owned single-family dwellings from applying CAN/CSA-B613-00.*

[See Appendix 3 for Elevator Requirements For Persons with Physical Disabilities. (Applicable to the CSA B44 only.)]



3.5.4.1. Elevator Car Dimensions

1) If one or more elevators are provided in a building, all storeys shall be served by at least one elevator which has inside dimensions that will accommodate and provide adequate access for a patient stretcher 2 010 mm long and 610 mm wide in the prone position. (See Appendix A.)

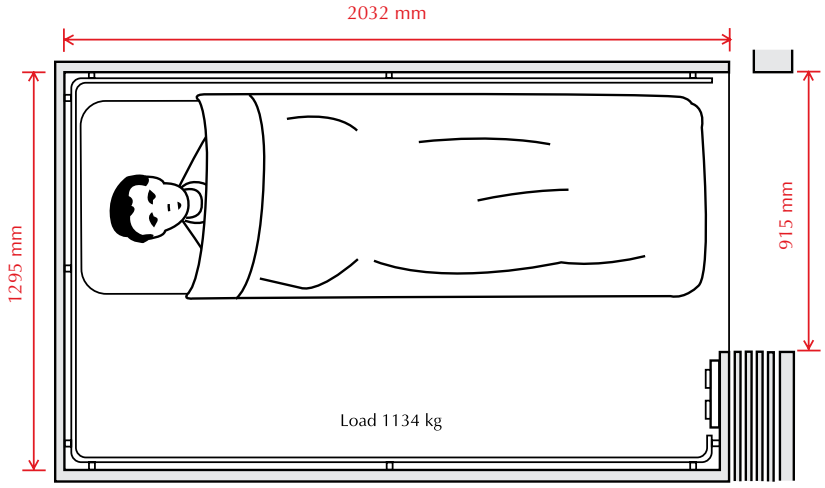


2) An elevator satisfying the requirements of Sentence (1) shall be clearly identified on the main entrance level of the building.

The ABC requires that the elevator be sized to accommodate a stretcher 2 010 mm long and 610 mm wide.

In some circumstances, it is necessary to maintain a patient on a stretcher in the prone position during transit to a hospital or to treatment facilities. Inclining the stretcher to load it into an elevator could be fatal or detrimental to the patient's health. Many ambulance services use a mobile patient stretcher that measures 2 010 mm long and 610 mm wide. As well as space for the stretcher in the elevator, there should be sufficient additional space for at least two attendants who may be providing treatment during transit. Common elevator units that can satisfy this requirement include

- a 1 134 kg elevator car with minimum interior dimensions of 2 032 mm wide and 1 295 mm deep with a right- or left-hand access door. The minimum access door width is 1 067 mm and it must be on the 2 032 mm side of the car.
- a 1 134 kg elevator car with minimum interior dimensions of 2 032 mm deep and 1 295 mm wide with a minimum 915 mm wide access door located on the 1 295 mm side.



NOTES

PUBLIC FACILITIES

IV

It is important and necessary to ensure that all environments where the public is expected to visit will be accessible so that everyone is provided with the opportunity to participate freely and safely in their chosen community.

Public attendance or participation at a sporting event, concert, graduation or play is important to everyone, including people with disabilities and seniors. Barrier-free access to a choice of seating in stadiums, theatres (stage and movie), outdoor bleachers and arenas, plus the washrooms, eating areas, concession stands, banking amenities, ticket wickets, pay telephones and so on, must be available to allow full participation by all patrons.

Stadium and Theatre Seating

3.8.2.1. Areas Requiring a Barrier-Free Path of Travel

3) Unless a barrier-free path of travel is not required in an assembly occupancy by Clause (2)(i), the number of spaces designated for use by persons using wheelchairs within rooms or areas with fixed seats shall conform to Table 3.8.2.1. and be dispersed

a) in each floor level of seating,

b) in each price range of seating, and

c) in each viewing section of seating.

(See Article 3.8.3.6. for the design requirements.)

The number of seating spaces designated for people using wheelchairs in Article 3.8.2.1. shall be in accordance with Table 3.8.2.1.

Table 3.8.2.1.
Designated Wheelchair Spaces
Forming Part of Sentence 3.8.2.1.(3)

Number of Fixed Seats in Seating Area	Number of Spaces Required for Wheelchairs
2 – 100	2
101 – 200	3
201 – 300	4
301 – 400	5
401 – 500	6
501 – 900	7
901 – 1 300	8
1 301 – 1 700	9
each increment of up to 400 seats in excess of 1 700	one additional space

Spaces that are designated for wheelchair users must be scattered throughout the seating areas to allow a choice of locations on different levels and offer different price ranges.

3.8.3.6. Spaces in Seating Area

1) Spaces designated for use by persons using wheelchairs referred to in Sentence 3.8.2.1.(3) shall be

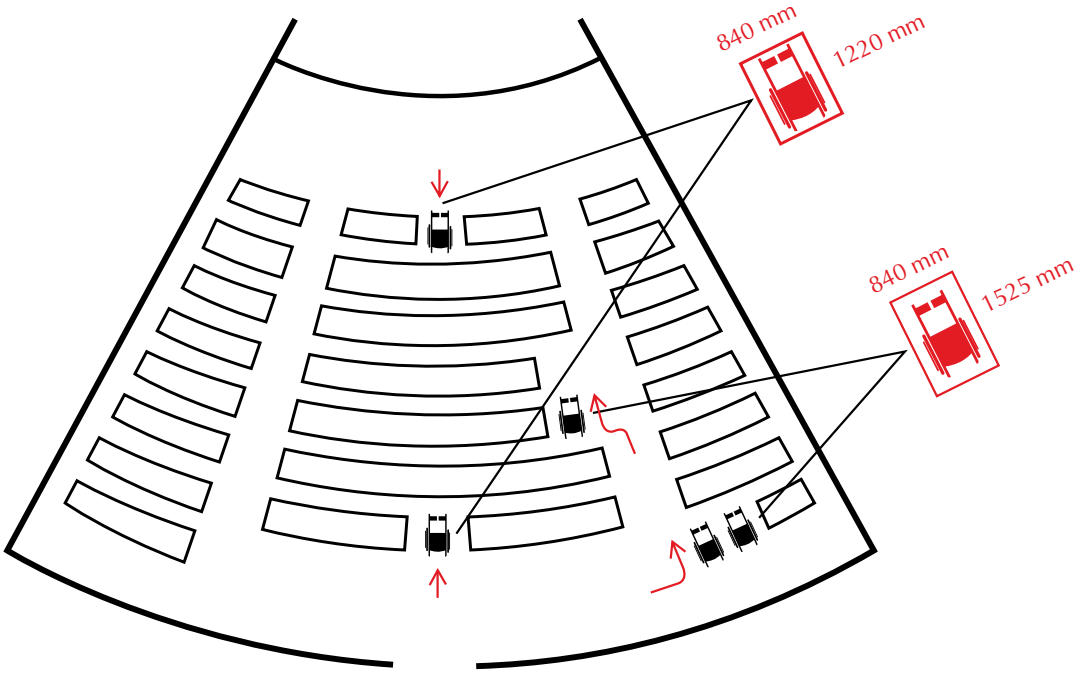
a) clear and level, or level with easily removable seating,

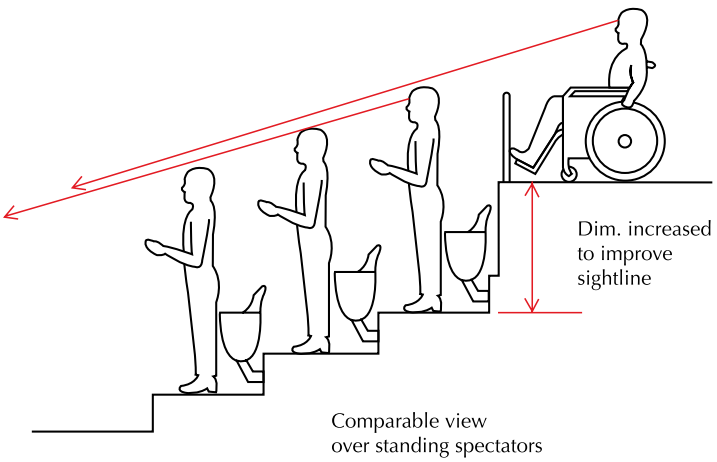
b) not less than 900 mm wide and 1 525 mm long to allow a person using a wheelchair to enter from a side approach and 1 220 mm long where the person using a wheelchair enters from the front or rear of the space,

c) arranged so that at least 2 designated spaces are side by side,

d) located adjoining a barrier-free path of travel without infringing on egress from any row of seating or any aisle requirements, and

e) situated, as part of the designated seating plan, to provide a choice of viewing locations and a clear view of the event taking place.





Seating for persons with disabilities is to be located throughout the facility

Note: *A reminder when designing/ incorporating both manual and power wheelchair seating and space for other mobility devices (such as scooters) in viewing areas, that they will take up more space than normal seating. They will need approximately 1½ regular-sized seats in width and 2 in length.*

Amenities

Spending time with family and friends is always more enjoyable when the facilities and amenities have barrier-free access, allowing for independence and safety.

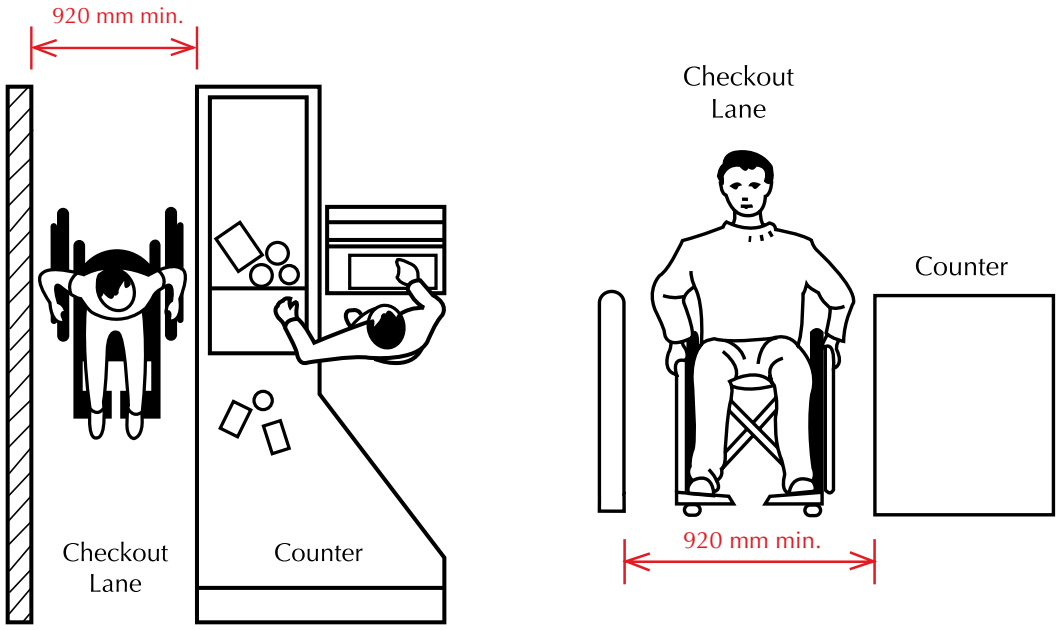
Counters

3.8.3.14. Counters

1) Every counter more than 2 m long, at which the public is served, shall have at least one barrier-free section not less than 760 mm long centred over a knee space conforming to Sentence (3). (See Appendix A.) (See also A-3.8.2.1. in Appendix A.)

Sentence (1) requires that every counter more than 2 m in length that serves the public shall have a barrier-free section. The only accepted exceptions to Sentence (1) are drinking establishment bar counters ONLY if a reasonable alternative for seating is provided for patrons who use wheelchairs or scooters. For example, a reasonable alternative may be dining or bistro tables or wall-mounted units that comply with Sentence (3).

2) A barrier-free counter surface shall not be more than 865 mm above the floor.



3) Except as permitted in Sentence (4), the knee space beneath a barrier-free counter intended to be used as a work surface shall not be less than

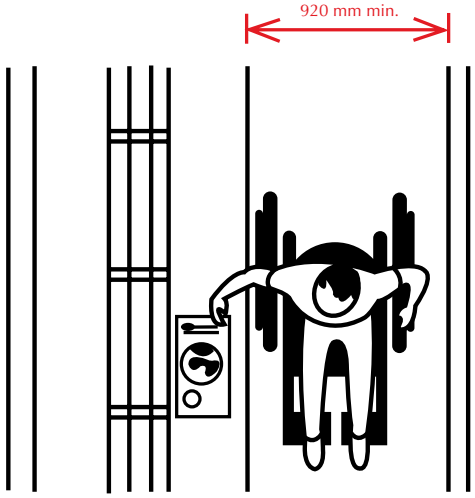
a) 760 mm wide,

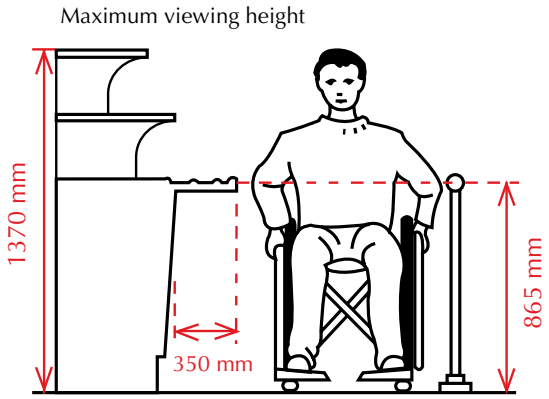
b) 685 mm high, and

c) 485 mm deep.

Banks must also conform to Sentences (2) and (3) when designing service counters for clients who may use a wheelchair or other mobility device, and for seniors who prefer to sit while conducting their banking. The same standards should be applied when installing accessible ATMs for users of wheelchairs and other mobility devices.

4) A counter that is used in a cafeteria, or one that performs a similar function whereat movement takes place parallel to the counter, need not provide a knee space underneath it.





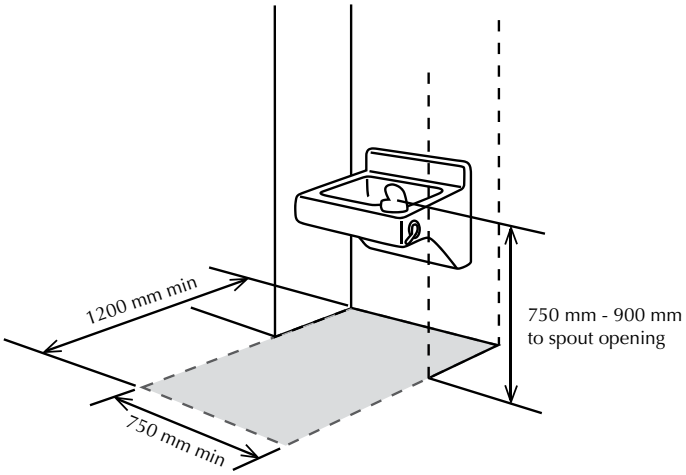
Drinking Fountains

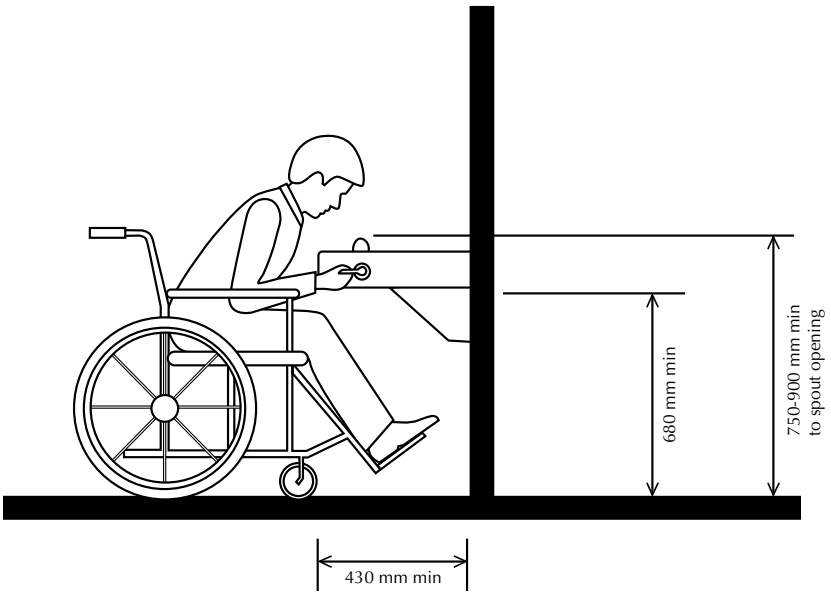
3.8.3.16. Drinking Fountains

1) If drinking fountains are provided, at least one shall be barrier-free and shall

a) have a spout located near the front of the unit not more than 915 mm above the floor, and

b) be equipped with controls that are easily operable from a wheelchair using one hand with a force of not more than 22 N, or be automatically operable.





Commercially-available drinking fountains having two spouts at varying heights are ideally suited to both people using wheelchairs and people who find it difficult and awkward to bend down. One spout must not be more than 915 mm high. The recommended height for the higher spout is 1 050 mm, measured from the floor to the mouth of the spout.

The location and design of drinking fountains may be hazardous for building users with visual disabilities. While there must be adequate space under or adjacent to the drinking fountain for people using wheelchairs or scooters, there must also be cane detectability for a person using a white cane. This means that, when the fountain is located in a barrier-free path of travel, a partition or cane-detectable barrier on each side of the wall-mounted drinking fountain must be provided. Enough space must still be provided between the partitions for persons who use wheelchairs or scooters.

Other Obstacles

Telephone kiosks, fire extinguishers and vending machines should be recessed on a barrier-free path of travel to prevent them from being obstacles to persons with visual disabilities. Their design and location may make them impossible to detect with the sweep of a white cane.

Planters and ashtrays should be recessed or located alongside the designated barrier-free path of travel.

The bottom edges of signs and the bases of wall lighting fixtures must be located no lower than 2 m, measured from the finished floor surface, to prevent them from being hazards to persons with visual disabilities.

Building Controls

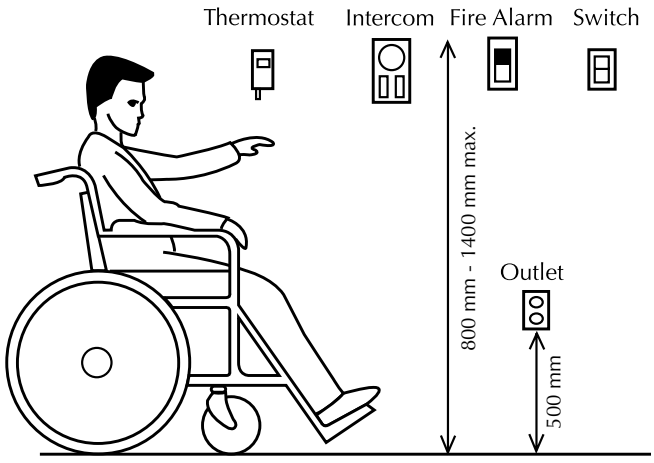
3.8.1.5. Controls

1) Except as required by Sentence 3.5.2.1.(3) and Article 3.8.3.5. for elevators and platform-equipped passenger-elevating devices, controls for the operation of building services or safety devices, including electrical switches, thermostats and intercom switches, that are intended to be operated by the occupant and are located in or adjacent to a barrier-free path of travel shall be accessible to a person in a wheelchair, operable with one hand, and mounted between 400 mm and 1 200 mm above the floor.

Pull stations (emergency/fire), thermostats, (in-home) security/alarm panels and other controls for the operation of building services shall be accessible to a person using a wheelchair. These controls are best located no higher than 1 400 mm and no lower than 800 mm above the floor. Raised lettering and/or Braille should be added to help persons with visual disabilities to access building service controls. Building controls should be easy to find by using colour contrast to the background for ease of identification, in particular, by persons with visual disabilities.

Light switches should be located between 1 100 mm and 1 400 mm above the finished floor to improve access for people in wheelchairs who may have a limited range of motion.

Electrical outlets should be located between 650 mm and 800 mm above the finished floor to create less bending for all users (including people in wheelchairs).



Public Washrooms

3.8.2.3. Washrooms Required to be Barrier-Free
(See Appendix A.)

1) Except as permitted by Sentence (2), all washrooms in a barrier-free path of travel shall be barrier-free in accordance with the appropriate requirements in Articles 3.8.3.8. to 3.8.3.12.

2) A washroom need not conform to the requirements of Sentence (1) provided it is located
- a) within a suite of residential occupancy that has not been designated by Sentence 3.8.1.1.(3) to be accessible, or
- b) in an individual suite having an area of less than 500 m^2 provided there are barrier- free washrooms on the same floor area within 45 m.

3) In a building in which water closets are required in accordance with Section 7.2., at least one barrier-free water closet shall be provided in the entrance storey, unless
- a) a barrier-free path of travel is provided to barrier-free water closets elsewhere in the building, or
- b) the water closets required by Section 7.2. are for dwelling units only.

4) If alterations are made to an existing building, universal toilet rooms conforming to Article 3.8.3.12. are permitted to be provided, in lieu of facilities for persons with physical disabilities in washrooms used by the general public.

5) In addition to the requirements of Sentence (1), at least one universal toilet room conforming to Article 3.8.3.12. shall be provided in a regional transportation terminal.

6) If more than one water closet is provided in a washroom, a barrier-free stall shall be provided for every 10 stalls or part thereof.

7) For temporary uses, such as outdoor fairs and festivals, a barrier-free stall shall be provided for every 10 stalls or part thereof.

All washrooms for use by the public must be made barrier-free using the design standards described previously; however, Clause (2)(b) shall be the exception. With respect to strip malls or other suites and buildings with an exterior sidewalk or other barrier-free path of travel, it is unreasonable to expect the consumer to leave the premise in search of a barrier-free washroom. Therefore, it is preferred that all suites, including those 500 m^2 or less, where the public is expected to have access to washrooms that are barrier-free, have a universal toilet room as an acceptable solution.

Units in a single-family dwelling that are used for social programs also require barrier-free washrooms, with no exceptions.

Existing buildings that are being renovated must comply with the requirements of current codes. In circumstances where this may not be possible, an alternate solution is acceptable. A separate washroom described as a universal toilet room (see the following section) is the preferred alternative when space is limited or it becomes cost prohibitive to make each set of washrooms accessible.

Note 1: *If this alternative is still not possible, the owner or designer should seek assistance from local disability organizations or advisory committees that deal with disability issues and concerns.*

Note 2: *The following sentence is not in the ABC, however, owners and designers should consider it for all new building construction (and renovations, wherever possible). A washroom designed with a maze entrance is a truer barrier-free washroom. Where a maze entrance exists for a public washroom, the floor finish shall be slip-resistant and be high in colour contrast to the wall finish. This is to provide safe and appropriate way-finding for people who have visual disabilities, but some residual vision.*

Note 3: *If an alternative or exemption is desired, an application for barrier-free relaxation is required to be submitted to Alberta Municipal Affairs. Only the Chief Building Administrator has the authority to grant a relaxation.*

3.8.3.11. Lavatories

1) A barrier-free washroom shall be provided with a lavatory that

a) is located so that the distance between the centreline of the lavatory and the side wall is not less than 460 mm,

b) has a rim height not more than 865 mm above the floor,

c) has a clearance beneath the lavatory not less than

i) 760 mm wide,

ii) 735 mm high at the front edge,

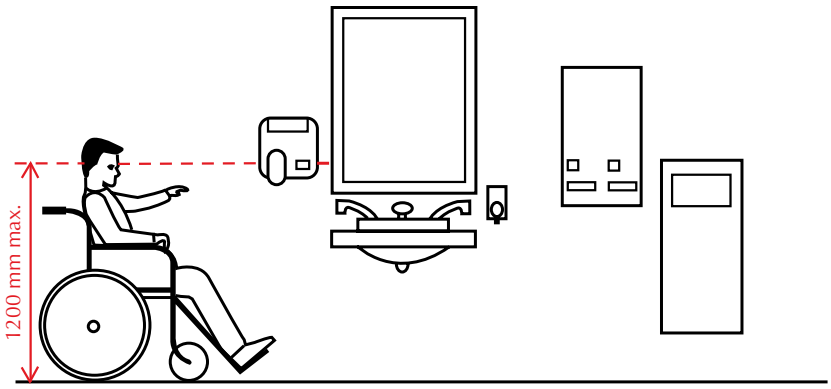
iii) 685 mm high at a point 205 mm back from the front edge, and

iv) 230 mm high over the distance from a point 280 mm to a point 430 mm back from the front edge (See Appendix A),

d) has insulated pipes where they would otherwise present a burn hazard (See Appendix A),

e) has a soap dispensers located close to the lavatory, not more than 1 200 mm above the floor and accessible to persons in wheelchairs, and

f) has a towel dispenser or other hand-drying equipment located close to the lavatory, not more than 1 200 mm above the floor and accessible to persons in wheelchairs.



