



UNIVERSAL DESIGN

guidelines (commercial buildings)



Introduction

1. Carparks.....01

- a. Parking lots 03
- b. Access lobbies 05

2. Entrances.....07

- a. Drop-off zones 09
- b. Lobbies 11

3. Horizontal circulation.....13

- a. Corridors/General 15
- b. Corridors/Orientation 17
- c. Seatings 19

4. Vertical circulation.....21

- a. Staircases/General 23
 - Staircases/Treads and risers 25
 - Staircases/Handrails 27
 - Staircases/Escape 29
- b. Ramps/General 31
 - Ramps/Landings 33
 - Ramps/Handrails 35
 - Ramps/Safety 37

5. Mechanical circulation.....39

- a. Lifts/Lift lobbies 41
 - Lifts/Lift cars 43
- b. Escalators/Safety features 45

6. Facilities.....47

- a. Information counters 49
- b. Nursing rooms 51
- c. Toilets/Planning and design 53
 - Toilets/Compartments 55
 - Toilets/Doors 57
 - Toilets/Wheelchair-friendly 59
 - Toilets/Urinals 63
 - Toilets/Wash basins 65
 - Toilets/Accessories 67
- d. Playgrounds 69

7. Retail.....71

- a. Retail/Supermarkets 73
- b. Retail/Shops and kiosks 75

8. Food and beverage.....77

- a. Foodcourts and cafes 79

References



Universal Design, in the broadest term, is “design for all people”. It seeks to create an environment addressing the needs for all age groups and people of different abilities including temporary disability. The move towards universal design has developed due to the expanding population of people with varying degree of abilities and advancing years, their demands for recognition and desire for independent living. Ronald Mace, the architect who coined the term “universal design” said that one of the more important changes brought about by the use of this term is the elimination of the label “special needs” from segments of the population who are working to maintain or gain their independence.¹ The Universal Design and Americans with Disabilities Act state that people should be viewed as equal in nature, as having similar rights and obligations, and as deserving of equal opportunity in every facet of society.

The introduction of Universal Design will no doubt add a new dimension in the accessibility landscape and has great influence towards the field of design. The designer and building owner/developer hold the key to create an environment allowing people with different levels of physical and/or cognitive capabilities to move independently so as to integrate as fully as possible into the mainstream of daily life. For all design professions, it is certainly a fast expanding area of practice.

In Singapore, the relevant authorities are also targeting at more innovative and friendly design to improve usability and livability for everyone. It is the intention of the Building and Construction Authority (BCA) to instill awareness among designers and building owners/developers who have the influence to cater for the full range of human needs and be sensitive to incorporate them in the design.

¹ Null, Roberta L. and Cherry, Kenneth F. *Universal Design: Creative Solutions for Americans with Disabilities Act Compliance*, Professional Publications, Inc., Belmont, California, USA, 1998, p25.



Principles of Universal Design

Universal Design is a continuous process of innovation targeted at improving usability for everyone. According to Ronald Mace, Universal Design is the design of products and environment to be usable by all people, to the greatest extent possible, without the need for adaptation or specialised design.

The Seven Principles of Universal Design, developed by the Centre for Universal Design, North Carolina State University with a consortium of universal design researchers and practitioners from across the United States², are :

- **Equitable Use**

The design is useful and marketable to people with diverse abilities.

- **Flexibility in Use**

The design accommodates a wide range of individual preferences and abilities.

- **Simple and Intuitive**

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



- **Perceptible Information**

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

- **Tolerance for Error**

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

- **Low Physical Effort**

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

- **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.



Universal Design in Singapore

While Universal Design has been widely practiced internationally, it has also been addressed in Singapore. Besides the Code of Barrier-Free Accessibility in Buildings, first introduced in 1990, which was essentially weighted towards wheelchair users, Universal Design guidelines were incorporated in the later revisions with recommendations on good practices in design for people of all abilities.

From statistics, it is noted that the population age status has been on an upwards move. Both globally and in Singapore, a demographic change has been experienced. Owing to a healthier lifestyle, life expectancy has now increased to 83.2 years and the proportion of people aged above 65 will increase from 8.4% in 2005 to 18.7% by 2030. With the advancement of medical services, more and more people are able to survive illnesses and accidents although some may result in physical disability.

Thus, in the planning of a city as well as in the design of buildings, special considerations should be applied to accommodate the needs of the community.



Towards a Universal Design Environment

Singapore, being a small island state has placed great emphasis on its planning to ensure the efficient use of the limited resources. The 2001 Concept Plan of Singapore envisioned to develop Singapore towards a thriving world class city in the 21st century. It establishes the strategies to develop Singapore into a dynamic city, a distinctive city and at the same time a delightful city. At the implementation level, BCA envisions a built environment that incorporates universal design and will transform Singapore into an accessible and user-friendly city for all.

■ Connectivity

In the planning and urban design of the city, considerations have been given to ensure connectivity. Overhead bridges and underground passes have been provided generously to allow safe and free movement without the interference of traffic. These facilities should also be enjoyed by people with disabilities. This should also be extended to achieve interconnectivity between buildings and urban spaces. These seamless movements are particularly crucial for a world class city.

■ Tropical Climate

Our tropical climate is characterised by heavy rainfall and intense heat. In universal design, protection from these elements is of utmost importance. For outdoor and in-between spaces, roof protection and floor drainage are essential. Safety measures such as the use of non-slip floor material, installation of handrail and warning signs would help reduce chances of slipping and falling.