Protection from Burns

Hot water and drain pipes under lavatories must be insulated to prevent the pipes from becoming a burn hazard to persons who use wheelchairs. Not all individuals have the ability to sense heat or prevent prolonged contact with the pipes.

Article 7.2.3.1. of the ABC requires water to be heated in the range of 45˚C – 60˚C for private dwellings. It is strongly recommended that care facilities heat water to a temperature above 70˚C and then lower it, or use a temperature regulator, to prevent accidental scalding.

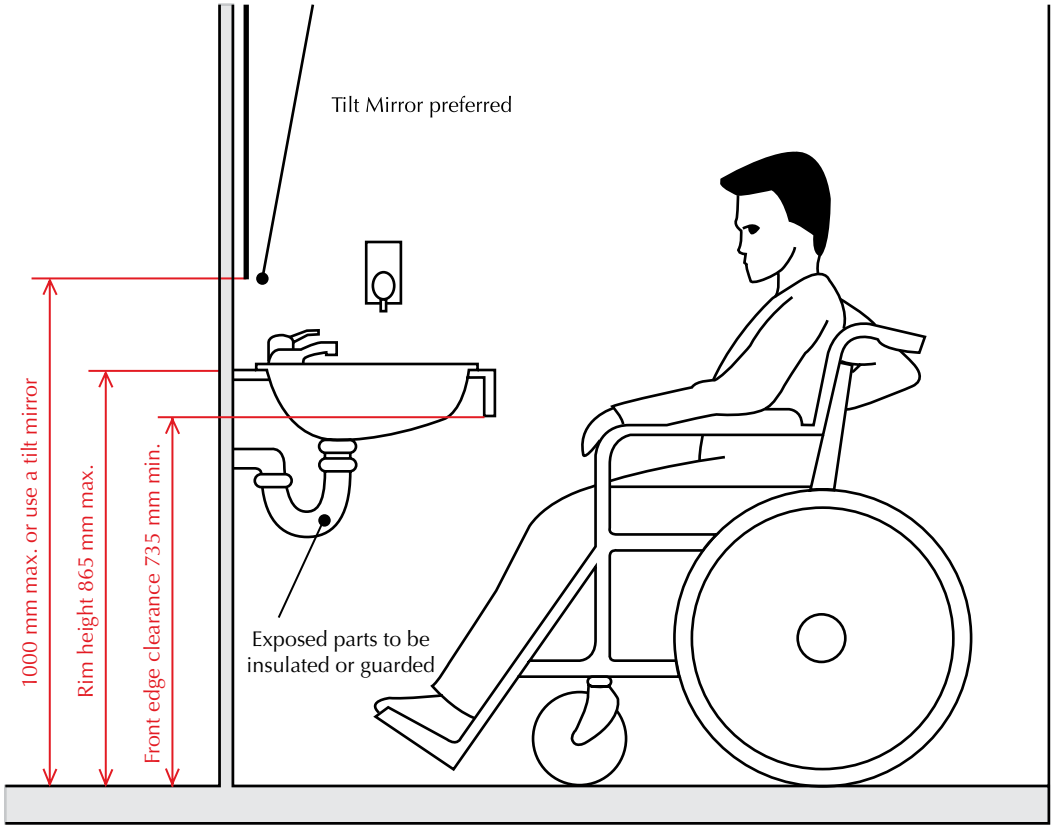
Mirrors

2) If mirrors are provided in a barrier-free washroom, at least one mirror shall be

a) mounted with its bottom edge not more than 1 000 mm above the floor, or

b) be inclined to the vertical to be usable by a person in a wheelchair.

Tilt mirrors are preferred to lowered mirrors that are mounted above the lavatory. The mirror shall be



mounted no more than 200 mm above the lavatory when measured from the surface of the sink or counter. This will allow a person who uses a wheelchair to visually scan their person from head to floor. Where a tilt mirror is provided, designers are advised to consider that taller individuals with visual disabilities may find the mirror a potential hazard. Insetting the tilt mirror or increasing the depth of the vanity would solve this potential problem. If no tilt mirror is provided, then, in addition to the mirror mounted above the lavatory, a wall-mounted full length mirror is an acceptable alternative.

Faucets

Automatic water controls are a preferred alternative to levered handle faucets. However, single-lever faucet controls are preferred to separate hot and cold lever handles. Valves used in large complexes are different from those used in single-family homes. In single-family homes, mechanical stops are sometimes used to prevent scalding; however these must be reset when the temperature is adjusted at the hot water heater. A better alternative is a water temperature regulator for use in public spaces.

7.2.4.1. General

3) Any shelf or projection above a lavatory shall be located so that it will not be a hazard to any person, including a person with a visual disability.

4) Except in a suite of residential occupancy, lavatories required by Sentence (1) shall be equipped with faucets that

a) operate automatically, or

b) have lever-type handles that do not close under spring action.

Faucets and shelves should be of contrasting colour to the surfaces to which they are attached. This will help those with visual disabilities to identify them.

Universal Toilet Rooms

A universal toilet room is required to accommodate a user and a family member or an attendant (often of the opposite gender) so that hygiene may be carried out with dignity and in private. A regional transportation terminal is required to provided universal toilet rooms as the preferred alternate to washroom facilities on buses, trains and planes, which are small and difficult to use. Universal toilet rooms are also required in shopping centres. These rooms are also useful to parents who have young children that cannot be left alone or require extra attention.

3.8.3.12. Universal Toilet Rooms

(See Appendix A.)

1) A universal toilet room shall

a) be served by a barrier-free path of travel,

b) have a door capable of being locked from the inside and released from the outside in case of emergency and having

i) a latch-operating mechanism that is operable with a closed fist, located not less than 900 mm and not more than 1 000 mm above the floor,

ii) if it is an outward swinging door, a door pull not less than 140 mm long located on the inside so that its midpoint is not less than 200 mm and not more than 300 mm from the hinged side of the door and not less than 900 mm and not more than 1 000 mm above the floor (See A-3.8.3.8.(1)(b)(iv) in Appendix A), and

iii) if it is an outward swinging door, a door closer, spring hinges or gravity hinges, so that the door closes automatically,

c) have one lavatory conforming to Article 3.8.3.11.,

d) have one water closet conforming to the requirements of Article 3.8.3.9., that has a clearance to the walls of

i) not less than 285 mm and not more than 305 mm on one side, and

ii) not less than 875 mm on the other side,

e) have grab bars conforming to Clause 3.8.3.8.(1)(d),

f) have no internal dimension between the walls that is less than 1 700 mm,

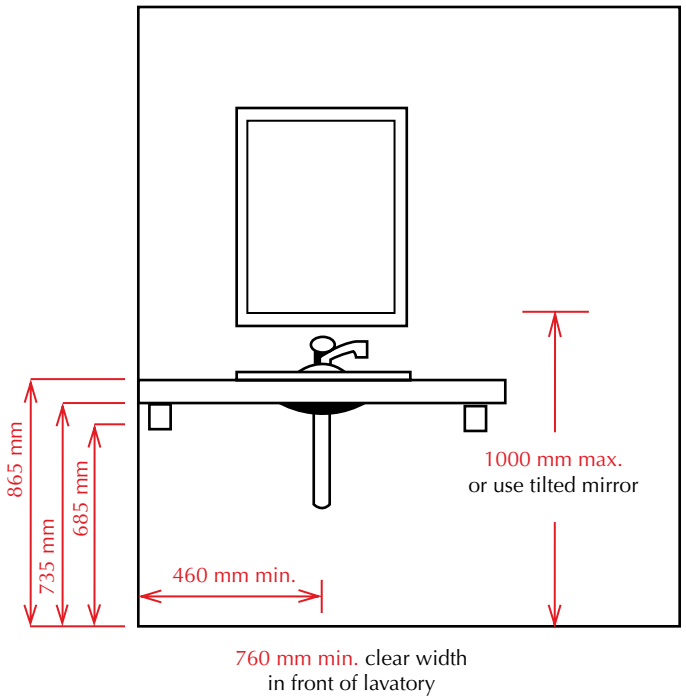
g) have a coat hook conforming to Clause 3.8.3.8.(1)(e), and a shelf located not more than 1 200 mm above the floor,

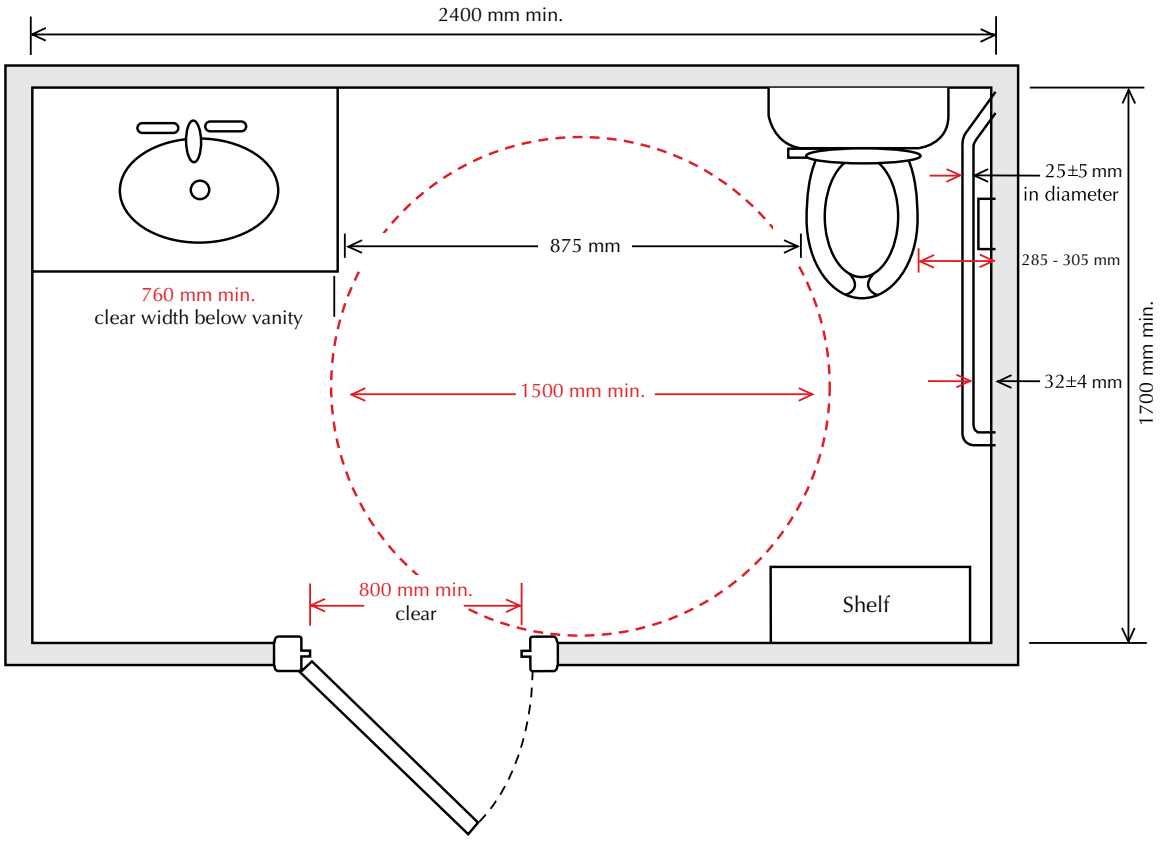
h) be designed to permit a wheelchair to back in alongside the water closet in the space referred to in Subclause (d) (ii), and

i) be designed to permit a wheelchair to turn in an open space not less than 1 500 mm in diameter.

A universal toilet room is a self-contained facility that can be used by either sex. Universal toilet rooms allow a person who may require assistance to use the facility in comfort and in private. Self-contained washrooms are of significant benefit under these circumstances.

Note: *The measurements in the ABC are based upon a person using a manual wheelchair. Some measurements that follow are greater than the ABC. The increased measurements are based on persons using power wheelchairs, which are generally taller and wider.*





The features that are important in a universal toilet room are as follows:

- The doorway will have a clear opening of 850 mm (900 mm is preferred) and must be easy to open and close.
- A locking mechanism must be easy to access and operate by a person using a wheelchair or a senior with limited strength and/or agility in hands and/or wrists. A sliding latch with a larger grasping surface, or a push-button mechanism, located 950 ± 50 mm from the floor would suffice.
- If the door swings outward, at least a 300 mm D-shaped handle is needed to pull the door shut, if it is not self-closing. The handle should be located horizontally on the inside of the door and installed at 150 mm from the hinge side and 950 mm from the floor, +/- 50 mm in either direction.
- It is preferred that the lavatory should have a clearance of 870 mm measured from the lowest part of the apron to the floor to allow a person in a wheelchair to manoeuvre beneath the sink. The rim height of the sink or top of the counter shall not be greater than 1 000 mm measured to the floor.
- The drain pipes beneath the lavatory shall be offset and insulated to permit the person in a wheelchair to manoeuvre as far in as possible without burning limbs on exposed plumbing.
- The toilet shall be no lower than 430 mm ± 30 mm when measured from the floor to the surface of the toilet seat.
- A grab bar located adjacent to the water closet shall be installed 300 mm from the toilet seat to the midpoint of the grab bar. It is preferred that the grab bar be L-shaped (i.e., 1 200 mm horizontal and 600 mm diagonal lengths). In addition, a 900 mm length grab bar shall be located at the back of the toilet and installed no less than 300 mm measured from the toilet seat to the midpoint of the grab bar.

Note: *When purchasing and installing the L-shaped grab bar, be aware that this accessory is available for either the left- or right-side of the toilet. The diagonal should be forward of the toilet.*

- The water closet stall or universal toilet room must have a dimension of not less than 2 000 mm × 1 500 mm to permit a person using a wheelchair or other mobility device to manoeuvre more easily within the space, i.e., to back in along side of the toilet or in front of the toilet.
- Dispensers and other amenities

- Toilet paper dispenser:	750 mm – 850 mm
- Paper towel dispenser or hand dryer:	1 100 mm – 1 300 mm
- Soap:	900 mm – 1 000 mm
- Other dispensers:	1 100 mm – 1 300 mm

Note: *The grab bar becomes UNUSABLE when mounted below the toilet paper dispenser.*

Note: *Do not mount soap or paper towel dispensers above and at the back of the sink.*

- A coat hook of a button (or similar) design, in order to not be a hazard to people with visual disabilities, should be located not less than 1 100 mm from the floor, and measured to the centre line of the hook.

Note: *It is recommended that a universal toilet room have automatic door openers on both sides for ease of entry and egress.*

7.2.2.1. Water Closets

3) Both sexes are permitted to be served by a single water closet if the occupant load in an occupancy referred to in Articles 7.2.2.5. to 7.2.2.10. is not more than 10.

A building owner is expected to provide one universal toilet room for each gender. However, if an owner can satisfy the Chief Building Administrator in an application for barrier-free relaxation that two universal toilet rooms are unnecessary, then only one for both genders may be permitted. Sentence 7.2.2.1.(3) permits the provision of a single toilet room for both sexes if the occupancy load is not more than 10.

Note: *According to the ABC regulations, both an accessible water closet stall and a universal toilet room are required for each gender.*

Water Closet Stalls

3.8.3.8. Water Closet Stalls

1) A water closet stall or enclosure in a washroom required by Article 3.8.2.3. to be barrier-free shall

a) be designed to allow a person using a wheelchair to turn in an open space that has a diameter of not less than 1 500 mm,

b) be equipped with a door that

i) can be latched from the inside with a closed fist,

ii) provides a clear opening of not less than 800 mm wide with the door in the open position,

iii) swings outward, unless sufficient room is provided within the stall or enclosure to allow the door to be closed without interfering with a person using a wheelchair (see Appendix A),

iv) is provided with a door pull on the inside not less than 140 mm long located so that its midpoint is not less than 200 mm and not more than 300 mm from the hinged side of the door and not less than 900 mm and not more than 1 000 mm from the floor (See Appendix A), and

v) is provided with a door pull on the outside, near the latch side of the door,

c) have a water closet located so that its centreline is not less than 460 mm and not more than 480 mm from an adjacent side wall on one side,

d) be equipped with knurled finished grab bars as described in Sentence (2),

e) be equipped with a coat hook mounted not more than 1 400 mm above the floor on a side wall and projecting not more than 50 mm from the wall, and

f) have a clearance of not less than 1 700 mm between the outside of the stall face and the face of an in-swinging washroom door and 1 400 mm between the outside of the stall face and any wall-mounted fixture.

2) A grab bar required by Sentence (1) shall

a) be mounted

i) horizontally on the wall beside the water closet, and be not less than 1 200 mm in length, located with its centreline between 300 mm and 330 mm above the height of the water closet seat and with its midpoint located in line with the front edge of the water closet,

ii) on the wall beside the water closet and have a horizontal portion 600 mm in length with a 600 mm extension extending upwards to the front and away from the horizontal portion at an angle of 60° to the horizontal, with the centreline of the horizontal portion between 300 mm and 330 mm above the height of the water closet seat and the intersection of the horizontal and sloping portions located in line with the front edge of the water closet, or

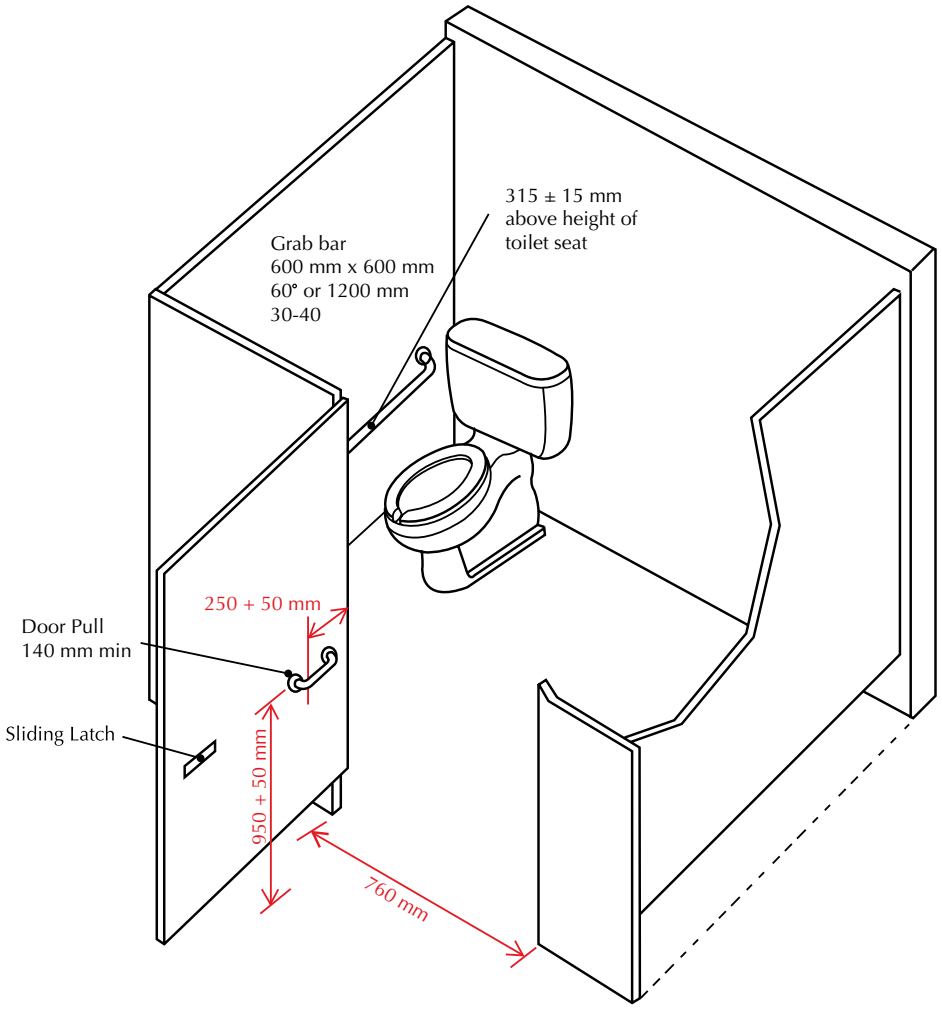
iii) horizontally on the wall behind the water closet, if the water closet does not have an attached water tank, centred on the toilet bowl and be not less than 600 mm in length,

b) be installed to resist a load not less than 1.3 kN applied vertically or horizontally,

c) be not less than 30 mm and not more than 40 mm in diameter, and

d) have a clearance of not less than 35 mm and not more than 45 mm from the wall.

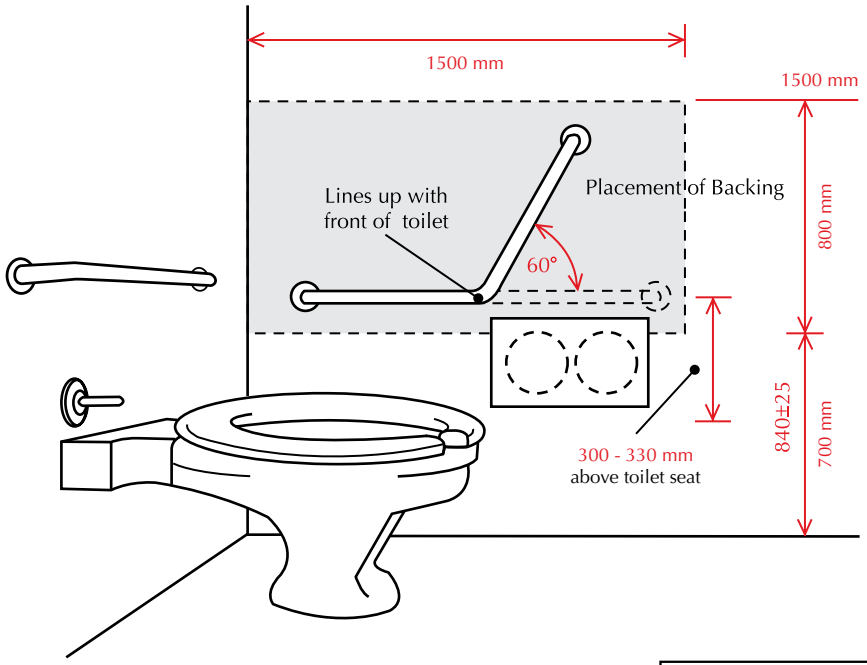
(See Appendix A.)



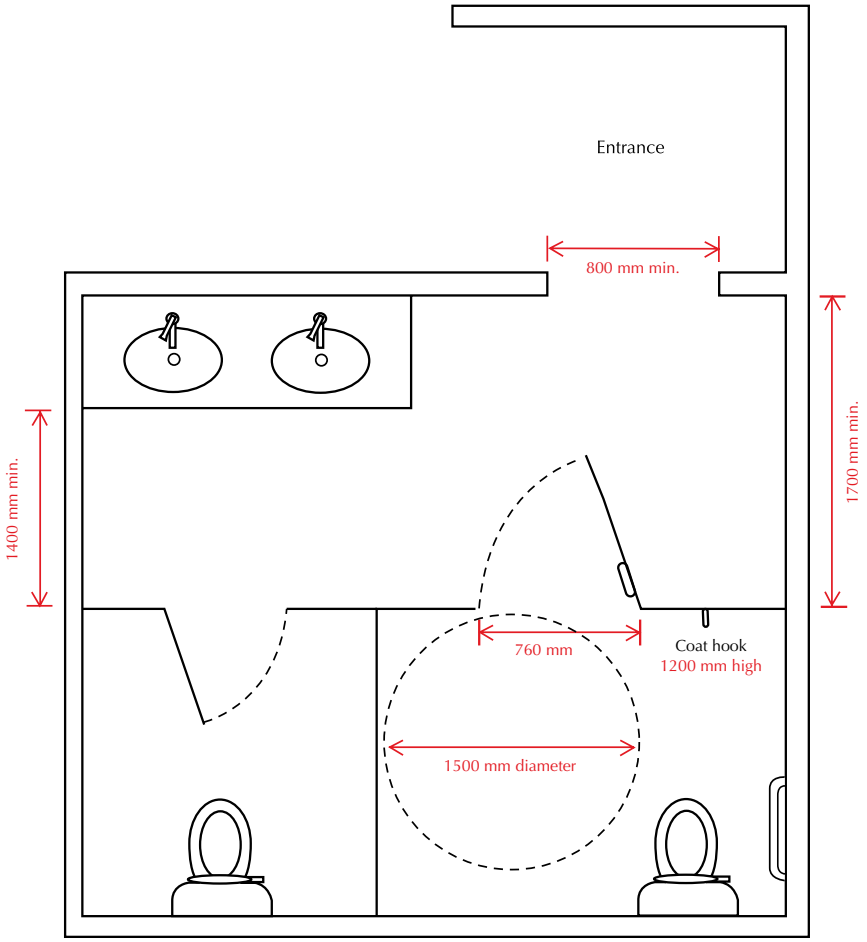
Note: *When purchasing and installing an L-shaped grab bar, be aware that this accessory is available for either the left- or right-side of the toilet. The diagonal should be forward of the toilet.*

Stall Doors: Where doors to water closet stalls swing outward, it is preferred that they swing against a side wall so as not to impede the flow of traffic or cause injury to a person passing by on the other side of the stall door. If the door of the stall swings inward, there must be an additional 1.5 m of space to allow an occupant in a wheelchair to close the door from within the stall.

Door Pulls: The door pull shall be a D-shaped handle at least 300 mm long and mounted in a horizontal position to allow for optimal leverage. The midpoint of the handle shall be located not less than 150 mm or not more than 200 mm from the edge of the door on the hinged side. As well, measured from the midpoint to the floor, the handle shall not be less than 900 mm and not more than 1 000 mm.



Backing for Grab Bar Installation: Sufficient backing (at least a 19 mm sheet of plywood behind cement board, floor-to-ceiling, is preferred for optimum strength and placement) is required for the installation of grab bars—in both vertical and horizontal positions—and towel bars, etc. Grab bars must resist a load of 1.3 kN (132 kg – force) applied vertically or horizontally in water closet stalls, showers and bathing areas. (This is applicable to residential dwellings and care facilities as well.)



Water Closets and Urinals

3.8.3.9. Water Closets

1) A water closet for a person with physical disabilities shall

a) be equipped with a seat located at not less than 400 mm and not more than 460 mm above the floor,

b) be equipped with hand-operated flushing controls that are easily accessible to a wheelchair user or be automatically operable,

c) be equipped with a seat lid or other back support, and

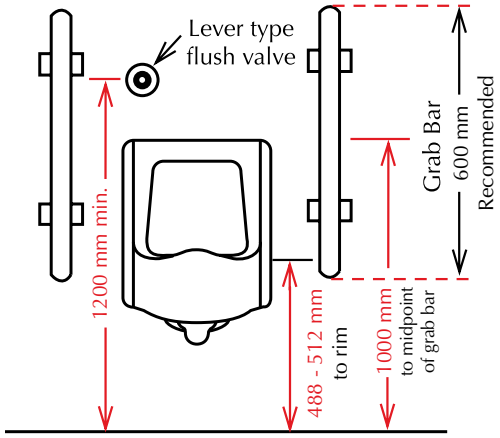
d) not have a spring-actuated seat.

Water Closets

Wall-mounted water closets or floor models with recessed bases are preferable because they provide the least amount of obstruction to a wheelchair user while s/he manoeuvres in front of or beside the toilet. To facilitate transfer from a wheelchair, the toilet seat should be the same height as the wheelchair seat, that is, between 400 mm and 460 mm from the floor. A properly installed grab bar will aid in a transfer. The grab bar will also benefit those who are elderly and may have difficulty rising from a seated position. These specifications will greatly increase a person's ability to rise, sit or stand because a grab bar provides stability and safety.

Automatic Flushers for Water Closets and Urinals

In accessible stalls, automatic flushers are preferable to hand-operated flushing mechanisms for both water closets and urinals. Automatic water closet flushers can eliminate the need to lean across the toilet (often the flusher is located on the inaccessible side of the toilet). Hand-operated flushing mechanisms may be difficult for people with limited strength and/or grasp to operate.



3.8.3.10. Urinals

1) If urinals are provided in a barrier-free washroom, at least one urinal shall be

a) wall mounted, with the rim located between 488 mm and 512 mm above the floor, or

b) floor mounted, with the rim level with the finished floor.

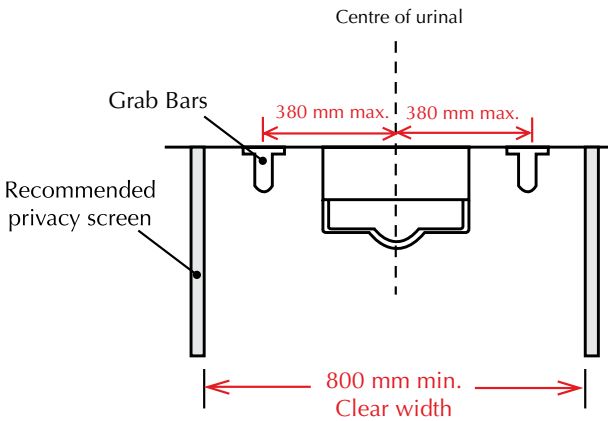
2) The urinal described in Sentence (1) shall have

a) a clear width of approach of 800 mm centred on the urinal,

b) no step in front, and

c) installed on each side a vertically mounted grab bar that is not less than 300 mm long, with its centreline 1 000 mm above the floor, and located not more than 380 mm from the centreline of the urinal.

(See Appendix A.)



A clear floor space shall be provided in front of a urinal so that the user of a wheelchair can approach the urinal without obstruction. Vertically mounted grab bars on each side of the urinal will allow a person in a wheelchair to pull himself up to a standing position, and/or to steady himself. A floor mounted urinal will make it easier to drain appliances, such as catheters. Flush controls should be lever operated or automatic.

Public Shower Facilities

In assembly buildings, such as schools, colleges and community halls, where individual showers are provided, at least one accessible shower stall and one accessible change cubicle are required for each gender. This will ensure that persons with disabilities and others who use wheelchairs or other mobility aids are accommodated.

3.8.3.13. Showers

1) Except within a suite of residential occupancy, where showers are provided in a building, at least one shower stall in each group of showers shall be barrier-free and shall

a) be not less than 1 500 mm wide and 900 mm deep,

b) have a clear floor space at the entrance to the shower, not less than 900 mm deep and the same width as the shower, except that fixtures are permitted to project into that space provided they do not restrict access to the shower (See Appendix A),

c) have a slip-resistant floor surface,

d) have a bevelled threshold not more than 13 mm higher than the finished floor,

e) have a hinged seat that is not spring-loaded or a fixed seat that is

i) not less than 450 mm wide and 400 mm deep,

ii) mounted approximately 450 mm above the floor, and

iii) designed to carry a minimum load of 1.3 kN,

f) have a horizontal knurled finished grab bar conforming to Clauses 3.8.3.8.(2)(b), (c) and (d) that is

i) not less than 900 mm long located on the wall 100 mm from the back of the seat,

ii) mounted between 750 mm and 850 mm above the floor, and

iii) located on the wall opposite the entrance to the shower so that not less than 300 mm of its length is at one side of the seat,

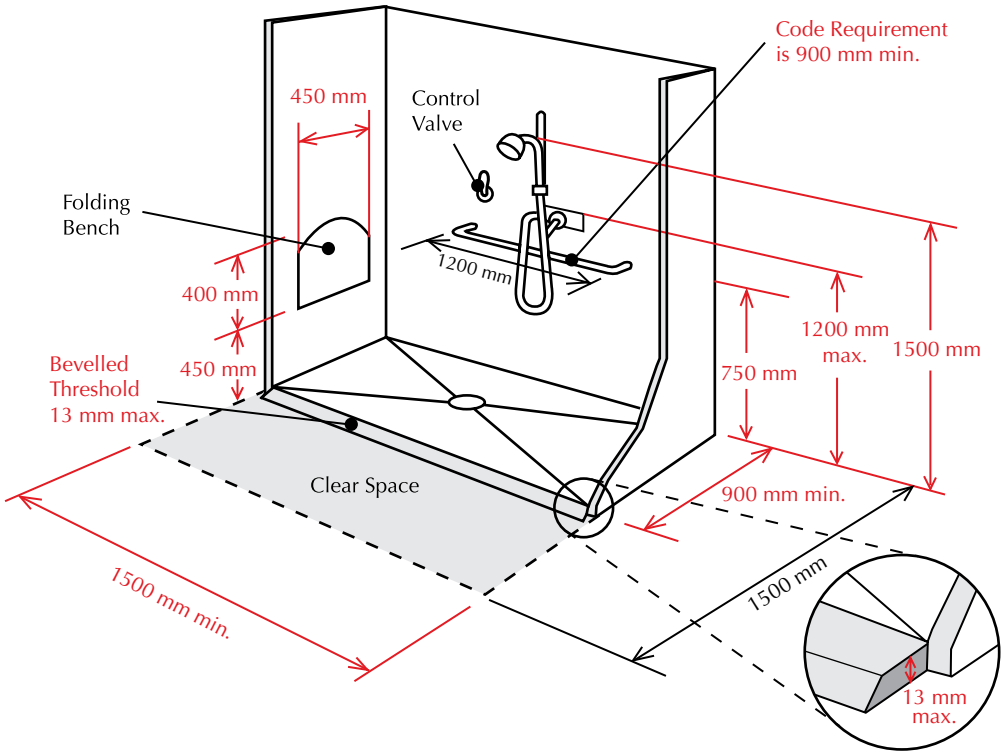
(See Appendix A),

g) have a pressure-equalizing or thermostatic mixing valve controlled by a lever or other device operable with a closed fist from the seated position, located on the side wall between 200 mm and 300 mm in front of the seat,

h) have a hand-held shower head with not less than 1 800 mm of flexible hose, located so that it can be reached from the seated position and equipped with a support so that it can operate as a fixed shower head, and

i) have fully recessed soap holders which can be reached from the seated position and located on the side wall between 100 mm and 200 mm in front of the seat.

2) Within a building containing suites of residential occupancy, where more than one suite is required to be barrier-free and contains bathing facilities, 50% of the barrier-free suites shall contain wheelchair-accessible showers conforming to Clauses (1)(a) through (i) and 50% shall contain bathtubs conforming to Sentence 3.8.3.17.(1).



The inside measurements of a wheelchair-accessible shower stall shall be at least 1 500 mm by 1 500 mm with a slip-resistant floor finish and have a bevelled threshold of not more than 13 mm. The inside measurements of the transfer shower stall shall be at least 900 mm by 1 500 mm with a slip-resistant floor finish and have a bevelled threshold of not more than 13 mm.

The hand-held shower head should be located in the centre of the long wall (i.e., 1 500 mm) adjacent to the fixed seating. This allows a person in a seated position to reach the hand-held shower head and controls, or to use the same shower head as a fixed shower from a seated position.

The inside measurement of a change cubicle shall be at least 2 000 mm × 2 000 mm with slip-resistant flooring and equipped with a wall-mounted bench seat (as legs or brackets may interfere with a person's ability to turn easily). Button-style clothing hooks (which are not a hazard to eyes or ears) shall be mounted adjacent to the bench seating.

Clear Space at Entrances to Showers

The clear space at the entrance to a shower shall not be encroached upon by fixtures such as wall-hung sinks, fixed benches, island counters, trash receptacles, etc., since the obstruction may restrict movement and access to and from the shower and shower area.

Shower Stalls and Grab Bars

Only one grab bar is required and must be installed on the wall adjacent to the seat in the shower stall. A grab bar behind the seat will assist with transfers and stability. If the grab bar is located on the wall opposite the seat, it cannot be reached safely from a seated position.

It is preferred that a single horizontal continuous grab bar be installed in the shower to provide stability and safety for those who prefer to stand or need assistance to walk to the other end of the shower area. (The seat itself may be used in conjunction with the bar to assist with transfers.)

The shower stall shall be equipped with a hinged seat, grab bar, pressure-balancing single-lever water control and a hand-held shower head. (If vandalism is a problem, the use of a fixed head is acceptable, as long as it is located near the seat.)

The shower stall control and the hand-held shower head shall be situated so that ease of access is provided to the person seated on the shower seat (and preferably on the wall adjacent to the seat).

7.2.1.7. Grab Bar Installation

1) Grab bars that are installed shall resist a load not less than 1.3 kN applied vertically or horizontally.

NOTES

RESIDENTIAL REQUIREMENTS

V

Universal design is an approach to the design of environments (and products) so that they may be usable by as many people as possible and to the greatest extent possible without the need for adaptation by the user or the need for specialized design. As life expectancy rises and modern medicine has increased the survival rates of those with significant injuries, illnesses and birth defects, there is an increasing need for homes that will house more than one type of user. The inclusive approach of universal design recognizes the need for function and aesthetics that have appeal to the wide range of consumers.

In order to achieve this, universal design is based on the following seven principles (see Appendix 1):

- equitable use
- flexibility in use
- simple and intuitive in use
- perceptible information
- tolerance for error
- low physical effort
- size and space for approach and use

Inclusion is a sense of belonging, where people can feel respected and valued for who they are. When a community can make this commitment to its members, the community will have greater success because it will benefit from the participation and resources of all its citizens.

Special Requirements for Residential Projects

3.8.1.1. Application

3) If a residential project is funded in part or in whole by the Government of Alberta, adaptable dwelling units, which could be made to meet barrier-free design principles, shall be provided as follows:

a) 2 or more in a project of 10 to 25 dwelling units,
b) 5 or more in a project of 26 to 50 dwelling units,
c) 10 or more in a project of 51 to 100 dwelling units,
d) 15 or more in a project of 101 to 200 dwelling units, and
e) 20 or more in a project exceeding 200 dwelling units.

(See Appendix A.)

4) If barrier-free dwelling units are provided in accordance with Sentence (3), one parking stall per unit shall be provided meeting the requirements of Sentence 3.8.2.2.(4).

In housing projects that have received any contribution from the Government of Alberta (GOA), in money or in-kind but not including indirect services provided by GOA staff, the required number of dwelling units must be designed to anticipate the specific needs of persons with disabilities. The principle of flexibility in use must allow the height of different work areas (e.g., sink, stove top, countertops, storage units) to be raised or lowered to accommodate the various users of the dwelling units. This allows dwelling units to be adapted to suit the needs of each user. (See ABC Appendix A; also see Appendix 2 in this Guide for a list of adaptable requirements.)

Note: *A technical bulletin (06-BCI-010 STANDATA March 2008) has been issued by Alberta Municipal Affairs listing core requirements and other considerations for the design of adaptable dwelling units.*

Residential Design

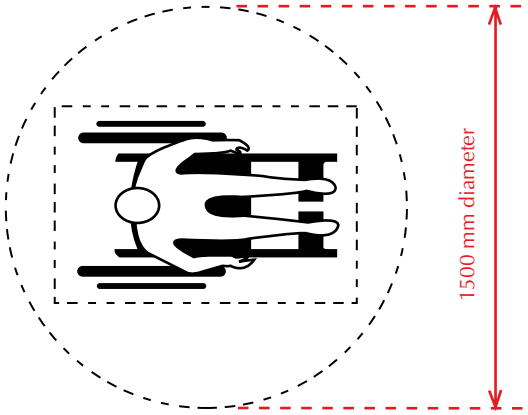
The accessibility requirements of the ABC deal primarily with public buildings, and set standards for a wide range of abilities. Barrier-free design for residential application is most often personalized in accordance with one's limitations and lifestyle. Over time, special features are often designed and modified on-site as determined by what an individual can and has learned to do. To design for accessibility in existing homes usually involves costly renovations and time to accomplish and may involve some minor inconveniences to the occupant.

The following general design standards are provided as guidelines that will accommodate most disabilities.

Overall Design Elements

There are some design elements that must be incorporated throughout the entire dwelling unit to ensure that accessibility is in place before adaptability can occur:

- Zero threshold
- 1.5 m turning diameter in all areas of the unit, including entry and laundry areas
- Electrical outlets shall be no lower than 600 mm when measured from the centre line of the plate to the finished floor
- Light switches shall be mounted between 1 200 mm – 1 400 mm when measured from the centre line of the plate to the finished floor
- Controls, like thermostats, shall be mounted at 1 400 mm when measured from the centre line of the plate to the finished floor
- Colour contrast between the door trim, door and wall
- Effective tactile-differentiation between living areas for wayfinding and safety
- Lever-handled hardware on all doors that latch



Entrances

In new construction, entrances should be at grade to provide a seamless path of travel into the dwelling unit. This means that exterior doorways must be wide enough (900 mm clear opening) to allow a person in a wheelchair or using another mobility device to enter with ease.

In older properties, stairs present the single greatest barrier. The first design solution is to alter the landscape by raising the land to provide a gradual and seamless path of travel to the entrance. However, the majority of entrances in homes are too high to accomplish this, so an alternative is to install a ramp or lift to create a barrier-free path of travel.

The length of a ramp, without a landing, should not exceed 9 m. A ramp of 9 m in length will elevate the user 750 mm. It would be reasonable to consider a rise of 750 mm for ramping, and the use of a lift for a rise over 750 mm. This general guideline would help to ensure safety of users as well as conserve real estate (if that is the desire).

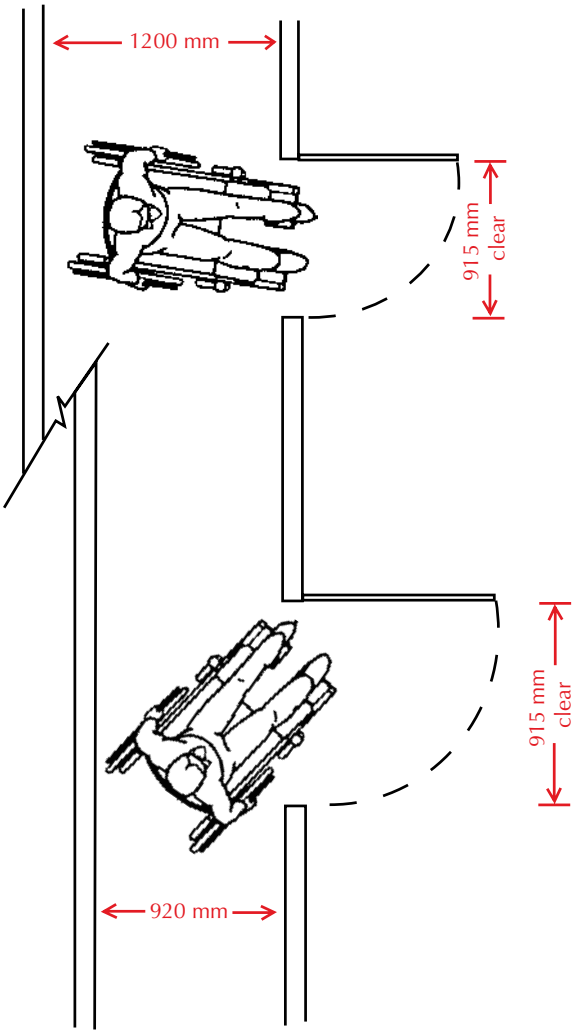
Exterior Doors

The ability to view the exterior entrance from the inside is necessary from a safety (crime prevention) perspective. Windows with lowered sills allow a person in a wheelchair (or a child) to view the exterior before opening the door to callers. If this is not possible, it is recommended that the door be changed to include a glass insert or a door security viewer, which should be located 1 150 mm from the floor.

Interior Doorways and Hallways

The relationship of a hallway to a doorway is critical. Narrow hallways impede the ability of a person who uses a wheelchair or other mobility device, especially when s/he needs to turn a 90° corner. A minimum width of 1 200 mm is needed for movement of a person who uses a wheelchair.

Interior doorways are required to be 900 mm to accommodate wheelchairs, including larger power wheelchairs and scooters.



Corridor width can be narrowed when clear door opening is widened

The use of lever handles is preferred on doors that latch. Pocket doors can be difficult to pull or push. Making the doorway wider and adding a D-handle to a pocket door will allow for easier access.

Residential bathrooms are normally too small to allow a door to swing inward and therefore doors to such rooms must swing out, usually into a corridor. However, with new construction, it is possible to design the bathroom so that the door will swing inward.

Windows

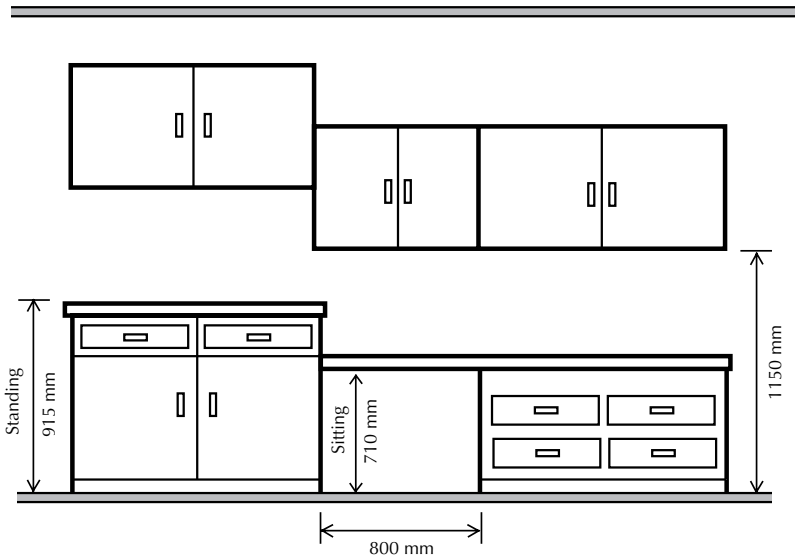
Windows throughout a residence are at or above the eye level of a person in a wheelchair or of a child. The designer/contractor should make the window sill in living and dining rooms no higher than 600 mm. This enables a person using a wheelchair to see the exterior comfortably for both enjoyment and safety. For bedroom, bathroom and other windows (the kitchen may be an exception), the window sills shall be no higher than 750 mm when measured from the finished floor. Windows should be easy to open and close, and their controls should be placed in an area 750 mm to 1 000 mm when measured from the floor. Lowered window sills and easy-to-operate mechanisms will also provide an alternate evacuation route in an emergency.

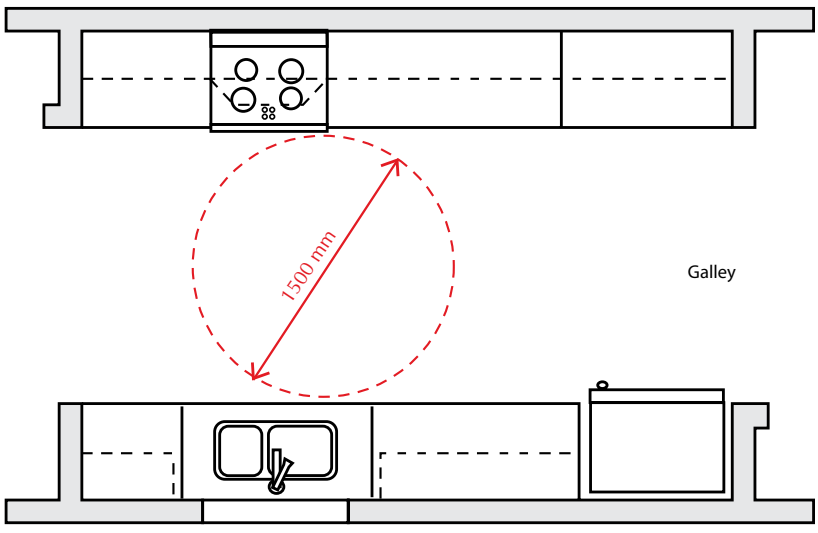
Kitchens

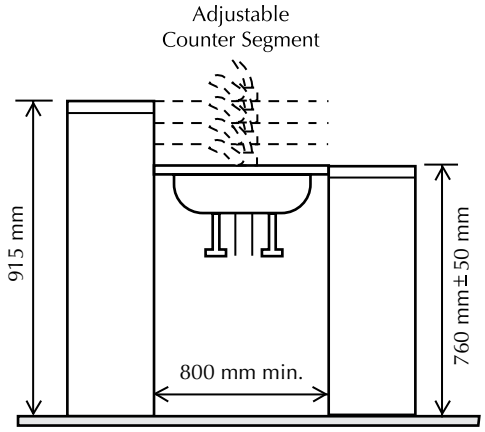
Kitchens are complex to design because of the various workstations that need to be considered and made accessible for all users. The following is a list of key design elements that need to be in the kitchen.

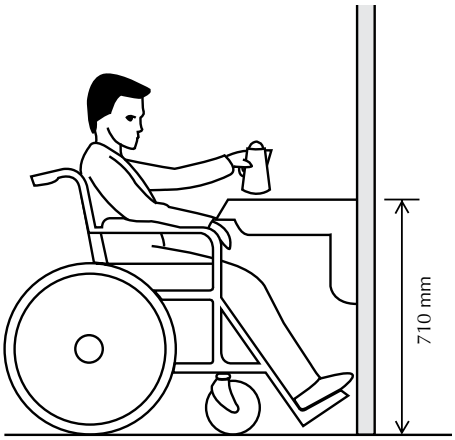
Recommended

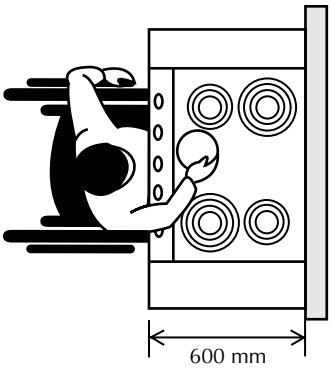
- turning diameter of 1 500 mm or greater
- height-adjustable cook top with controls located in front, and a height-adjustable sink with a single lever faucet
- counter tops with at least two counter heights (915 mm and 760 mm) and with knee space beneath
- additional counter space for appliances, such as a microwave
- a pull-out work surface
- upper cabinets mounted on a track system that will allow for adjustability, and lower cabinets with drawers on full-extension glides and D-handles
- a wall oven with a side-swing door, and a pull-out shelf below the oven on full-extension glides
- at least two electrical outlets mounted on the lower cabinetry

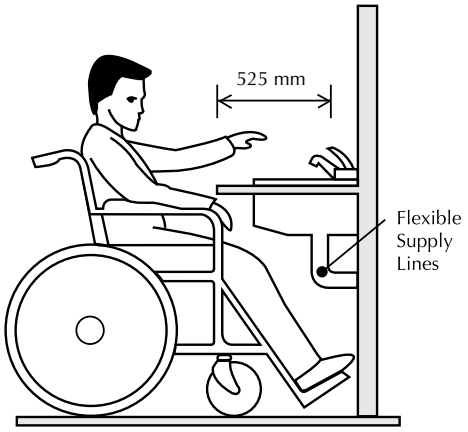


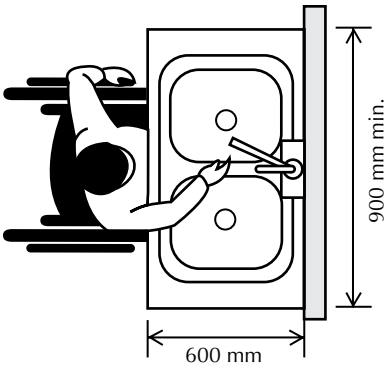


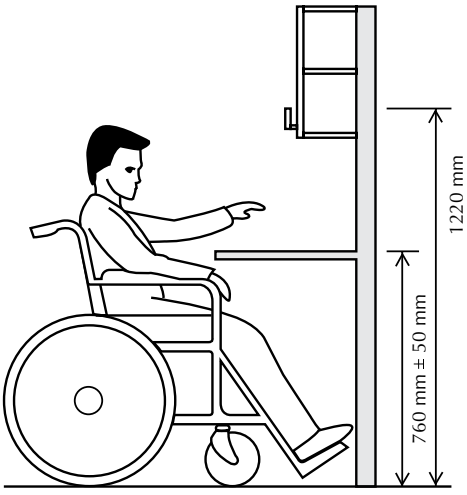


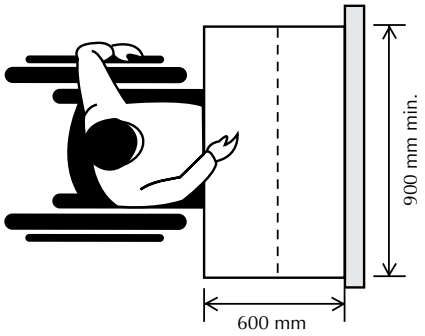




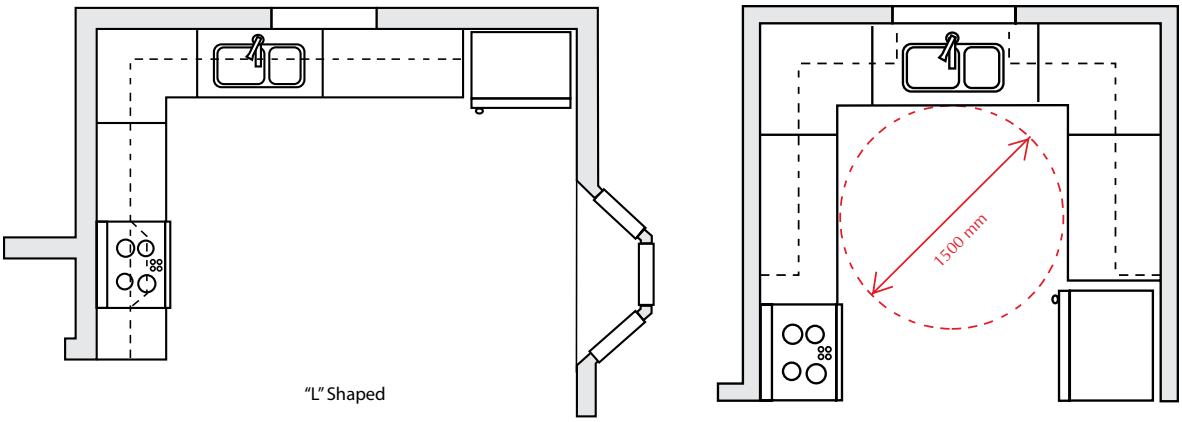








Select appliances that will be suitable to a person who uses a wheelchair. The majority of occupants, whether a person with a disability or a senior, will appreciate the thought given to creating an attractive and accessible kitchen. A free-standing microwave oven and a refrigerator with a bottom freezer (or a side-by-side) are good ideas.



"L" Shaped

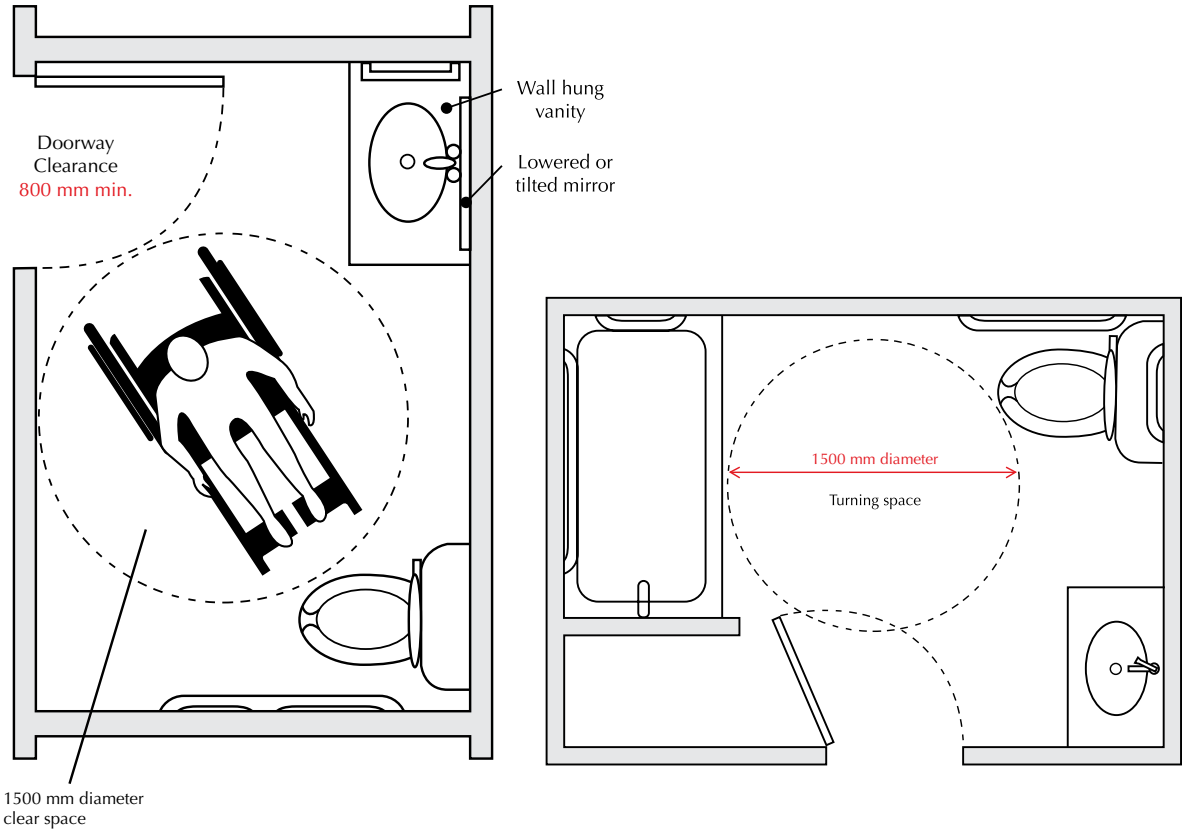
"U" Shaped

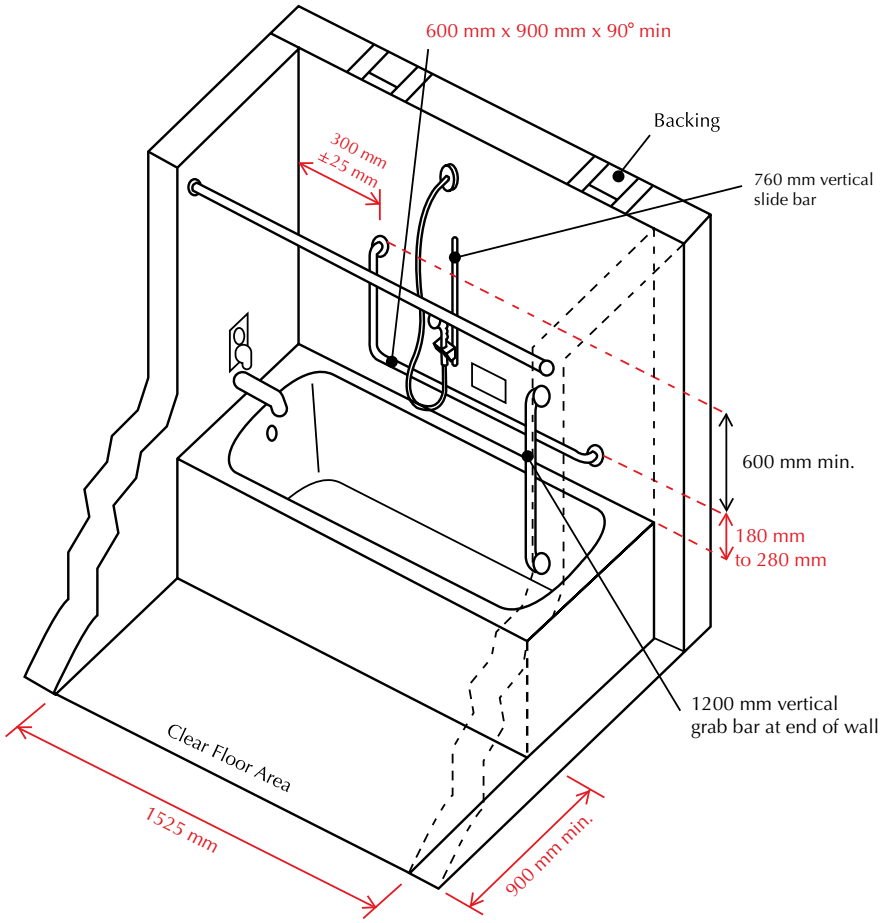
Bathrooms

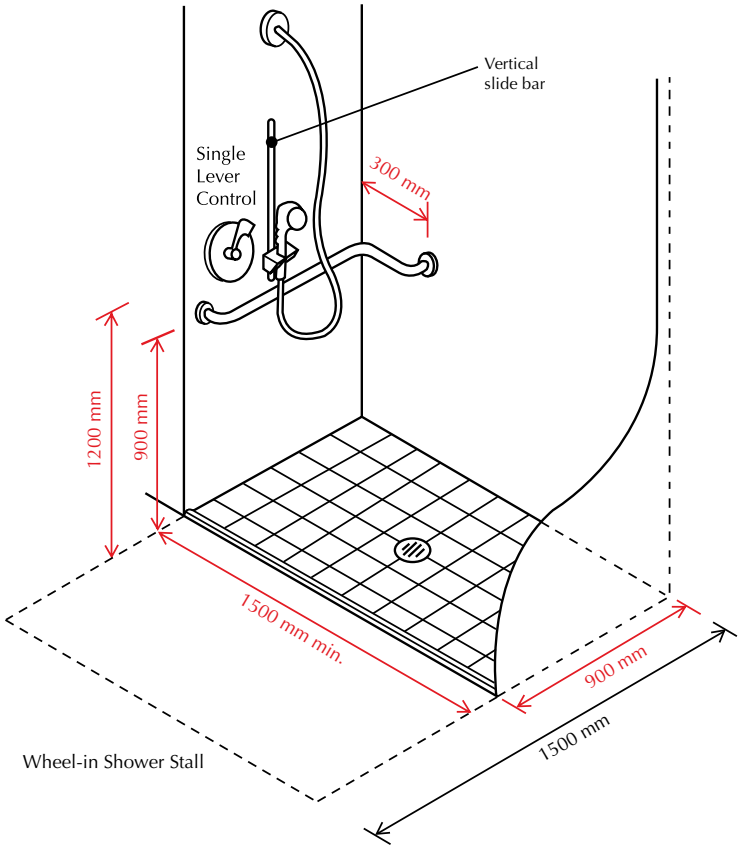
The barrier-free code requirements in the ABC are specifically for the design of public washrooms. However, many of the height and distance measurements are valid for use in a residential dwelling unit.

Recommended

- turning diameter of 1 500 mm or greater
- shallow sinks with knee space beneath; exposed plumbing must be insulated to prevent burns
- single lever faucet control for the sink, shower and/or bathtub
- 1 500 x 1 500 mm shower with no lip, and/or a bathtub (see 3.8.3.17. Bathtubs; 3.8.3.13. Showers)
- grab bars for the toilet, shower and bathtub
- a transfer space (for those who use wheelchairs) of 900 - 1 000 mm located beside the toilet







Note: *The powder room shall follow the same design considerations that are required for a full bath.*

With careful planning and positioning of fixtures, an existing slightly larger conventional washroom can be made accessible.

Designers should plan all bathrooms with people using larger wheelchairs or scooters, and those with visual disabilities, in mind. The functional placement of fixtures must be considered when the goal is to provide safe and effective access.

3.8.3.17. Bathtubs

A bathtub that is installed in a suite for residential occupancy and required to be barrier-free shall

a) be located in a room complying with the dimensions of Sentence 3.8.3.12.(1),
b) conform to Article 7.2.1.8.,
c) be equipped with a hand-held shower head mounted on a vertical slide bar not less than 760 mm long and with the bottom of the slide bar at a height not less than 1 200 mm above the floor, and controls and flexible hose conforming to Article 3.8.3.13.,
d) have grab bars that
    i) can resist a load not less than 1.3 kN applied vertically or horizontally,
    ii) are not less than 1 200 mm long, located vertically at the end of the bathtub that is adjacent to the clear floor space, with the lower end between 180 mm and 280 mm above the bathtub rim, and
    iii) are not less than 1 200 mm long located horizontally along the length of the bathtub located 180 mm to 280 mm above the bathtub rim, and
e) have a clear floor space not less than 900 mm wide along its length.

Note: *Ensure that bathtubs have slip-resistant surfaces. If feasible, add a non-slip, waterproof seating area at least 37 mm deep and located at the end of the bathtub to provide safer transfers in and out of the tub.*

7.2.1.8. Bathtubs in Hotels and Motels

1) Where a bathtub is installed in a hotel or a motel, it shall

a) have faucets that conform to Clause 7.2.4.1.(4)(b),
b) have grab bars that
    i) conform to Sentence 7.2.1.7.(1),
    ii) are not less than 1 200 mm long, located vertically at the end of the bathtub, with the lower end between 180 mm and 280 mm above the bathtub rim, and
    iii) are not less than 1 200 mm long located horizontally along the length of the bathtub at 180 mm to 280 mm above the bathtub rim, and
c) be open along its length with no tracks mounted on the bathtub rim.

In the new construction of a hotel or motel, or the renovation of existing units, the bathtubs shall conform to Sentence 7.2.1.8.(1). Grab bars must be installed in every bathing unit whether designated accessible or not. The intent of this Code is to ensure that all guests are provided with an added measure of safety. This also provides the owner with more options to accommodate guests who may require moderate assistance with bathing.

Note: *A hotel or motel suite must have a barrier-free path of travel to its entry. This includes wider doorways into the suite and wider doorways to the bathrooms within. (It is unreasonable to expect that visitors who use a wheelchair or other mobility device leave that suite to use an accessible washroom in another part of the building.) [See Sentence 3.8.2.1.(1) Areas Requiring a Barrier-Free Path of Travel.]*

Visitability

Visitability promotes inclusion and social integration of those with disabilities into their communities rather than isolating them in their own homes, or forcing them into institutions. Homes that allow visitability—whether or not designated for residents who currently have mobility limitations—offer some specific accessibility features, such as one zero-step entrance on an accessible route leading from a driveway or public sidewalk, all interior doors providing at least 850 mm of unobstructed passage space, and a half bath on the main floor.

FIRE SAFETY

VI

Fire safety requirements are in place to alert and protect property users by minimizing risks to health and safety in a built environment.

Protection on Floor Areas with a Barrier-Free Path of Travel

3.3.1.7. Protection on Floor Areas with a Barrier-Free Path of Travel

1) Every floor area above or below the first storey that is not sprinklered throughout and that has a barrier-free path of travel shall

a) be served by an elevator

i) conforming to Sentences 3.2.6.5.(6) to (8), and

ii) protected against fire in conformance with Clauses 3.2.6.5.(5)(b) or (c),

b) be divided into at least 2 zones by fire separations conforming to Sentences (2), and (3) so that

i) persons with physical disabilities can be accommodated in each zone, and

ii) the travel distance from any point in one zone to a doorway leading to another zone shall be not more than the value for travel distance permitted by Sentence 3.4.2.5.(1) for the occupancy classification of the zone,

c) have an exterior exit at ground level, or

d) have a ramp leading to ground level.

(See Appendix A.)

2) The fire separations referred to in Clause (1)(b) shall have a fire-resistance rating not less than 45 min.

3) A door acting as a closure in a fire separation referred to in Clause (1)(b) shall be weather stripped or otherwise designed and installed to retard the passage of smoke. (See A-3.3.3.5.(6) in Appendix A.)

4) In a barrier-free path of travel, a downward change in elevation shall be signalled by the use of a 600 mm wide tactile warning strip placed 250 mm from the edge and for the full width of a stair, escalator, moving walkway, ramp or platform and identified using colour and brightness contrast.

The above measures are intended to provide temporary places of refuge for persons with disabilities. In all situations, a plan to evacuate persons with disabilities must be developed and approved by the local fire authorities. This is a mandatory requirement as cited in the Alberta Fire Code.

In buildings without sprinklers, it is necessary to take additional measures to ensure the safety of persons with disabilities and those who may require assistance to exit a burning building. Three design measures are suggested:

1. An elevator meeting CSA-B44-04 Safety Code for Elevators and Escalators – Supplement #1 and Update #1 should be installed. The electrical system serving the elevator shall be protected against the effects of fire, and a safe zone be created around the elevator doors by means of a vestibule or corridor that is protected by fire resistive construction. This protected elevator is intended to be used by firefighters to evacuate persons with disabilities. It is not intended that this elevator be used without the assistance of firefighters.

2. The floor area should have a safe zone that is separated by fire resistive construction, such as a door that has the ability to retard the passage of smoke between zones, and minimizes the distance of travel for those who need to move to another zone. In office buildings, the distance to a safe zone and exit is 40 m; for all other occupancies the distance is no greater than 30 m. The size requirement of each safe zone can be created or designed by the number of occupants who may require assistance in an emergency.

3. Direct exit with zero grade to the exterior of the building is preferred. However, a ramp leading to the exterior ground level is also acceptable.

9.5.2.2. Protection on Floor Areas with a Barrier-Free Path of Travel

1) Where a barrier-free path of travel required in Article 9.5.2.1. is provided to any storey above the first storey, the requirements in Article 3.3.1.7. shall apply.

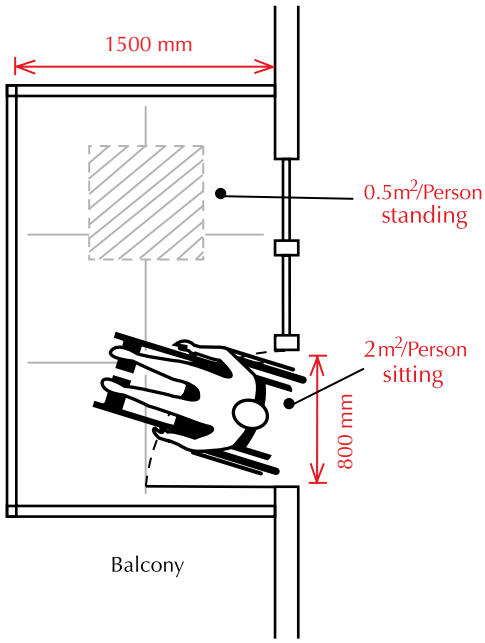
2) In addition to the requirements of Article 3.3.1.7., every floor area above or below the first storey that is not sprinklered throughout and that has a barrier-free path of travel shall in the case of residential occupancies, be provided with balconies conforming to Sentence (3), except on the storey containing the barrier-free entrance required by Article 3.8.1.2.

3) A balcony required by Sentence (2) shall

a) have direct barrier-free access from the suite or floor area,

b) be not less than 1.5 m deep from the outside face of the exterior wall to the inside edge of the balcony, and

c) provide not less than 1.5 m^2 of balcony space for each non-ambulatory occupant and 0.5 m^2 for each ambulatory occupant.



Fire Alert and Alarm Systems

The primary purpose of fire alarm systems is to warn occupants to evacuate a building by providing the necessary information. An audible signal must be accompanied with a visual signal to ensure that people who are deaf or hard of hearing and people who are blind receive notification of the alert and/or alarm in an emergency. In addition, the system may include a textual notification appliance to provide further communication for people who are deaf or hard of hearing.

In buildings required to be barrier-free, the audible and visual signals shall be designed and installed to ensure that no harm befalls persons who are deaf or hard of hearing and all others. This can be done by reading and applying the engineering information in the National Fire Protection Association (NFPA) Standard 72® National Fire Alarm Code® handbook, with specific reference to the placement of visual signals when proximity to the audible signals is considered/necessitated.

The National Fire Protection Association® (NFPA) standards are used in this Guide to supplement the Alberta Building Code (ABC) on visual signalling systems. The NFPA® and fire alarm industry has worked closely with various code and advocacy groups in the US to develop safe, reasonable and effective visible signalling requirements that are not as fully referenced in Canadian materials.

Note: *It is strongly recommended that ALL designers refer to the* National Fire Protection Association (NFPA) Standard 72® National Fire Alarm Code® *for further information on the design and installation of visual signaling appliances. The NFPA® has published a* National Fire Alarm Code® Handbook 2007 *edition that provides important information on good engineering design practises for visual signaling systems.*

Note: *In the following text, the NFPA 72® Standards are printed in blue.*

3.2.4.17. Alert and Alarm Signals

4) In a building, or portion thereof, intended for use primarily by persons with hearing impairment, visual signal devices shall be installed in addition to audible signal devices.

Sentence (4) suggests that visual signalling devices will not be installed (in addition to audible signalling devices) when a building or a portion thereof is not primarily used by persons with hearing impairments. However, this is not considered acceptable. It is strongly recommended that signalling devices be installed in all buildings because persons who are deaf or hard of hearing might use any environment at any time, and emergency systems must be accessible to everyone.

3.2.4.19. Visual Signals

1) Visual signal devices required by Sentences 3.2.4.17.(4) and 3.2.4.18.(7) and (8) shall be installed so that the signal from at least one device is visible throughout the floor area or portion thereof in which they are installed. (See Appendix A.)

2) Visual signal appliances shall conform to ULC-S526, "Standard for Visual Signal Appliances."

3) A visual signal appliance shall be installed in close proximity to each required audible signal appliance.

Sentence (3): close proximity of a visual signalling device to an audible may not be the most effective. Please refer to the NFPA 72® NFAC® Handbook for more information pertaining to the installation of these two signalling devices.

NFPA 72® 7.5 Visible Characteristics - Public Mode.

7.5.1 Visible Signaling. Public mode visible signaling shall meet the requirements of Section 7.5 using visible notification appliances.

A.7.5.1 There are two methods of visible signaling. These are methods in which notification of an emergency condition is conveyed by direct viewing of the illuminating appliance or by means of illumination of the surrounding area. Visible notification appliances used in the public mode must be located and must be of a type, size, intensity, and number so that the operating effect of the appliance is seen by the intended viewers regardless of the viewer's orientation. (See A.7.5 mounting height of appliances.)

A.7.5 The mounting height of the appliances affects the distribution pattern and level of illumination produced by an appliance on adjacent surfaces. It is this pattern, or effect, that provides occupant notification by visible appliances. If mounted too high, the pattern is larger but at a lower level of illumination (measured in lumens per square foot or foot-candles). If mounted too low, the illumination is greater (brighter) but the pattern is smaller and might not overlap correctly with that of adjacent appliances.

A qualified designer could choose to present calculations to an authority having jurisdiction showing that it is possible to use a mounting height of greater than 2.4 m (96 in.) or less than 2.0 m (80 in.), provided an equivalent level of illumination is achieved on the adjacent surfaces. This can be accomplished using listed higher intensity appliances or closer spacing, or both.

Engineering calculations should be prepared by qualified persons and should be submitted to an authority having jurisdiction, showing how the proposed variation achieves the same or greater level of illumination provided by the prescriptive requirements of Section 7.5.

The calculations require knowledge of calculation methods for high-intensity strobes. In addition, the calculations require knowledge of the test standards used to evaluate and list the appliance.

NFPA 72® 7.5.2 Light, Colour, and Pulse Characteristics.

7.5.2.1 The flash rate shall not exceed two flashes per second (2 Hz) nor be less than one flash every second (1 Hz) throughout the listed voltage range of the appliance.

7.5.2.2 A maximum pulse duration shall be 0.2 seconds with a maximum duty cycle of 40 percent.

7.5.2.3 The pulse duration shall be defined as the time interval between initial and final points of 10 percent of maximum signal.

7.5.2.4 Lights used for fire alarm signaling only or to signal the intent for complete evacuation shall be clear or nominal white and shall not exceed 1000 cd (effective intensity). Also see A.7.5.2.4.

A.7.5.2.4 Effective intensity is the conventional method of equating the brightness of a flashing light to that of a steady-burning light as seen by a human observer. The units of effective intensity are expressed in candelas (or candlepower, which is equivalent to candelas). For example, a flashing light that has an effective intensity of 15 cd has the same apparent brightness to an observer as a 15 cd steady-burning light source.

Measurement of effective intensity is usually done in a laboratory using specialized photometric equipment. Accurate field measurement of effective intensity is not practical. Other units of measure for the intensity of flashing lights, such as peak candela or flash energy, do not correlate directly to effective intensity and are not used in this standard.

Strobe lights be used to signal fire or other emergencies and might be intended to initiate evacuation, relocation, or some other behaviour. Lights intended to initiate evacuation due to fire are required by the Code to be clear or white. Colored lights, such as amber/yellow lights, might be used in a combination system for an emergency (fire, bomb, chemical, weather, etc.) when the intent is for the signal recipient to seek additional information from other source (voice, text displays, and so on).

NFPA 72® 7.5.3 Appliance Photometrics. The light output shall comply with the polar dispersion requirements of ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*, or equivalent.

3.2.4.18. Audibility of Alarm Systems
(See Appendix A.)

1) Audible signal devices forming part of a fire alarm system shall be installed in a building so that alert signals and alarm signals are clearly audible throughout the floor area in which they are installed. (See Appendix A.)

Installation of Alarms and Lights

Fire alarms must be audible in all areas of a building, including service areas such as mechanical penthouses and interstitial spaces. Walls separating suites are designed and constructed for better sound attenuation. To compensate for the intervening walls, designers shall install alarms within individual suites rather than increasing the size of the alarm bells (or ineffective alarm frequencies) in corridors.

All audible sounds must be accompanied with visual cues to ensure that the needs or access/safety issues of all users are addressed.

5) The sound pressure level in a sleeping room from a fire alarm audible signal device shall be not less than 75 dBA in a building of residential occupancy when any intervening doors between the device and the sleeping room are closed. (See Appendix A.)

Hospitality

Sentence (5) says that the audible signal shall be not less then 75 dBA, however, it is the recommendation of this Guide that the audible signal be not less then 85 dB. A higher decibel is not always effective at waking people who are deaf, or sound sleepers. A lower frequency is determined to be more effective where life safety is an issue.

Suites designated for use by persons who are deaf, hard of hearing, or deaf-blind shall also be equipped with visual signalling devices and a vibration device for the bed so that it will vibrate, helping to wake a person who is asleep when the alarm is activated. This single unit system usually fits under a pillow, and is also connected to a clock or telephone, which acts as an additional alert.

Apartment and Condominium Units

Designers shall install alarms within individual suites rather than increasing the size of the alarm bells (or adding ineffective alarm frequencies) in corridors. A variety of reasons for not being easily wakened must be considered, e.g., sound sleeper, medications, ear plugs, eye masks.

NFPA 72® 7.9 Textual Visible Appliances. (See A.7.9)

7.9.1 Application. Textual visible appliances shall be permitted if used in addition to audible or visible, or both, notification appliances.

Textual visible devices are used primarily to communicate information rather than act as an alarm.

7.9.2 Performance. The information produced by textual visible appliances shall be legible.

Examples of textual visible appliances include annunciators, panel displays (LED and LCD), CRTs, screens, and signs.

7.9.3 Location.

7.9.3.1 Private Mode. Unless otherwise permitted by the authority having jurisdiction, all textual visible notification appliances in the private mode shall be located in rooms that are accessible only to those persons directly concerned with the implementation and direction of emergency action initiation and procedure in the areas protected by the system.

7.9.3.2 Public Mode. Textual notification appliances used in the public mode shall be located to ensure readability by the occupants or inhabitants of the protected area.

Manual Fire Alarm Pull Stations

It is important that manual fire alarm pull stations be accessible to everyone since the purpose of an alarm is to notify all occupants that there may be or is danger of fire. In some buildings (see building classifications) the activation of an alarm will automatically transmit its signal to the fire department. Other buildings (see building classifications) will require the occupant to contact the fire department (or call 911) when the alarm has been activated.

3.8.1.5. Controls

1) Except as required by Sentence 3.5.2.1.(3) and Article 3.8.3.5. for elevators and platform-equipped passenger-elevating devices, controls for the operation of building services or safety devices, including electrical switches, thermostats and intercom switches, that are intended to be operated by the occupant and are located in or adjacent to a barrier-free path of travel shall be accessible to a person in a wheelchair, operable with one hand, and mounted between 400 mm and 1 200 mm above the floor.

3.2.4.16. Manual Stations

1) Except as permitted by Sentences (2) and (3), where a fire alarm system is installed, a manual station shall be installed in every floor area near

a) every principal entrance to the building, and

b) every exit.

(See Appendix A.)

2) In a building that is sprinklered throughout, a manual station is not required at an exterior egress doorway from a suite that does not lead to an interior shared means of egress in a hotel or motel not more than 3 storeys in building height, provided each suite is served by an exterior exit facility leading directly to ground level.

3) In a building that is sprinklered throughout, a manual station is not required at an exterior egress doorway from a dwelling unit that does not lead to an interior shared means of egress in a building not more than 3 storeys in building height containing only dwelling units, provided each dwelling unit is served by an exterior exit facility leading directly to ground level.

4) In a building referred to in Sentences (2) or (3), manual stations shall be installed near doorways leading from shared interior corridors to the exterior.

Tactile Warning Signals

3.3.1.7. Protection on Floor Areas with a Barrier-Free Path of Travel

4) In a barrier-free path of travel, a downward change in elevation shall be signalled by the use of a 600 mm wide tactile warning strip placed 250 mm from the edge and for the full width of a stair, escalator, moving walkway, ramp or platform and identified using colour and brightness contrast.

Embossed surfaces are used to warn people who are visually disabled of a change in condition. People using a cane rely on changes to surfaces for clues regarding their environment. A change in flooring material or a grid of truncated domes placed 60 mm apart and forming a floor texture can serve as a tactile warning strip.

To assist persons with limited vision and those who are blind, tactile warning strips in contrasting colours must be used at the top of escalators, ramps, moving walkways, stairways and at the edge of platforms not served by handrails or guards, as would be the case with transit stations. The required tactile warning strip shall begin 850 mm back from the edge in question and for its full width. It should feel and/or sound noticeably different when walked on, and be in a contrasting colour to the surrounding flooring. It should not cause a person to stumble.

Stairwells that are properly identified with tactile signals can also serve as a warning of a change in direction.

Grooves parallel to the direction of travel within the curb cut are often used to indicate a street.

NFPA 72® 7.10 Tactile Appliances.

7.10.1 Application. Tactile appliances shall be permitted if used in addition to audible or visual, or both, notification appliances.

7.10.2 Performance. Tactile appliances shall meet performance requirements of ANSI/UL 1971, *Standard for Safety Signaling Devices for Hearing Impaired*, or equivalent.

Wayfinding

Wayfinding is integral to orientation and often key in the safe/effective mobility of many populations (particularly for users with various types and levels of sensory disabilities). In the event of an emergency or when evacuation becomes necessary, it is recommended that all buildings have well planned and marked evacuation routes. The finishes used within the building (and perhaps with particular attention given to all forms of signage) can have a dramatic effect upon wayfinding for any building user.

There are four basic wayfinding information types: orientation, direction, identification and general information. There are four primary senses for using building information: visual, auditory, tactual and olfactory. The five general criteria of using colour/contrast, lighting, auditory, tactile and ergonomic design features or considerations apply to wayfinding for building users with visual disabilities.

Floor Numbering

3.4.6.18. Floor Numbering

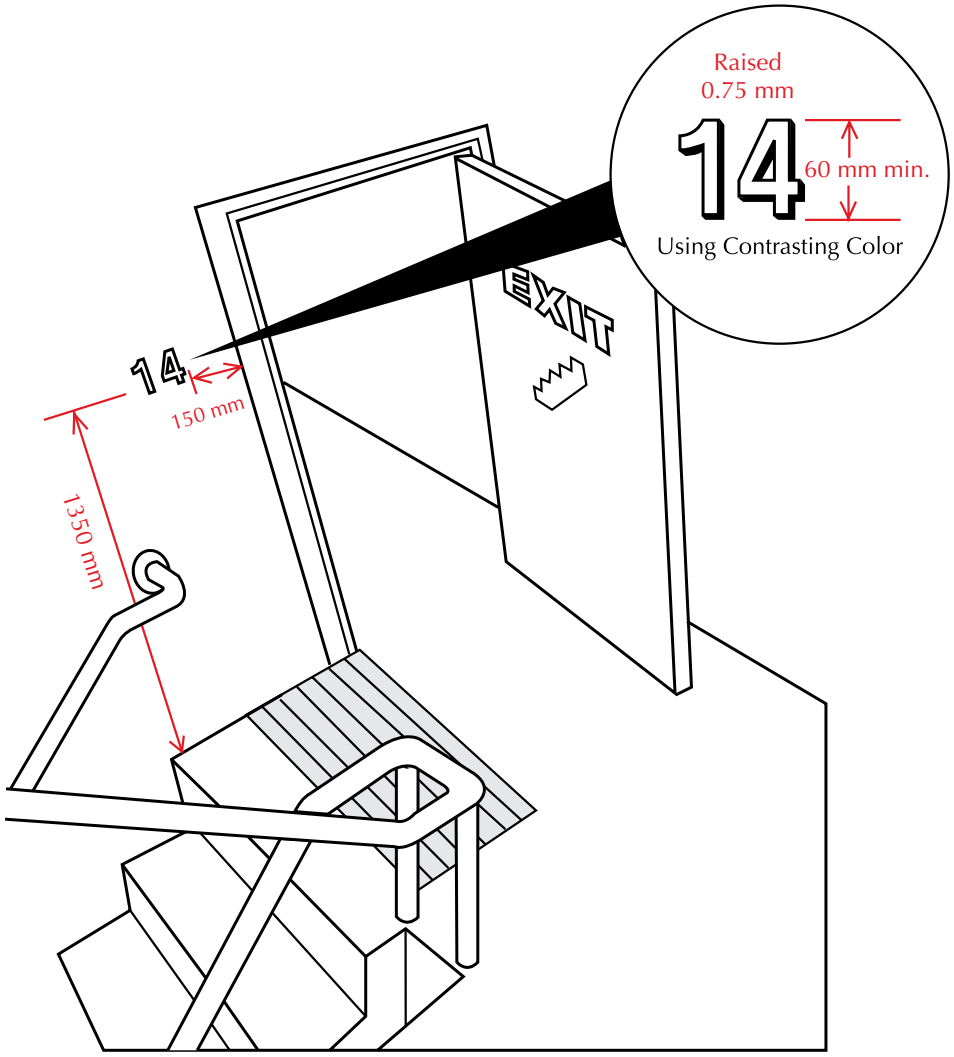
1) Arabic numerals indicating the assigned floor number shall

a) be mounted permanently on the stair side of the wall at the latch side of doors to exit stair shafts,

b) be not less than 60 mm high, raised approximately 0.7 mm above the surface,

c) be located 1 350 mm from the finished floor and beginning not more than 150 mm from the door, and

d) be contrasting in colour with the surface on which they are applied. (See Appendix A.)



NOTES

COMMUNICATION

VII

Entrance Security System

Entrances equipped with electromagnetic locks as part of a security system can create difficulties for people with hearing loss. Some entrances in walk-up apartments, for example, have security locks that are released from a remote location, such as a tenant's suite. Barrier-free design requires that both an audible and visual signal be provided to alert visitors that the locking mechanism is deactivated.

3.8.1.2. Entrances

6) If an entrance is equipped with a security system, both visual and audible signals shall be used to indicate when the door lock is released.

The installation of a telephone keypad configuration (like the recent CSA-approved design of the telephone keypad configuration for use in elevators) would be beneficial for all visitors for calling tenants from security entrances. Searching columns of buttons and corresponding long lists of names is time consuming and often impractical, if not impossible, for visitors with visual disabilities.

Public Telephones

3.8.3.15. Shelves or Counters for Telephones
(See Appendix A.)

1) If built-in shelves or counters are provided for public telephones, they shall be level and shall
- a) not be less than 265 mm deep,
- b) have, for each telephone provided, a clear space adjacent to the phone, not less than 265 mm wide, having no obstruction within 265 mm above the surface.

2) The top surface of a section of the shelf or counter described in Sentence (1) serving at least one telephone shall be not more than 865 mm above the floor.

3) If a wall-hung telephone is provided above a shelf or counter section described in Sentence (2), it shall be located so that the receiver and coin slot are not more than 1 370 mm above the floor.

4) At least one telephone with a built built-in telecommunication device for the deaf (TTY/TDD) shall be provided if public telephones are installed in lobbies or entrance foyers of
- a) buildings classified as Group A, Group B, Division 1, or Group E major occupancies,
- b) hospitals in Group B, Division 2, major occupancies,
- c) police stations in Group D, major occupancies or
- d) hotels and motels.

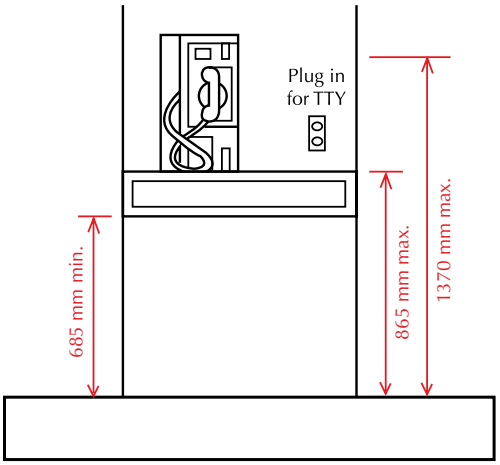
Telephone Service

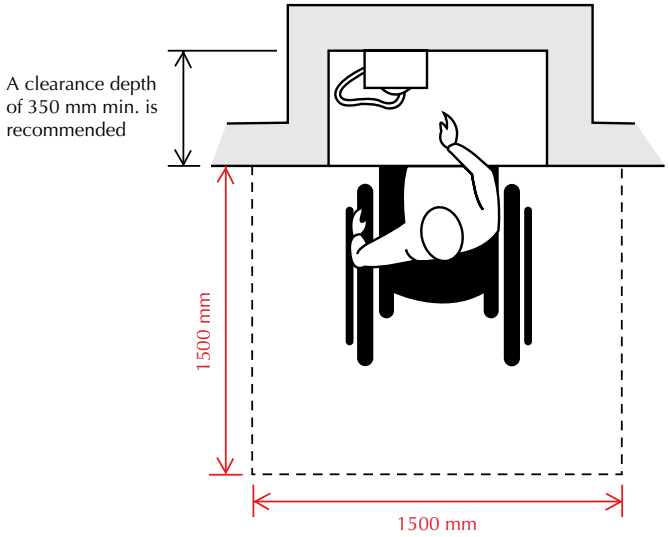
To make it accessible, an area of 1 500 mm × 1 500 mm is required to provide space to manoeuvre a wheelchair in front of a public telephone. Coin slots and other features must be within reach of a person sitting in a wheelchair. These must not be higher than 1 370 mm above the floor. A fold-down seat should be provided in order to make it easier to read an LCD screen or type messages on the keyboard. To add flexibility, a shelf or counter is required for setting down a portable teletypewriter (TTY) or a computer.

This space must be 265 mm deep, 265 mm wide, have a 265 mm clearance above it and be located no more than 865 mm above the floor.

Along with the foregoing measurements, any public telephone or bank of telephones should retain a cane-detectable partition in order for a person with visual disabilities to detect that s/he is approaching an area with projecting shelves and telephones.

A TTY provides a screen and keyboard for transmitting visual messages. There are two types of devices: portable devices that can be used with any telephone, and devices that are built into the bases of public telephones. The latter is expensive and must be placed in areas that are supervised, in order to prevent vandalism. In large complexes, such as shopping malls, where more than one bank of pay telephones is provided, signs should indicate the location of the TTY.





Assistive Listening Devices

3.8.3.7. Assistive Listening Devices

(See Appendix A.)

1) Except as permitted by Sentence (2), in a building of assembly occupancy, all assembly areas with an area of more than 100 m^2 shall be equipped with an assistive listening system encompassing the entire seating area.

2) If the assistive listening system required by Sentence (1) is an induction loop system, only half the seating area in the room need be encompassed.

Assistive Listening Device Systems

Wireless sound transmission systems, such as FM, infrared or an induction loop, improve sound reception for those who are hard of hearing by providing amplification that can be adjusted by the user. These systems block out unwanted background noise. They transmit signals that are picked up by special receivers worn by the person who has a hearing impairment. This person does not necessarily have to use a hearing aid. These systems do not interfere with the listening enjoyment of others.

The induction loop system requires users to sit in the area circumscribed by the loop. Though installation of the loop is relatively simple, the installer should be knowledgeable about these systems to ensure proper functioning.

FM or infrared systems can be designed to broadcast signals that cover the entire room, and thus do not restrict seating to any one area. The diagram shows the general configuration of FM and infrared systems. The transmitter for these wireless systems can be connected to the existing sound system amplifier, or be used independently with separate microphones.

Assistive Listening Devices (ALD) should be installed in all areas of any building where occupancy might be 50 persons and more. The appropriate number of ALDs required for each area can be determined with the assistance of the Canadian Hearing Society or Canadian Hard of Hearing Association. These same organizations can assist in choosing the most appropriate system (including information on cost, installation and maintenance; suitability to the audience; ease of operation and the need for privacy) and report on designers and suppliers.

Generally, the systems installed in church halls, auditoria, theatres and similar places of assembly are not portable; they are installed as part of the fixed-sound system for the facility.

Hard-wired systems (where a jack is provided at a particular seat) require special individual volume control provisions to accommodate people with varying degrees of hearing impairment.

Signage

3.8.3. Design Standards

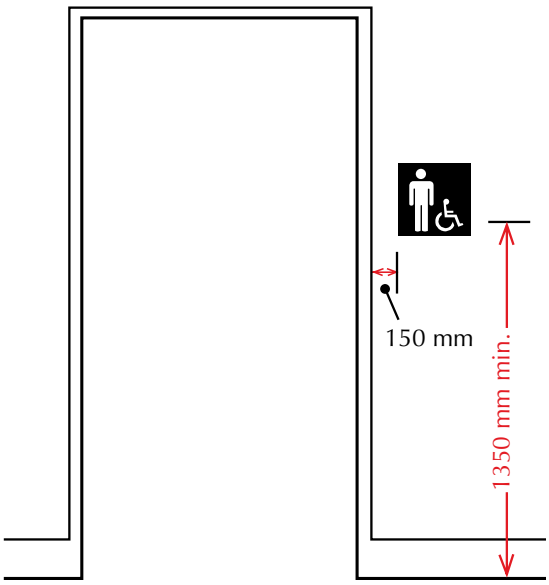
3.8.3.1. Accessibility Signs

1) Signs incorporating the international symbol of accessibility for persons with physical disabilities shall be installed to indicate the location of a barrier-free entrance. (See Appendix A.)

2) A washroom, shower, elevator or parking space designed to be barrier-free shall be identified by a sign consisting of the international symbol of accessibility for persons with physical disabilities and by appropriate graphic or written directions to indicate clearly the type of facility available. (See Appendix A.)

3) Facilities and services for persons with a specific disability shall be identified using nationally recognized symbols. (See Appendix A.)

4) Accessibility signs of universal toilet rooms shall be installed in accordance with Clause (5)(b).



5) Where tactile signage is installed, it shall

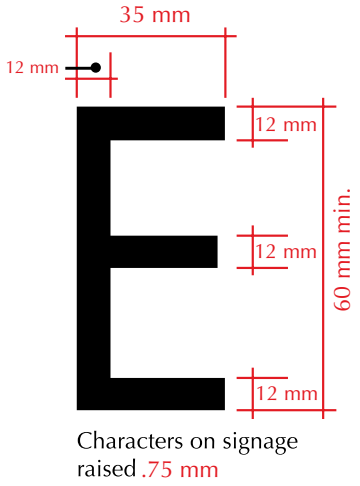
a) be not less than 60 mm high, raised approximately 0.7 mm above the surface,

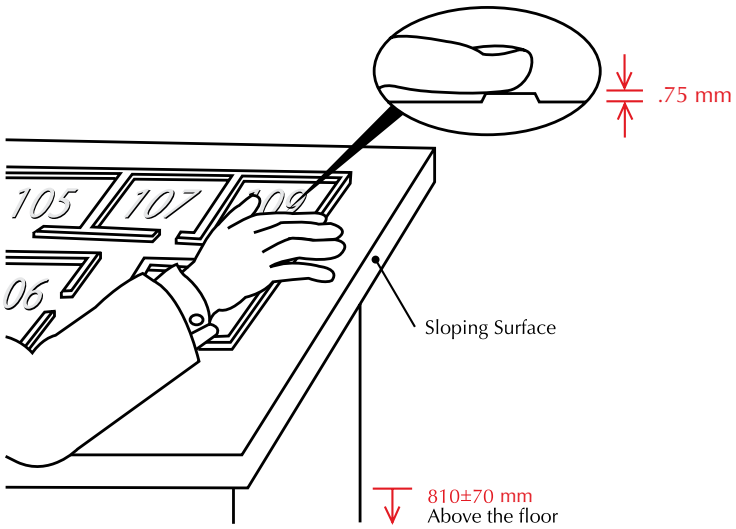
b) be located not more than 1 200 mm above the finished floor,

c) begin not more than 150 mm from the door or entrance,

d) be contrasting in colour with the surface on which it is applied, and

e) include Braille identification by use of Braille dots not less than 1 mm in relief, located directly below the tactile signage.





The International Symbol

The international symbol indicates that persons with disabilities will have reasonable freedom of movement within a building so signed. The symbol is usually white on a blue background. Where the colours do not stand out, the symbol can be in blue on a white background. Though other contrasting colours may be used, these should be avoided if possible. An arrow can be added to indicate direction or the location of an accessible space or facility.

Additional Symbols

Facilities provided for people with hearing impairments shall be indicated with a symbolic ear with the beginnings of a line through it.

Facilities provided for those with visual impairments shall be indicated with a figure using a white cane.

Alternate Forms of Communication for People with Visual Disabilities

Recent technology (such as a product known as Talking Signs) offers infrared wireless communication systems where pedestrians who are visually impaired may use a receiver to pick up remote directional voice messages. Destination points in a structure can be equipped with infrared equipment that provides beams of invisible light to receivers that pedestrians would use. Verbal messages can then be provided through the receiver directly or through a headset. Such technology may be used in both internal and external environments. This would, for people who have visual impairments, either augment or replace the need for sighted guides or tactile/high contrast directories.

Signage

People with visual disabilities rely on cues to find their way. Doors and openings that lead from public places and through which the public is permitted to enter shall be identified by specific tactile signs with letters not less than 60 mm high and raised 0.75 mm above the surface, and located 1 350 mm above the floor surface and beginning not more than 150 mm from the door openings.

Persons with visual disabilities rely on

- lighting cues, i.e., the intensity and distribution of lights used to accent areas and passageways,
- audible cues, i.e., subtle sounds, such as a fountain, clock, music, machine or verbal announcement, to help with orientation,
- tactile cues, i.e., different types of flooring that mark a pathway, or change from one area to another, thus serving as a warning that a change in direction is to take place,
- colour/contrast cues, i.e., used to define the location of doorways, building controls (such as light switches and thermostats) and protruding elements, such as handrails and fire extinguishers, and
- ergonomic cues, i.e., the design of rooms and the arrangement of furnishings that allow people to move efficiently and safely along pathways within rooms and from room to room.

Accessibility for Persons with Language Difficulties

The use of graphics or internationally recognized symbols to indicate direction or identify facilities and services will be beneficial to persons with

- developmental disabilities,
- learning disabilities,
- brain injuries,
- mental illnesses causing disorientation or confusion, or
- little to no knowledge of the local written language.

However, if wording is to be used on signs, the language on them must be simple and concise to be accessible for most building users.

Directories

Building directories should be conveniently located, tactile in nature and located on a sloping plane 760 mm to 900 mm above the floor. Characters that are raised at least 0.75 mm are needed.

Persons who are blind can be given directions by the use of pre-recorded messages or the use of tactile maps and signs. Guide dogs and canes are also used to aid the blind.

Those with visual disabilities or who are deaf-blind rely on the following cues for orientation:

- colour contrast/brightness
- changes in illumination
- sounds
- textures (different flooring materials to indicate change in direction or use)
- standard architectural features
- patterns
- placement of elements

Colour Contrast

The identification of floors and other signs intended to help orient people who are visually disabled should offer maximum colour contrast to be effective. For this reason, it is recommended that white on black or black on white is used, as this combination produces the best legibility.

It is also recommended that sign surfaces be processed to prevent glare. Assigned floor numbers should have a glare-free surface and be mounted on a background in a contrasting colour.

NOTES

INFORMATION AND DESIGN BASICS FOR PERSONS WITH DISABILITIES AND SENIORS

VIII

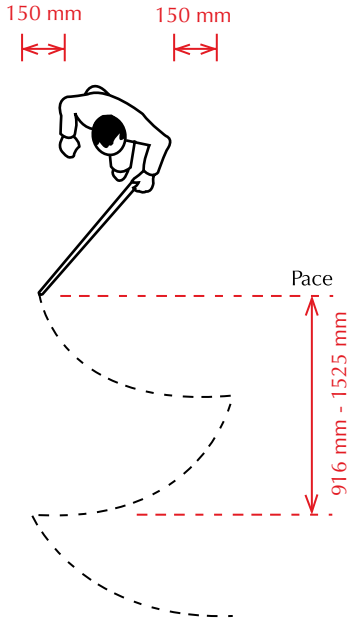
Barrier-Free Design Basics for People with Visual Disabilities

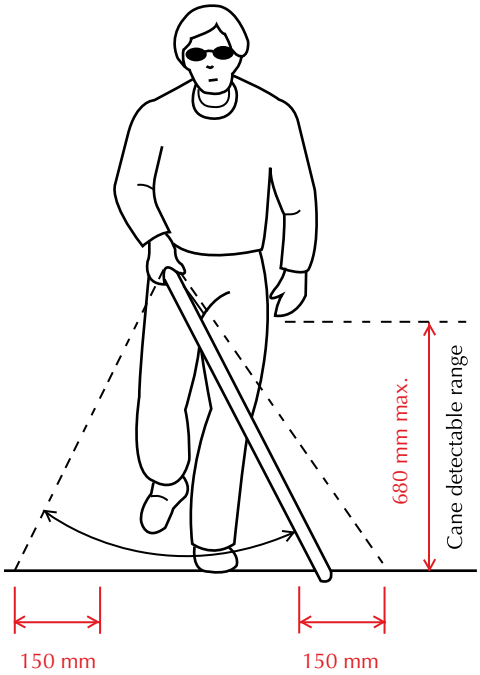
Canadians with visual disabilities is not a homogenous group as there are many types and levels of eye conditions. For example, a person with an eye condition might require a dimly lit environment, when another person with a different eye condition may require intense lighting for functional living. The guidelines listed, therefore, reflect a well-researched average way of addressing related design issues to best accommodate people with these disabilities.

Effective barrier-free design for built-environment users with visual disabilities relies upon

- colour/contrast cues, which can be used to define building landmarks, help one identify obstacles in a path of travel and assist with locating building controls such as light switches, thermostats and fire alarms;
- lighting, planned to enhance the intensity and distribution of artificial lighting sources while minimizing glare and back-lit areas;
- auditory cues, which can help a person to map his/her environment through sounds, such as water fountains, music or public address systems;
- tactile and kinaesthetic cues, such as the application of different floor surfaces and approved tactile warning surfaces; and
- ergonomics, which can be applied to room arrangements with logical, effective furniture use, helping a person map his/her path of travel and avoid hazardous building zones.

Note that the design considerations are not mutually independent. The five areas are all necessary for effective design.





Barrier-Free Design Basics for People who are Deaf

A person who is deaf has little or no functional hearing and depends on visual communication such as sign language, reading and writing. Since a person who is deaf cannot hear speech, s/he relies on visual cues such as a light to alert him/her of a ringing telephone, a doorbell or an alarm. Individuals who are deaf require good lighting and open spaces because this allows them to view their surroundings. An open layout designed with as few walls, wall dividers and columns as possible will increase the ability of these individuals to scan an area.

Barrier-Free Design Basics for People who are Deaf-Blind

Those who are deaf-blind have a dual disability. Many of these individuals retain some varying and limited degree of either hearing or sight. They often rely more upon their kinesthetic senses (e.g., touch, heat, pressure) to function within built environments. Building designs that benefit people with visual disabilities as well as those who are hard of hearing or deaf are also often beneficial to deaf-blind populations.

Barrier-Free Design Basics for People who are Hard of Hearing

As with people who have a loss of vision, those with hearing loss are not a homogeneous group. There is a broad spectrum of hearing loss, including those with hearing loss that comes on late in life. A hard of hearing person relies on visual cues, such as light signals and captions. Open designs with non-glare surfaces are most suitable.

Barrier-Free Design Basics for People with Communication and Cognitive Disabilities

Communication disabilities (such as aphasia, i.e., difficulty talking, understanding, reading and/or writing) can result after injury to the brain (such as a stroke). Signs with simple pictures and with written information limited to short, simple concepts is important for this group. People with communication disabilities may also benefit from the use of design considerations for those with visual disabilities (e.g., colour/contrast, lighting, auditory, tactile/kinaesthetic and ergonomic cues). People with communication disabilities may or may not also have mobility issues.

These listed considerations and solutions are similar for people with cognitive disabilities.

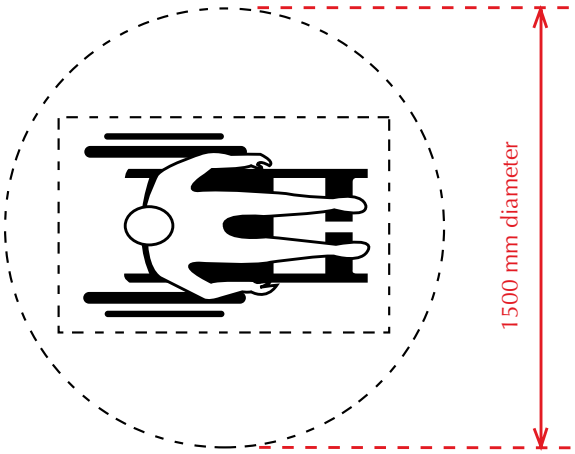
Barrier-Free Design Basics for Seniors

The majority of seniors (those 65 and over) are subject to some form of age-related change in their abilities, such as loss of vision, loss of hearing, arthritis, stroke, or hip or knee replacement. Some of these factors create mobility limitations, creating an increase in the number of people who rely on mobility devices such as walkers, wheelchairs or power scooters to get around. In addition to space for these tools, lighting and auditory levels need to be addressed in order for seniors to function independently and safely.

Barrier-Free Design Basics for People Using Mobility Devices

People who experience decreased hand and finger dexterity; limited ranges of motion; decreases in strength, balance or co-ordination; or fatigue may require the use of a mobility device, such as a walker, cane, brace, crutch, wheelchair or scooter. These devices require ease of access to buildings and all facilities and services. This includes a barrier-free safe path of travel, accessible entrances (preferably at zero grade with powered doors), accessible washrooms and stalls, access to paper towels and soap dispensers, lever handles, larger handles on locking devices, and a turning radius to accommodate

wheelchairs or scooters. These adaptations also benefit parents with strollers, delivery people and those manoeuvring presentation materials.



Wayfinding

Wayfinding for access and use of public buildings has often relied upon graphic designers or interior decorators/designers to incorporate information after a structure is planned and sometimes even after construction has commenced. The topic of wayfinding, however, is integral to the orientation and often the safe/effective mobility of many populations (particularly for those building users with various types and levels of sensory disabilities). It is recommended, therefore, that all building design and construction professions keep wayfinding in mind from the conceptual planning to the final design stages, and even during the construction of facilities.

Note that the finishes of a building (and all forms of signage) can have a dramatic effect upon wayfinding for any building user.

The four basic wayfinding information types are orientation, direction, identification and general information. The four primary senses for using building information are visual, auditory, tactual and olfactory. The five general criteria of using colour/contrast, lighting, auditory, tactile and ergonomic design features apply to wayfinding for building users with visual disabilities.

Visitability

Visitability promotes inclusion and social integration of those with disabilities into their communities rather than isolating them in their own homes, or forcing them into institutions. Homes that allow visitability—whether or not designated for residents who currently have mobility limitations—offer some specific accessibility features, such as one zero-step entrance on an accessible route leading from a driveway or public sidewalk, all interior doors providing at least 850 mm of unobstructed passage space, and a half bath on the main floor.

Environmental Design Considerations for the Morbidly Obese/Bariatric Population

Considerations must be made for the growing population of severely obese and bariatric individuals in Canada. In general, bariatric individuals can be described by any of the following: overweight by greater than 100 – 200 lbs, a body weight greater than 300 lbs, and/or a BMI greater than 40. Individuals that are severely or morbidly obese (bariatric) are at greater risk for many disabling conditions such as stroke, diabetes, cancer, reduced respiratory function, etc. They also experience decreased mobility and less independence with activities of daily living due to obesity itself.

Current basic building standards are not adequate to accommodate individuals who are severely and morbidly obese and who rely on mobility aids such as larger, bariatric 4-wheeled walkers, wheelchairs and scooters. Doorways and hallways are too narrow, stairs are very difficult to negotiate and turning radii are too small.

The following information is useful when designing or modifying private dwellings, and congregate dwellings and facilities to accommodate individuals who are severely or morbidly obese. It can also be beneficial when developing public spaces, especially as it relates to entry ways, door widths, corridors and water closets.

Bathrooms/Showers

- Avoid use of wall-mounted toilets.
- Use bariatric floor-mounted toilets that are rated to 450 kg. CAUTION: Bariatric toilets are deeper and wider, and may have a higher seat height, making it difficult for the bariatric individual to use, especially if of shorter stature.
- Use a bariatric commode over a standard toilet, if not using a bariatric toilet. The seat height can be adjusted to fit the individual's needs. A floor-mounted toilet with an unattached flush tank has more options for use with various bariatric commodes.
- Have a minimum distance of 530 mm between the toilet and the flanking wall. A greater distance may be indicated if assistance from caregivers and/or larger equipment is required.
- Locate toilets so that they can be accessed by moving sideways rather than twisting and making a 90° or 180° turn.
- Have a clear width of approach of at least 1 140 mm for urinals in order to accommodate individuals using wider wheelchairs.
- Avoid floor sinks, as they interfere with wheelchairs. Instead provide extra support to wall-mounted sinks/counters.
- Allow a larger turning radius for individuals using wheelchairs. A recommended 1 900 mm turning radius for wheelchairs or commodes and a caregiver is suggested.
- Ensure that wall-mounted grab bars are structurally reinforced and rated to handle 4.5 kN (454 kg). They should also be mounted further forward from the back wall.
- Mount toilet tissue dispensers sufficiently in front of the toilet to allow ease of access and to not interfere with grab bar use.
- Use texture-tiled open showers with floor drains. Avoid enclosing walls, instead using shower curtains to allow for ease of access and assistance by caregivers, if needed.
- Include multiple, reinforced grab bars [rated for at least 4.5 kN (454 kg)] for showers. The grab bars must be located so that they can be reached by a user who is obese.
- Ensure that the dimensions of private showers are at least 1 500 mm × 1 500 mm. If assistance is required, the dimensions should be greater to accommodate the caregiver (i.e., 1 830 mm × 1 500 mm or more).
- Incorporate a removable shower head. A bariatric shower seat/commode may also be necessary.
- Avoid curbs into accessible showers.

Doorways/Corridors/Elevators

- Ensure that doorways have a minimum clearance of 1 140 mm. This clearance can accommodate an individual in a wheelchair with a total width of 990 mm (approximately 760 mm seat width), with 76 mm clearance on either side.
- Consider that the use of oversized equipment may require a door clearance larger than 1 140 mm. A larger door width can be accomplished by using unequal-leaf swing doors. For example, one leaf might be 1 066 mm and the other 457 mm for an overall width of 1 524 mm, which would accommodate a bariatric hospital bed. Other ways to maximize door clearance include the use of pocket doors, folding doors and off-set hinges.
- Increase the width of corridors/hallways to accommodate larger girth and equipment. An 890 mm corridor accommodates a user with a 711 mm bariatric walker. A 1 500 mm wide corridor allows for one person who is obese and using a walker and one person of regular size and no equipment to pass. If passage of larger equipment is required (e.g., a bariatric wheelchair), hallways wider than 1 500 mm (i.e., 1 830 mm or more) should be considered to allow passage and the turning of wheelchairs.
- Make elevator door clearances as large as possible (and a minimum of 1 140 mm). The interior dimensions should be a minimum of 1 828 mm × 2 032 mm to allow for a larger turning radius of the wheelchairs and the transportation of a stretcher with two caregivers (e.g., for emergency services).

Accessible Entrances/Ramps

- Use ramps that have a minimum unobstructed width of 1 140 mm to allow for larger wheelchair widths and clearance for individuals to propel the wheelchair.
- Use a gradient of 1 in 20 because of the increased weight of the individual who is obese, considering that self-propulsion and/or caregiver effort when pushing the wheelchair will be greater.
- Have a minimum 1 500 mm × 1 500 mm level area where a ramp makes a 90° or 180° turn, and at intermediate levels as required in longer ramps.
- Ensure that curb cut outs and openings are at least 1 140 mm wide to accommodate larger wheelchair widths.
- Ensure that doorways located in a barrier-free path of travel have a minimum clearance of 1 140 mm
- If a door swings open toward the wheelchair user, increase the clear space on the latch side of door to a minimum of 760 mm to allow for the increased turning radius of larger wheelchairs.
- Where a doorway or stairway empties onto a ramp through an end wall, have a level area extending across the full width of the ramp (e.g., 1 140 mm) and along its length for not less than 1 500 mm.
- Increase load values for handrails so that they can withstand the increased weight of individuals who are obese. Recommend construction to withstand a minimum of 4.5 kN (454 kg) applied at any point and in any direction and a uniform load of 3.3 kN (340 kg) applied in any direction to handrails located outside of dwelling units

Bedrooms/Private Spaces

- Have 1 500 mm of clearance available around the bed of an obese individual to allow room for caregiver assistance, equipment such as wheelchairs and walkers, and space for lifts to be manoeuvred beside the bed.
- Have grab bars rated for at least 454 kg placed strategically from bed to toilet to allow increased independence with toileting.
- Consider space for oversized furniture and storage of oversized equipment (i.e., 1 sq m for a portable lift, 370 sq m for a walker, 1.5 sq m for a wheelchair, 465 sq mm for a commode).
- Consider that individuals who are obese are sensitive to ambient temperatures. Recommend strategies to help them control temperature in personal spaces, e.g., increase air conditioning capacity, allow access to temperature controls, add a ceiling fan or portable fan.

For further information on bariatrics, please contact:

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DEFINITIONS

The Guide may contain terms that are unfamiliar, so the following terms have been defined to increase awareness and understanding and to provide effective implementation of barrier-free design.

Access to Exit – a means of egress within a floor area that provides access to an exit serving the floor area.

Accessibility – the ability or ease that a person with a physical or sensory disability, or with limited language skills, may approach, enter and use buildings, facilities and services, as well as receive or send communication or information.

Adaptable – built-in design features that allow flexibility and adjustability, such as a height-adjustable sink and cook top, or adequate framing in walls and additional electrical rough-in allowing simple, economical and structurally adequate modifications, including adding grab bars or visual alarms; adaptability accommodates the needs of all occupants and allows more effective functioning.

Alteration – a change or extension to any matter (includes a building) or thing or to any occupancy regulated by the Alberta Building Code.

Assembly Occupancy (Group A) – the occupancy or use of a building, or part thereof, by a gathering of persons for any reason, e.g., civic, political, travel, religious, social, educational, recreational or like purposes, or for the consumption of food or drink.

Assistive Listening Devices – electronic devices installed to make communication easier in difficult listening environments. Special equipment is used to minimize the effects of noise, echoes and distortion in an unfriendly acoustic building.

Authority Having Jurisdiction – a safety codes officer in the building discipline exercising authority pursuant to the designation of the powers and terms of employment, in accordance with Section 28 of the Safety Codes Act.

Bariatrics (Morbid Obesity) – persons who are much larger in physical size and heavier in weight than other individuals.

Barrier-Free – the absence of obstacles in an environment, therefore allowing persons with physical, mental or sensory disabilities safer and easier access into buildings and then use of those buildings and related facilities and services.

Building Area – the greatest horizontal area of a building above grade within the outside surface of exterior walls or within the outside surface of exterior walls and the centre line of firewalls.

Building Height (in Storeys) – the number of storeys contained between the roof and the floor of the first storey.

Business and Personal Services Occupancy (Group D) – the occupancy or use of a building, or part thereof, for the transaction of business or the rendering or receiving of professional or personal services.

Cane Detectable – the ability of a white-cane user to differentiate ground or floor surface changes and to detect obstacles generally within his/her path of travel in a built environment. Any obstacle projecting into a path of travel in excess of 100 mm and situated more than 680 mm above the floor or ground surface is not considered cane detectable.

Care Occupancy (Group B, Division 2) – the occupancy or use of a building, or part thereof, by persons who require special care or treatment because of mental or physical limitations.

Dwelling Unit – a suite operated as a housekeeping unit and used, or intended to be used, as a domicile by one or more persons; usually contains cooking, eating, living, sleeping and sanitary facilities.

Exit – that part of a means of egress, including doorways, that leads from the floor area it serves to a separate building, an open public thoroughfare or an exterior open space protected from the building's fire and having access to an open public thoroughfare.

Fire Separation – a construction assembly that acts as a barrier against the spread of fire.

First Storey – the uppermost storey having its floor level not more than 2 m above grade.

Flex Housing – a concept in housing that incorporates, at the design and construction stage, the ability to make future changes easily and with minimum expense in order to meet the evolving needs of occupants. The intent is to allow homeowners to occupy dwellings for longer periods of time, perhaps over entire lifetimes, while adapting to changing circumstances and meeting a wide range of needs. For example, a large bedroom can be easily renovated into two smaller ones.

Floor Area – the space on any storey of a building between exterior walls and required firewalls, including the space occupied by interior walls and partitions, but not including exits, vertical service spaces or their enclosing assemblies.

Guard – a protective barrier around an opening in a floor or at the open side of stairs, a landing, balcony, mezzanine, gallery, raised walkway or other location; used to prevent accidental falls from one level to another; such a barrier may or may not have openings through it.

Hard of Hearing – any person who has a hearing loss of any degree and whose usual means of communication is spoken language; includes a broad spectrum of hearing loss, including those who lose hearing later in life; a hard of hearing person has difficulty understanding speech, and therefore depends on visual cues such as light signals, captions, etc.

Major Occupancy – the principal occupancy for which a building, or part thereof, is used or intended to be used; this includes the subsidiary occupancies that are an integral part of the principal occupancy.

Mercantile Occupancy – the occupancy or use of a building, or part thereof, for the displaying or selling of retail goods, wares or merchandise.

Occupancy – the use or intended use of a building, or part thereof, for the shelter or support of persons, animals or property.

Orientation and Mobility – the field dealing with systematic techniques by which those who are blind or visually disabled orient themselves to their environments and move about safely and independently.

People with Visual Disabilities – includes those with partial vision, as well as those who are blind, deaf-blind and elderly people with visual deterioration.

Project – any construction, alteration or demolition operation.

Residential Occupancy (Group C) – the occupancy or use of a building, or part thereof, by persons for whom sleeping accommodation is provided but who are not harboured or detained to receive medical care or treatment.

Safety Codes Officer – an individual certified as such and given designated powers by the Safety Codes Council.

Signaling (Alerting) Devices – used to indicate the telephone, doorbell or other loud sounds in a building by changing the auditory signal to a visual or vibratory signal.

Sprinklered (as applying to a building) – means that the building, or part thereof, is equipped with a system of automatic sprinklers.

Storey – that portion of a building that is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of the floor and the ceiling above it.

Suite – a single room, or series of rooms of complementary use, operated under a single tenancy; includes dwelling units and individual guest rooms in motels, hotels, boarding houses, rooming houses and dormitories, as well as individual stores and individual or complementary rooms for business and personal service occupancies.

TTY – stands for teletypewriter; a device that allows a person who is deaf or hard of hearing to communicate over a telephone line.

Turning Radius – an area that allows a person who uses a wheelchair or a scooter the ability to make a 360° turn without encountering obstacles.

Universal Design – design that adapts to meet the needs of all users occupying the space.

Visitability – Homes—whether or not designated for residents who currently have mobility limitations—offer some specific accessibility features, such as one zero-step entrance on an accessible route leading from a driveway or public sidewalk, all interior doors providing at least 850 mm of unobstructed passage space, and a half bath on the main floor.

Wayfinding (and Signage) – visual and audible or textural cues that guide a person more safely and easily through an environment.

THE PRINCIPLES OF UNIVERSAL DESIGN

Universal design is 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.

PRINCIPLE ONE: Equitable Use

The design must be useful and marketable to people with diverse abilities.

Guidelines:

1a. Provide the same means of use for all users: identical whenever possible; equivalent when not.
1b. Avoid segregating or stigmatizing any users.
1c. Allow provisions for privacy, security and safety that are equally available to all users.
1d. Make the design appealing to all users.

PRINCIPLE TWO: Flexibility in Use

The design will accommodate a wide range of individual preferences and abilities.

Guidelines:

2a. Provide choice in methods of use.
2b. Accommodate right- or left-handed access and use.
2c. Adapt to user's accuracy and precision.
2d. Provide adaptability to the user's pace.

PRINCIPLE THREE: Simple and Intuitive Use

Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills or current concentration level.

Guidelines:

3a. Eliminate unnecessary complexity.
3b. Be consistent with user expectations and intuition.
3c. Accommodate a wide range of literacy and language skills.
3d. Arrange information consistent with its importance.
3e. Provide effective prompting and feedback during and after task completion.

PRINCIPLE FOUR: Perceptible Information

The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Guidelines:

4a. Use different modes (e.g., pictorial, verbal, tactile) for redundant presentation of essential information.
4b. Provide adequate contrast between essential information and its surroundings.
4c. Maximize legibility of essential information.
4d. Differentiate elements in ways that can be described (in order to make it easy to give instructions or directions).
4e. Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

PRINCIPLE FIVE: Tolerance for Error

The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Guidelines:

5a. Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated or shielded.

5b. Provide warnings of hazards and errors.

5c. Provide fail-safe features.

5d. Discourage unconscious actions in tasks that require vigilance.

PRINCIPLE SIX: Low Physical Effort

The design can be used efficiently and comfortably and with a minimum of fatigue.

Guidelines:

6a. Allow users to maintain neutral body position.

6b. Use reasonable operating forces.

6c. Minimize repetitive actions.

6d. Minimize sustained physical effort.

PRINCIPLE SEVEN: Size and Space for Approach and Use

Appropriate size and space is provided for approach, reach, manipulation and use regardless of user's body size, posture or mobility.

Guidelines:

7a. Provide a clear line of sight to important elements for any seated or standing user.

7b. Make reach to all components comfortable for any seated or standing user.

7c. Accommodate variations in hand and grip size.

7d. Provide adequate space for the use of assistive devices or personal assistance.

Please note that the Principles of Universal Design address only universally usable design, while the practice of design involves more than considerations for usability. Designers must also incorporate other considerations, such as economic, engineering, cultural, gender and environmental concerns, into design processes. These principles offer designers guidance to better integrate features that meet the needs of as many users as possible.

Compiled by advocates of universal design, listed in alphabetical order:
Bettye Rose Connell, Mike Jones, Ron Mace, Jim Mueller, Abir Mullick, Elaine Ostroff, Jon Sanford, Ed Steinfeld, Molly Story and Gregg Vanderheiden.

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ADAPTABLE DWELLING UNITS (06-BCI-010 STANDATA MARCH 2008)

DISCUSSION

This STANDATA has been developed to clarify the requirements for adaptable dwelling units in residential projects that have received full or partial funding from the Government of Alberta. Sentence 3.8.1.1.(3) sets out the requirements for when a project is required to incorporate adaptable dwelling units. For the purposes of this STANDATA, "adaptable" means a dwelling unit that has been designed to allow it to be altered to make the dwelling unit consistent with the principles of barrier-free design.

The Appendix note to Sentence 3.8.1.1.(3) explains that there must be a certain amount of flexibility incorporated into the dwelling units at the time of construction. As an example, if a dwelling unit is inhabited by an able-bodied person as well as a person who uses a wheelchair, the heights at which the kitchen counters are to be installed become an issue. Flexibility must allow the height of different work stations to be raised or lowered so that the dwelling unit may be converted one way or the other to cater to the need of its current tenants.

Some of the items that are discussed in this STANDATA are seen to be required features of an adaptable dwelling unit in order to allow it to be altered to become barrier-free at some later date.

In addition to the items deemed to be required features, the following items should be taken into consideration, but are not mandatory, when designing and constructing a building with adaptable dwelling units:

- Lighting should be equipped to provide illumination to an average level not less than 50 lx at floor or tread level in all living spaces of the dwelling unit.
- Door frames and base boards should be contrasting in colour and texture with the surface to which they are applied.
- Windowsills should be located not more than 865 mm above the floor level and be equipped with opening devices of a design which does not require tight grasping and twisting of the wrist as the only means of operation.
- Controls for the operation of building services or safety devices, including electrical switches and outlets, thermostats and intercom switches should be accessible to a person in a wheelchair, operable with one hand, and mounted between 400 mm and 1 200 mm above the floor.
- Sinks and lavatories should be equipped with faucets that operate automatically or have lever-type handles that do not close under spring action.
- Bathrooms should be designed to allow for the installation of grab bars that conform with the requirements of Clause 3.8.3.8.(2)(b), (c) and (d).

Please refer to the following publications for additional information on barrier-free design principles in residential occupancies:

- "Barrier-free Design Guide", published by the Safety Codes Council
- CAN/CSA B651-04, "Accessible Design for the Built Environment"
- "Accessible Kitchens & Bathrooms by Design: Universal Design Principles in Practice", published by McGraw-Hill Companies (ISBN 0070499802)

CODE REFERENCES

1. Sentence 3.8.1.1.(3) states:

3) If a residential project is funded in whole or in part by the Government of Alberta, adaptable dwelling units which could be made to meet barrier-free design principles shall be provided as follows:

a) 2 or more in a project of 10 to 25 dwelling units,

b) 5 or more in a project of 26 to 50 dwelling units,

c) 10 or more in a project of 51 to 100 dwelling units,

d) 15 or more in a project of 101 to 200 dwelling units, and

e) 20 or more in a project exceeding 200 dwelling units.

(See Appendix A.)

2. Appendix note A-3.8.1.1.(3) states:

A-3.8.1.1.(3) Adaptable Dwelling Units. Providing adaptable dwelling units which could be made to meet barrier-free design principles needs further clarification. In designing dwelling units, it is difficult to anticipate the specific needs of individuals. If a dwelling unit is inhabited by an able-bodied person as well as a person confined to a wheelchair, the height at which the kitchen counters are to be installed becomes an issue. Flexibility must allow the height of different work stations to be raised or lowered. Adaptable means that the dwelling unit can be adjusted to suit all occupants' needs. For this to happen, each occupant's physical limitations must be understood. As a general rule, the pathway from the street to the entrance of the dwelling unit must be well marked and free of curbs or steps. A person in a wheelchair must be able to turn into and turn around in any room. Work stations for persons in wheelchairs must be capable of being lowered to the person's height with allowance for their feet beneath. For persons who are blind or deaf, a common electric circuit must interconnect all rooms and be able to be connected to the fire alarm, intrusion alarm, intercom or phone system.

INTERPRETATION

Adaptable dwelling units required by Sentence 3.8.1.1.(3) shall incorporate the following features:

1) Entryways, kitchens, washrooms and laundry areas (if applicable) shall be designed to allow a person using a wheelchair to turn in an open space that has a diameter of not less than 1 500 mm.

2) Every doorway into rooms within the dwelling unit shall have a clear width not less than 800 mm when the door is in the open position. (See Appendix A).

3) A threshold for a doorway referred to in Sentence (2) shall be not more than 13 mm higher than the finished floor surface and shall be bevelled to facilitate the passage of wheelchairs.

4) At least one washroom in the dwelling unit shall be provided with a barrier-free shower that shall

a) be not less than 1 500 mm wide and 900 mm deep,

b) have a clear floor space at the entrance to the shower, not less than 900 mm deep and the same width as the shower, except that fixtures are permitted to project into that space provided they do not restrict access to the shower (see Appendix A),

c) have a slip-resistant floor surface,

d) have a bevelled threshold not more than 13 mm higher than the finished floor, and

e) have a pressure-equalizing or thermostatic mixing valve controlled by a lever or other device operable with a closed fist.

5) The washroom referred to in Sentence (4) shall be provided with a lavatory that

a) is located so that the distance between the centreline of the lavatory and the side wall is not less than 460 mm,

b) has a rim height not more than 865 mm above the floor,

c) has a clearance beneath the lavatory not less than

i) 760 mm wide,

ii) 735 mm high at the front edge,

iii) 685 mm high at a point 205 mm back from the front edge, and

iv) 230 mm high over the distance from a point 280 mm to a point 430 mm back from the front edge

(see Appendix A), and

d) has insulated pipes where they would otherwise present a burn hazard (see Appendix A).

6) The washroom referred to in Sentence (4) shall be provided with a water closet that shall

a) be equipped with a seat located at not less than 400 mm and not more than 460 mm above the floor,

b) be equipped with hand-operated flushing controls that are easily accessible to a wheelchair user or be automatically operable,

c) be equipped with a seat lid or other back support,

d) not have a spring-actuated seat, and

e) have a clearance to the walls of

i) not less than 285 mm and not more than 305 mm on one side, and

ii) not less than 875 mm on the other side.

(See Appendix A).

7) The washroom referred to in Sentence (4) shall be designed to permit a wheelchair to back in alongside the water closet referred to in Sentence (6) in the space referred to in Subclause (6)(e)(ii).

8) Every kitchen counter shall have at least one barrier-free section not less than 760 mm long centred over a knee space conforming to Sentence (10). (See Appendix A).

9) The top surface of the barrier-free section referred to in Sentence (8) shall be not more than 865 mm above the finished floor level.

10) The knee space beneath the barrier-free section referred to in Sentence (8) shall be not less than

a) 760 mm wide,

b) 685 mm high, and

c) 485 mm deep.

11) Counters intended for the installation of a kitchen sink or a range shall be provided with a means of adjusting their height so that the counter surface is

a) not less than 710 mm above the finished floor level, and

b) not more than the height of the adjacent counter surface.

(See Appendix A).

12) The kitchen sink referred to in Sentence (11) shall be provided with a clearance beneath the sink not less than

a) 760 mm wide,

b) 735 mm high at the front edge,

c) 685 mm high at a point 205 mm back from the front edge, and

d) 230 mm high over the distance from a point 280 mm to a point 430 mm back from the front edge

13) Overhead kitchen cabinets shall be provided with a means of adjusting their height by not less than 500 mm, provided the minimum clearances for ranges specified in Subsection 9.10.22. are not reduced at the lowered height. (See A BCI010.(11) in Appendix A).

This INTERPRETATION is applicable throughout the province of Alberta.

APPENDIX A - EXPLANATORY MATERIAL

Note: This Appendix does not form a mandatory part of this STANDATA.

A-BCI010.(2) Residential Occupancies. This requirement ensures that the doorways in adaptable dwelling units are at least large enough to accommodate someone using a wheelchair. Residential suites must allow reasonable accessibility for persons in wheelchairs. Where a dwelling unit has more than one washroom, only one needs to be designed to be adaptable. It is relatively simple to make washrooms accessible through careful planning and positioning of fixtures and this can be achieved in an area not much larger than that of conventional washrooms.

A-BCI010.(4)(b) Clear Space at Entrances to Showers. The clear space at the entrance to a shower may be encroached upon by fixtures such as a wall hung sink which does not interfere with the leg rests of the wheelchair. However, this sink could restrict movement for persons who need to make a lateral transfer if it were installed at the seat end of the shower.

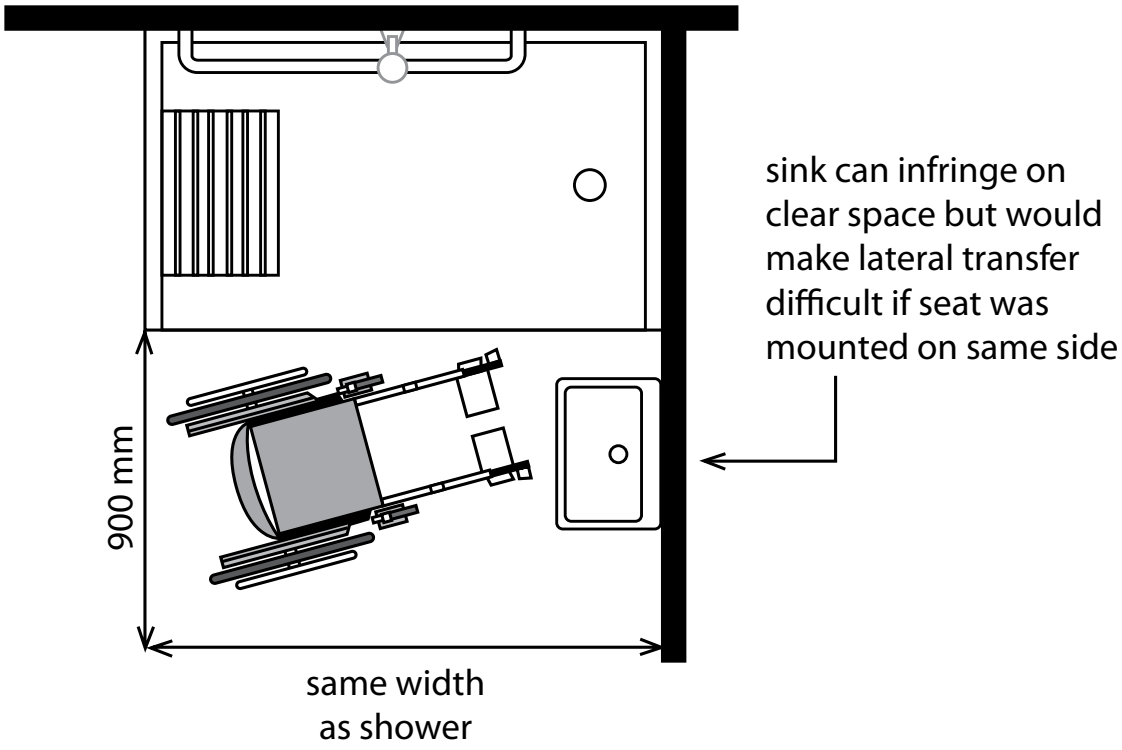


Figure A-BCI010.(4)(b)
Shower Design

A-BCI010.(5)(c) Clearances Beneath a Lavatory.

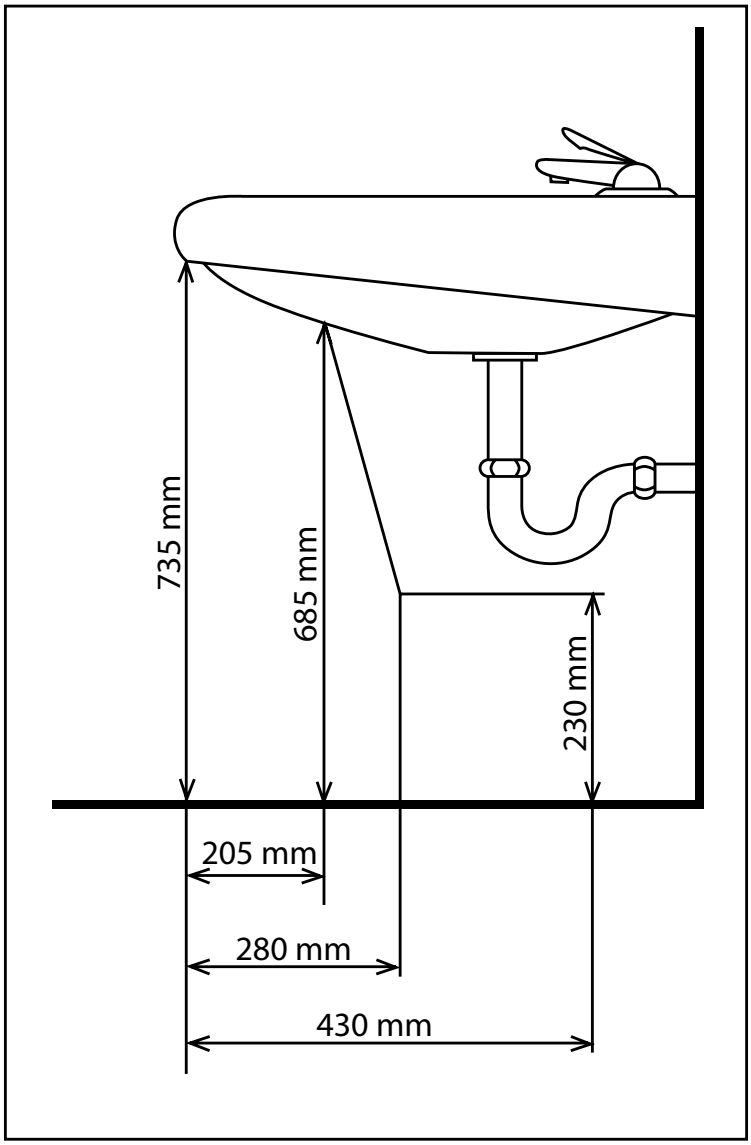


Figure A-BCI010.(4)(b)
Clearances beneath a lavatory

A-BCI010.(5)(d) Pipe Protection. Persons who have lost the sense of touch in their limbs cannot feel hot or cold and are susceptible to burns without knowing. The pipes referred to in Clause (5)(d) include both supply and waste pipes. The hazard can be prevented by insulating the pipes, by locating the pipes in enclosures, or avoided by limiting the temperature of the hot water to a maximum of 45°C.

A-BCI010.(6) Water Closets. Wall-mounted water closets or floor models with receding bases are preferable because they provide the least amount of obstruction.

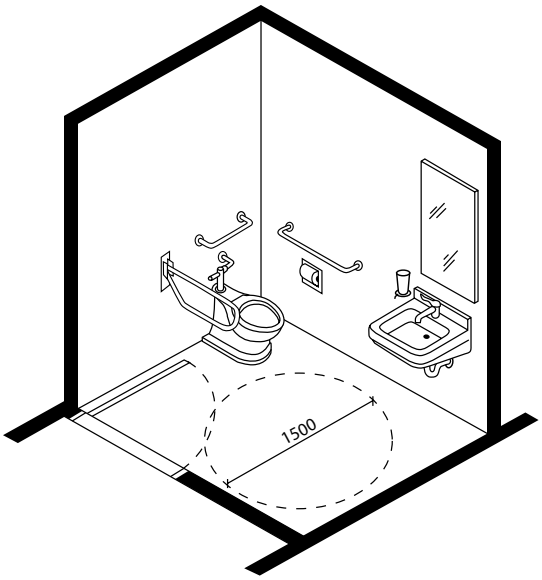


Figure A-BCI010.(6)-A
Washroom with inward swinging door

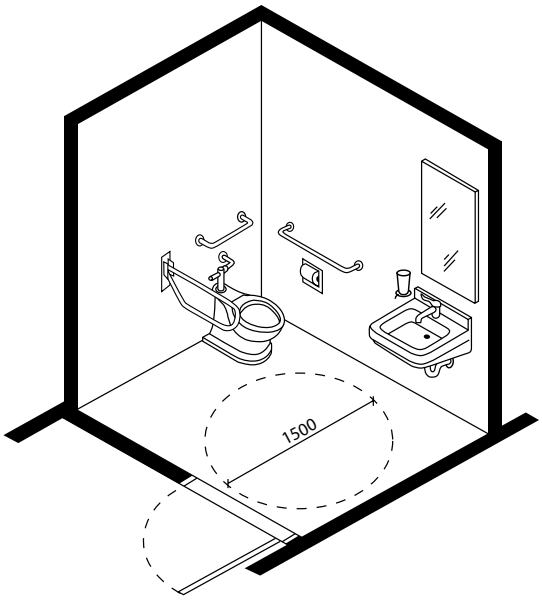


Figure A-BCI010.(6)-B
Washroom with outward swinging door

A-BCI010.(8) Kitchen Counters. It is not intended that the entire kitchen counters be barrier-free, but that sufficient barrier-free counter space be available. This allows persons with disabilities to be able to use the counters to prepare food, while still providing ample counter space at regular heights for persons that are not disabled.

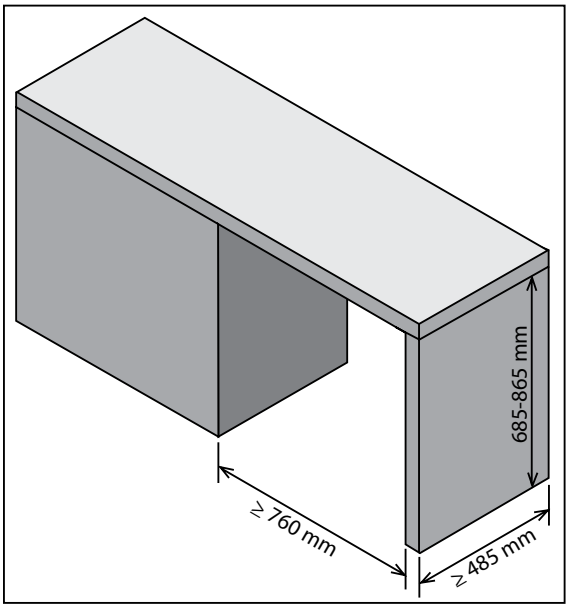


Figure A-BCI010.(8)
Barrier-free counters

A-BCI010.(11) Height Adjustable Counters and Cabinets. There are many different ways of providing for height adjustability in counters and cabinets in adaptable dwelling units, ranging in cost and complexity. The most cost effective way is to build into the supporting structure a series of support points so that the counters or cabinets can manually be removed and repositioned in a more accessible position. The most accessible method, in terms of persons with disabilities, would be to install some form of motorized guides that move the counters and cabinets up and down with the flip of a switch. The method of providing a means for adjusting the counters and cabinets is left to the designer.

Installation of a standard residential range does not allow for any flexibility in design in terms of the height of the burners or elements. As such, it is recommended that adaptable dwelling units be provided with standalone cooktop rangers with separate wall mounted ovens.

(CSA) NON-MANDATORY APPENDIX E
ELEVATOR REQUIREMENTS FOR PERSONS WITH PHYSICAL DISABILITIES (APPLICABLE TO THE CSA B44 ONLY)

E.1 Scope
This appendix contains requirements intended to make passenger elevators usable by persons with physical disabilities. These requirements are in addition to, or modifications of, certain requirements specified elsewhere in this standard.

E.2 Operation and levelling
Elevator operation shall be automatic. Each car shall be equipped with a self-levelling feature that will automatically bring and maintain the car at floor landings within a tolerance of ±13 mm under rated loading to zero loading conditions.

E.3 Door operation
Power-operated, horizontally sliding car and landing doors opened and closed by automatic means shall be provided.

E.4 Door size
The clear width of elevator doors shall comply with Table E-1.

E.5.1 Door protective and reopening device
Doors shall be provided with a door-reopening device that will function to stop and reopen a car door and an adjacent landing door to at least 910 mm, in case the car door is obstructed while closing. This reopening device shall also be capable of sensing an object or person in the path of a closing door at a nominal 125 mm ±25 and 735 mm ±25 mm above the floor without requiring contact for activation.

E.5.2
Door-reopening devices shall remain effective for a period of not less than 20 seconds.

E.6 Door timing for hall and car calls
From the time the doors start to open, a minimum period of 5 seconds shall elapse before the doors start to close if it is a hall call, and 3 seconds if it is a car call. A reduction of this time shall be permitted after operation of the door-close button.

E.7 Inside dimensions of elevator cars
The inside dimensions of elevator cars shall comply with Table E-1.

Table E-1 Minimum dimensions of elevator cars in millimetres				
Door location	**Door clear width mm**	**Inside car, side to side, mm**	**Inside car, back wall to front return, mm**	**Inside car, back wall to inside face of door**
Centred	1065	2030	1295	1370
Side (off-centre)	915[2]	1725	1295	1370
Any	915[2]	1370	2030	2030
Any	915[2]	1525	1525	1525
Minimum Diameter of LU/LA (Limited Use/Limited Application) Elevators				
Any	815	1065	1370	Not specified

Notes:
(1) *Table E-1 is based on Table 407.2.8 in ANSI/ICC A117.1, metric values only.*
(2) *A tolerance of minus 16 mm shall be permitted.*

E.8 Car controls
E.8.1 Car controls shall have the features specified in Clauses E.8.2 to E.8.7.

E.8.2 Clear floor space
A clear floor space of 760 mm × 1 220 mm minimum shall be provided at the controls.

E.8.3 Height
Buttons with floor designations shall be located a maximum of 1 220 mm above the floor or ground measured to the centre line of the buttons, except that when the elevator serves more than 16 openings and parallel approach is provided, the location of buttons with floor designations, a maximum of 1 370 mm above the floor shall be permitted. Emergency controls, including the emergency alarm, shall be grouped at the bottom of the panel. Emergency control buttons have their centre lines 890 mm minimum above the floor or ground.

E.8.4 Buttons

E.8.4.1 Button dimensions
Buttons shall be ¾ in. (19 mm) minimum in their smallest dimension. Buttons or surrounding button collars shall be raised a minimum 1.5 mm.

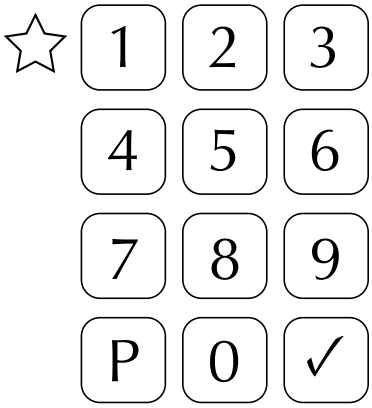
E.8.4.2 Button arrangement
Except where provided in a standard telephone keypad arrangement, buttons shall be arranged with numbers in ascending order. When two or more columns of buttons are provided, they shall read from left to right.

E.8.4.3 Button designations
Except where provided in a standard telephone keypad arrangement, control buttons shall be identified by tactile characters complying with Clause E.19. Tactile characters and Braille shall be placed immediately to the left of the button to which they apply.

E.8.4.4
The control button for the main entry floor, and control buttons other than remaining buttons with floor designations, shall be identified with tactile and visual symbols as shown in Table 2.26.12.1.
Exception: The location and size of Braille, where required, shall comply with Table 2.26.12.1. (English shown for reference only.)

E.8.4.5
Buttons with floor designations shall be provided with visible indicators to show that a call has been registered. The visible indication shall extinguish when the car arrives at the designated floor.

E.8.5 Telephone-style keypads
Telephone-style keypads shall be a standard telephone keypad arrangement. Call buttons shall be 19 mm in their smallest dimension. Buttons shall be raised a minimum of 1.5 mm. Braille is not required. Characters shall be 13 mm in height and otherwise conform to E.19.4. The number five key shall have a single-raised dot. The dot shall be 3.0 mm to 3.05 mm base diameter and in other aspects conform to Table E-19.5. Characters shall be centred on the corresponding keypad button. A display shall be provided in the car with visible indicators to show registered car destinations. The visible indication shall extinguish when the call has been answered. A standard five-pointed star shall be used to indicate the main entry floor.



See Appendix 3

As Canada and Alberta construct more large multi-storey structures, a telephone-style keypad arrangement for in-car controls will become more prevalent and will eliminate any awkwardness by users with visual disabilities.

E.9 Car position indicators

E.9.1 General
In elevator cars, both audible and visible car floor location indicators shall be provided to identify the floor location of the car.

E.9.2 Visible
Indicators shall be located above the car control panel or above the door. Numerals shall be 16 mm in height.

E.9.3 Audible
The audible signal shall be 10 dBA minimum above ambient, but shall not exceed 80 dBA maximum, as measured at the annunciator. The signal shall be an automatic verbal announcement that announces the floor at which the car has stopped, except for elevators that have a rated speed of 1 m/s or less, in which an audible signal with a frequency of 1 500 Hz maximum sounds as the car passes or stops at a floor served by the elevator shall be permitted.

E.10 Emergency communications

E.10.1

Emergency two-way communication systems between the elevator car and a point outside the hoistway shall comply with 2.27.1. The highest operable part of a two-way communication system shall be located a maximum of 1 220 mm from the floor. If the device is located in a closed compartment, the compartment door hardware shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 22.2 N maximum.

E.10.2

The device shall be identified by a symbol. The identification shall be a telephone located adjacent to the device or located on the compartment door if the device is located in a closed compartment. If the system uses a handset, the cord from the panel to the handset shall have a minimum length of 900 mm. The telephone, where provided, shall be equipped with a receiver that generates a magnetic field in the area of the receiver cap, and the telephone shall have a volume control and comply with CSA CAN3-T515.

E.10.3 Emergency signalling device

The car emergency signalling device shall not be limited to voice communication. If instructions for use are provided, essential information shall be presented in both tactile and visual forms.

E.11 Floor surfaces

Floor surfaces in elevator cars shall be firm, stable and skid-resistant, permitting easy movement of wheelchairs. Carpet pile height shall be 13 mm maximum.

E.12 Handrails

Handrails shall be provided on all non-access walls. The top of the gripping surfaces of the handrails shall be at a height of 800 mm to 920 mm, with a space of 35 mm to 45 mm between the handrails and wall.

E.13 Illumination levels

The level of illumination at the car controls, platform, car threshold and landing sill shall be 100 lx minimum.

E.14 Hall Buttons

E.14.1

Hall buttons in elevator lobbies and halls shall be located vertically between 890 mm and 1 220 mm above the floor, measured to the centre line of the respective button.

E.14.2

A clear floor space of 760 mm × 1 220 mm minimum shall be provided at the hall buttons.

E.14.3

Hall buttons shall be 19 mm minimum in the smallest dimension.

E.14.4

Hall buttons shall have visual signals to indicate when each call is registered and when each call is answered.

E.14.5
The hall button that designates the UP direction shall be located above the button that designates the DOWN direction. Buttons or surrounding button collars shall be raised a minimum of 1.5 mm. Objects located beneath hall buttons shall protrude 25 mm maximum.

E.15 Hall or in-car signals

E.15.1
A visible and audible signal shall be provided at each hoistway entrance to indicate which car is answering a call and its direction of travel, except that signals in cars, visible from the floor area adjacent to the hall call buttons, and complying with requirements of Clauses E.15.2 and E.15.3, shall be permitted.

E.15.2 Audible signals
Audible signals shall sound once for the UP and twice for the DOWN direction or shall have verbal annunciators that state the word UP or DOWN. Audible signals shall have a frequency of 1 500 Hz maximum. The audible signal or verbal annunciator shall be 10 dBA above ambient but shall not exceed 80 dBA above maximum, measured at the hall call button.

E.15.3 Visible signals

E.15.3.1 Height
Hall fixture signals shall be 1 830 mm minimum above the floor or ground, measured to the centre line of the fixture.

E.15.3.2 Size
The visible signal elements shall be 60 mm minimum in the smallest dimension.

E.15.3.3 Visibility
Signals shall be visible from the floor area adjacent to the hall button.

E.16 Floor/car designations
Raised character and Braille floor designations shall be provided on both jambs of elevator hoistway entrances and shall be centred at 1 525 mm above the floor, measured from the baseline of the characters. A raised star placed immediately to the left of the floor designation shall also be provided on both jambs at the main entry level. Such characters shall be 50 mm high and comply with Clause E.19.2.

E.17 Destination-oriented elevators

E.17.1 General
Destination-oriented elevators shall comply with Clauses E.2 to E.7, E.10, E.11, E.13, E.16 and E.17.2 to E.17.6.

E.17.2 Call buttons
Call buttons shall be 890 mm minimum and 1 220 mm maximum above the floor or ground, measured to the centre line of the buttons. A clear floor or ground space of 760 mm × 1 220 mm shall be provided. Call buttons shall be 19 mm minimum in their smallest dimension. Buttons shall be raised a minimum of 1.5 mm. Objects beneath hall call buttons shall protrude 25 mm maximum into the clear floor or ground space. Destination-oriented elevator systems shall have a keypad or other means for the entry of destination

information. Keypads, if provided, shall be in a standard telephone keypad arrangement, and buttons shall be identified by characters complying with Clause E.19.4. Characters shall be centred on the corresponding keypad button. The number five key shall have a single raised dot. The dot shall be 3.0 mm to 3.05 mm base diameter, and in other aspects comply with Table E-19.5. Destination-oriented elevator systems shall be provided with visual and audible signals that indicate which elevator car to enter. The audible signal shall be activated by pressing the function button. The function button shall be identified by the international symbol for accessibility (see Figure E-19.2.6.1). The symbol shall be 16 mm in height. The function button shall be located immediately below the keypad arrangement or floor buttons. A display shall be provided in the car with visible indicators to show registered car destinations.

E.17.3 Hall signals

E.17.3.1 General

A visible and audible signal shall be provided to indicate a car destination in accordance with Clause E.17.2. The audible tone and verbal announcement shall be the same as those given at the call button or call button keypad, if provided. Each elevator in a bank shall have an audible and visible means for differentiation.

E.17.3.2 Visible signals

E.17.3.2.1 Height

Hall signal fixtures shall be 1 830 mm minimum above the floor or ground, measured to the centre line of the fixture.

E.17.3.2.2 Size

The visible signal elements shall be 60 mm minimum in their smallest dimension.

E.17.3.2.3 Visibility

Signals shall be visible from the floor area adjacent to the hoistway entrance.

E.17.4 Car controls

Emergency controls, including the emergency alarm, shall have centre lines that are 890 mm minimum and 1 220 mm maximum above the floor or ground. Buttons shall be 19 mm minimum in their smallest dimension. Buttons shall be raised a minimum of 1.5 mm. A clear floor space of 760 mm × 1 220 mm minimum shall be provided at the controls.

E.17.5 Car position indicators

E.17.5.1 General

In elevator cars, audible and visible car location indicators shall be provided.

E.17.5.2 Visible indicators

Indicators shall be above the car control panel or above the door. Numerals shall be 16 mm high minimum. As the car passes or stops at a floor served by the elevator, the corresponding character shall illuminate. The visible indicators shall extinguish when the car arrives at the designated floor.

E.17.5.3 Audible indicators

An automatic verbal announcement that announces the floor at which the car has stopped shall be provided. The announcement shall be 10 dBA minimum above ambient and 80 dBA maximum, measured at the annunciator.

E.17.6 Elevator car identification
In addition to the tactile signs required by Clause E16, a tactile elevator car identification shall be placed immediately below the hoistway entrance floor designation. The characters shall be 50 mm high and shall comply with Clause E.19.2.

E.18 Limited-use/limited-application elevators
Limited use/limited-application elevators shall comply with Clauses E.1 to E.17.

E.19 Signs

E.19.1 General
Signs required to be tactile, visual or both shall comply with Clauses E.19.2 to E.19.7.

E.19.2 Characters that are both tactile and visual

E.19.2.1 General
Characters required to be tactile shall comply with Clauses E.19.2.2 to E.19.2.6. Tactile characters shall be duplicated in Braille in accordance with Clause E.19.5, except for tactile characters complying with Clause E.19.3, where separate visual characters with duplicate information complying with Clause E.19.4 are provided.

E.19.2.2 Finish and contrast
Characters and their background shall have a non-glare finish. Characters shall contrast with their background: either light characters shall appear on a dark background or dark characters shall appear on a light background.

E.19.2.3 Tactile character depth
Tactile characters shall be raised a minimum of 0.8 mm above the background.

E.19.2.4 Character forms

E.19.2.4.1
Fonts shall have characters complying with Clauses E.19.2.4.2 to E.19.2.4.7.

E.19.2.4.2 Case
Characters shall be uppercase.

E.19.2.4.3 Style
Characters shall be sans serif. Characters shall not be italic, oblique, script, highly decorative or of other unusual form.

E.19.2.4.4 Width
Character width shall be 55% minimum and 110% maximum of the height of the character, with the width based on the uppercase letter O and the height based on the uppercase letter I.

E.19.2.4.5 Stroke thickness
Characters with rectangular cross-sections shall have a stroke thickness that is 10% minimum and 15% maximum of the height of the character, based on the uppercase letter I. Characters with other cross-sections shall have a stroke thickness at the base of the cross-sections that is 10% minimum and 30% maximum of the height of the character, and a stroke thickness at the top of the cross-section that is 15% maximum of the height of the character, based on the uppercase letter I.

E.19.2.4.6 Spacing
Where characters have rectangular cross-sections, spacing between individual characters shall be 3 mm minimum to 10 mm maximum. Where characters have other cross-sections, spacing between individual characters shall be 2 mm minimum to 10 mm maximum at the base of the cross-sections and 3 mm minimum to 10 mm maximum at the top of the cross-sections. Spacing shall be measured between the baselines of separate lines of characters and shall be 135% minimum to 170% maximum of the character height.

E.19.2.4.7 Height
Character height, measured vertically from the baseline of the character, shall be 16 mm minimum and 51 mm maximum based on the uppercase letter I.

E.19.2.5 Mounting height
Characters shall be located 1 220 mm minimum and 1 525 mm maximum above the adjacent floor or ground surface, measured from the baseline of the characters, except for elevator car controls.

E.19.2.6 Mounting location
Where a sign containing tactile characters is provided at a door, the sign shall be located alongside the door on the latch side. Where a tactile sign is provided at double doors, the sign shall be located to the right of the right-hand door. Where there is no wall space on the latch side of a single door, or to the right side of double doors, signs shall be located on the nearest adjacent wall. Signs containing tactile characters shall be located so that a clear floor space of 455 mm × 455 mm minimum, centred on the sign, is provided beyond the arc of any door swing between the closed position and 45° open position.
Exception: Signs shall be permitted on the push side of doors with closers and without hold-open devices.

E.19.3 Tactile Characters

E.19.3.1
Where tactile characters are required, and separate tactile and visual characters with duplicate information are provided, tactile characters shall comply with Clauses E.19.3.2 to E 19.3.5 and visual characters shall comply with Clause E.19.4. Tactile characters shall be duplicated in Braille in accordance with Clause E.19.5.

E.19.3.2 Tactile character depth
Tactile characters shall be raised a minimum of 0.8 mm above the background.

E.19.3.3 Character forms

E.19.3.3.1
Fonts shall have characters complying with Clauses E.19.3.3.2 to E.19.3.3.7.

E.19.3.3.2 Case
Characters shall be uppercase.

E.19.3.3.3 Style
Characters shall be sans serif. Characters shall not be italic, oblique, script, highly decorative or of other unusual form.

E.19.3.3.4 Width
Character width shall be 55% minimum and 110% maximum of the height of the character, with the width based on the uppercase letter O and the height based on the uppercase letter I.

E.19.3.3.5 Stroke thickness
Characters shall have a stroke thickness that is 15% maximum of the height of the character, based on the uppercase letter I.

E.19.3.3.6 Spacing
Spacing between individual characters shall be 3 mm minimum to 6 mm maximum. Spacing shall be calculated by measuring the two closest points between each adjacent character within a message, excluding spaces between words. Spacing between the baseline of separate lines of characters within a message shall be 135% minimum and 170% maximum of the character height.

E.19.3.3.7 Height
Character height, measured vertically from the baseline of the character, shall be 13 mm minimum, and 19 mm maximum, based on the uppercase letter I.

E.19.3.4 Mounting height
Characters shall be located 1 220 mm minimum and 1 525 mm maximum above the adjacent floor or ground surface, measured from the baseline of the characters, except for elevator car controls.

E19.3.5 Mounting location
Where a tactile sign is provided at a door, the sign shall be located alongside the door on the latch side. Where a tactile sign is provided at double doors, the sign shall be located to the right of the right-hand door. Where there is no wall space on the latch side of a single door, or to the right side of double doors, signs shall be located on the nearest adjacent wall. Signs containing tactile characters shall be located so that a clear floor space of 455 mm × 455 mm minimum, centred on the sign, is provided beyond the arc of any door swing between the closed position and 45° open position.

Exception: Door-mounted signs shall be permitted on the push side of doors with closers and without hold-open devices.

E.19.4 Visual characters

E.19.4.1 General

Visual characters required to be accessible shall comply with Clauses E.19.4.2 and E.19.4.3.

E.19.4.2 Finish and contrast

Characters and backgrounds shall have a non-glare finish. Characters shall contrast with the background: either light characters shall appear on a dark background or dark characters shall appear on a light background.

E.19.4.3 Character forms

E.19.4.3.1 General

Visual characters required to be accessible shall comply with Clauses E.19.4.2 and E.19.4.3.

E.19.4.3.2 Case

Characters shall be uppercase and/or lowercase.

E.19.4.3.3 Style

Characters shall be conventional in form. Characters shall not be italic, oblique, script, highly decorative or of other unusual form.

E.19.4.3.4 Width

Character width shall be 55% minimum and 110% maximum the height of the character, with the width based on the uppercase O, and the height based on the uppercase I.

E.19.4.3.5 Stroke thickness

Characters shall have a stroke thickness that is 10% minimum and 30% maximum of the height of the character, based on the uppercase letter I.

E.19.4.3.6 Spacing

Spacing between individual characters shall be 10% minimum and 35% maximum of character height. Spacing shall be calculated by measuring the two closest points between each adjacent character within a message, excluding spaces between words. Spacing between the baseline of separate lines of characters within a message shall be 135% minimum and 170% maximum of the character height.

E.19.4.3.7 Height

Minimum character height, measured from the baseline of the character, shall comply with Clause E.4.4. based on the height of the characters above the finished floor of the viewing location and the minimum viewing distance. Character height shall be based on the uppercase letter I. Minimum viewing distance shall be the horizontal distance where an obstruction prevents further approach toward the sign.

E.19.5 Braille

E.19.5.1 General

Tactile characters shall be accompanied by Grade II Braille complying with Clauses E.19.5.2 to E.19.5.4 and Table E.19.5 Braille dots shall have a domed or rounded shape.

Table E-19.5
Measurement range for standard sign Braille

Measurement range for	Minimum	Maximum
Dot base diameter	1.5 mm	1.5 mm
Distance between any two dots in same cell, centre to centre	2.3 mm	2.5 mm
Distance between corresponding dots in adjacent cells, centre to centre	6.1 mm	7.6 mm
Dot height	0.6 mm	0.8 mm
Distance between corresponding dots from one cell to the cell directly below, centre to centre	10.0 mm	10.1 mm

E.19.5.2 Location

Braille shall be located below the corresponding text. If text is multi-lined, Braille shall be placed below entire text. Braille shall be separated 10 mm minimum from any other tactile characters. Braille provided in accordance with Figure 4.10.1.12 shall be separated 5 mm minimum either directly below or adjacent to the corresponding raised characters or symbols.

E.19.5.3 Height

Braille shall be located 1 015 mm minimum and 1 525 mm maximum above the finished floor, measured from the baseline of the Braille cells, except for elevator car controls.

E.19.5.4 Braille standard

Braille shall be in accordance with literary Braille, except the indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials or acronyms.

E.19.6 Identifying pictograms

E.19.6.1 General

Where pictograms are required to be accessible, they shall comply with Clauses E.19.6.2 to E. 19.6.4.

E.19.6.2 Pictogram field

Pictograms shall have a field with a height of 150 mm minimum. Characters and/or Braille shall not be located in the pictogram field.

E.19.6.3 Finish and contrast

Pictograms and their fields shall have a non-reflective finish. Pictograms shall contrast with their fields: either a light pictogram shall appear on a dark field or a dark pictogram shall appear on a light field.

E.19.6.4 Text descriptors

Where text descriptors for pictograms are required, they shall be located directly below or adjacent to the pictogram and shall comply with Clause E.19.2.

E.19.7 Symbols of accessibility

E.19.7.1 Finish and contrast

Symbols of accessibility and their backgrounds shall have a non-glare finish. Symbols of accessibility shall contrast with their backgrounds: either a light symbol shall appear on a dark background or a dark symbol shall appear on a light background.

E.19.7.2 Symbols

E.19.7.2.1 International symbol of accessibility

Where the international symbol of accessibility is required, it shall be proportioned as shown in Fig. E-19.7.2.1.

E.19.7.2.2 International symbol of a text telephone (TTY)

Where the international symbol of text telephones is required, it shall be proportioned as shown in Fig. E-19.7.2.2.

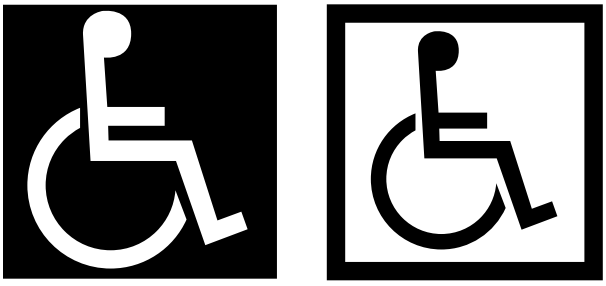
E.19.7.2.3 Assistive listening systems

Where assistive listening systems are required to be identified by the international symbol of access for hearing loss, it shall be proportioned as shown in Fig. E-19.7.2.3.

E.19.7.2.4 Volume-controlled telephones

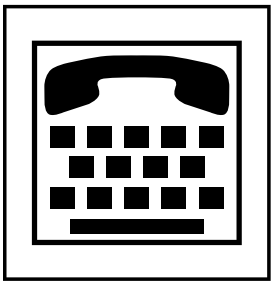
Where telephones with volume controls are required to be identified, the identification symbol shall be a telephone handset with radiating sound waves as shown in Fig. E-19.7.2.4.

Figure E-19.7.2.1



International symbol of accessibility

Figure E-19.7.2.2



International TTY symbol

Figure E-19.7.2.3

International symbol of access for hearing loss

Figure E-19.7.2.4

Volume-controlled telephone

Occupancy Types

1.3.3. Application of Division B

1.3.3.1. Application of Parts 1, 7 and 8

1) Parts 1, 7 and 8 of Division B apply to all *buildings* covered in this Code. (See Article 1.1.1.1.)

1.3.3.2. Application of Parts 3, 4, 5 and 6

1) Parts 3, 4, 5, and 6 of Division B apply to all *buildings* described in Article 1.1.1.1. and

a) classified as *post-disaster buildings*,

b) used for *major occupancies* classified as

i) Group A, *assembly occupancies*,

ii) Group B, *care or detention occupancies*, or

iii) Group F, Division 1, *high-hazard industrial occupancies*, or

c) exceeding 600 m^2 in *building area* or exceeding 3 *storeys* in *building height* used for *major occupancies* classified as

i) Group C, *residential occupancies*,

ii) Group D, *business and personal services occupancies*,

iii) Group E, *mercantile occupancies*, or

iv) Group F, Divisions 2 and 3, *medium-* and *low-hazard industrial occupancies*.

1.3.3.3. Application of Parts 9, 10 and 11

1) Part 9 of Division B applies to all *buildings* described in Article 1.1.1.1. of 3 *storeys* or less in *building height*, having a *building area* not exceeding 600 m^2, and used for *major occupancies* classified as

a) Group C, *residential occupancies* (see Appendix Note A-9.1.1.1.(1) of Division B),

b) Group D, *business and personal services occupancies*,

c) Group E, *mercantile occupancies*, or

d) Group F, Divisions 2 and 3, *medium-* and *low-hazard industrial occupancies*.

Metric Conversion Chart

When you know:	Multiply by:	To find:
inches	25	millimeters
feet	30	centimeters
yards	0.9	meters
miles	1.6	kilometers
centimeters	0.393	inches
meters	1.1	yards
kilometers	0.6	miles
ounces	28	grams
pounds	0.45	kilograms
short tons	0.9	metric tons
grams	0.035	ounces
kilograms	2.2	pounds
metric tons	1.1	short tons
fluid ounces	30	milliliters
pints, US	0.47	liters
pints, Imp.	.568	liters
quarts, US	0.95	liters
quarts, Imp.	1.137	liters
gallons, US	3.8	liters
gallons, Imp.	4.546	liters
milliliters	0.034	fluid ounce
liters	2.1	pints, US
liters	1.76	pints, Imp.
liters	1.06	quarts, US
liters	0.88	quarts, Imp.
liters	0.26	gallons, US
liters	0.22	gallons, Imp.

Alberta Building Codes

National Fire Protection Association® Codes

Canadian Standards Association Codes

Nonmandatory Appendix E Elevator Requirements For Persons with Physical Disabilities (Applicable to the CSA B44 only)

American Society of Mechanical Engineers / Canadian Standards Association Codes

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