Objectives

With the commitment that all people with different abilities should continue to be integrated with the society, BCA aims to derive a set of guidelines that provide data and information essential to achieve universal design with the goal to cater for the usability, safety, comfort and convenience for all people in the design process.

The specific objectives are:

- To assist urban designers and architects to better address the needs of people of different abilities.
- To promote a greater sensitivity and innovation in universal design beyond minimum requirements.
- To achieve a higher standard of universal design for the built environment.



Scope

Universal design could be accomplished through a good appreciation of the broad range of abilities or disabilities of all user groups in the community. Thus, this book gives the full range of requirements and sets out guidelines for designers to work towards an accessible environment for the independent living of people of varying abilities.

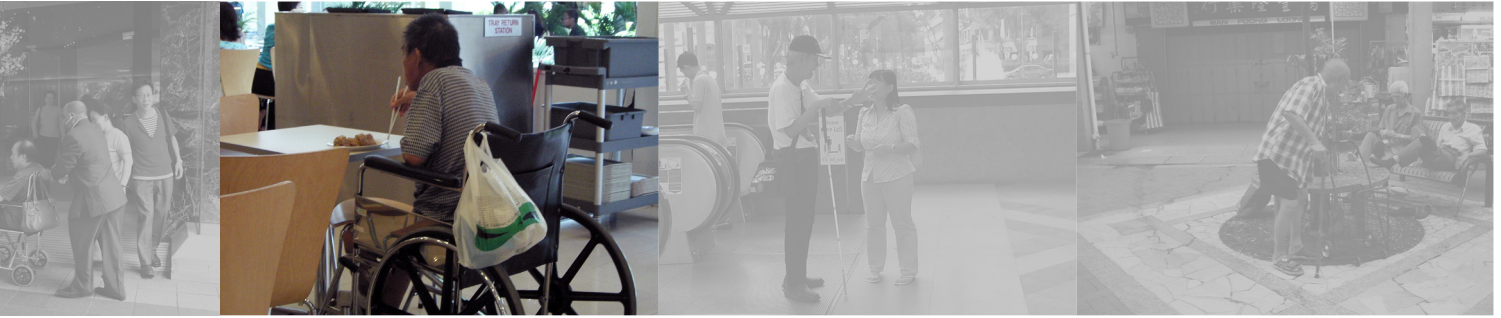
The book begins with the needs of people of different abilities:

■ Infants and Children

In public buildings, particularly shopping centres and recreation centres, facilities should be “family friendly”. Provision of play equipment and nursing spaces is highly recommended. Consideration should also be given to the special needs of and the appropriate scale for children. In the micro design, the material and the design detail need to be non-hazardous such as the use of non-toxic and non-breakable materials and the avoidance of sharp corners. Appropriate height for furniture, sanitary equipment, grab bars and drinking fountains is also an important aspect.

■ Expectant Mothers

Expectant mothers also have special needs. Therefore priority in the use of facilities such as the lifts and rest areas should be accorded to them.



- **Elderly**

Today, there is a greater proportion of elderly living independently. The main concerns are their reduced mobility, limited strength, range of reach, poor eyesight and hearing, etc. Walking may no longer be easy. This may be aggravated by less stable gait, poorer eyesight and hence changes in floor level may not be easily discerned.

- **Wheelchair Users**

Wheelchair users should be able to access all public places. There are two categories of wheelchair users: those who are able to move independently and others who require assistance. In the design of the built environment, consideration should be given to better facilitate the independent wheelchair users such as the provision of gentler ramps and more easily operated doors and equipment to ease their mobility.

- **Physically Injured Persons**

A physical injury suffered could be temporary or permanent and in most instances, likely to result in unstable and slow movement. The person may need crutches or other aids. Provisions such as automatic doors and sensor control tabs would be desirable.



■ **Sightless or Partially Sighted Persons**

All people with vision impairment will rely on whatever vision they have as well as other aids to find their way around. Provision of physical and other sensory cues such as touch, sound, smell as well as tactile or audible information are therefore important aids for them to move independently.

■ **Hearing Impaired Persons**

It is important to understand the unique needs of the deaf or hearing impaired. Since they are unable to receive audio information, all information should be transmitted through other means, for example substituting audio alerts with visual alerts and allowing users to configure frequency and volume of audible cues.

Chart Outlining the Profile of People of Different Abilities

User Group	Special Characteristics Requiring Attention			
	Difficulty in Interpreting Information	Poor or Complete Degradation of Sight	Poor or Complete Degradation of Hearing	Prevalence of Poor Balance
Infants and Children (up to 8 years old)				
Expectant Mothers				
Elderly (>50 years old)				
Hearing Impaired Persons				
Sightless or Partially Sighted Persons				
Physically Injured Persons (upper and lower body)				
Wheelchair Users				

Categories adapted from The Enabler Model. Source: David Driskell, ed. *Design*








Prevalence of Poor Coordination and Orientation	Poor or Inability in Handling and Fingering	Poor or Inability in using Upper Extremities	Poor or Inability in using Lower Extremities	Limitations of Stamina	Limitations of Strength	Vertically and Horizontally Challenged (in terms of height or size)	Require Physical Assistance/ Supervision	Require Family-friendly Facilities	Use of Movement Aids	Others
										Increased visit to toilets
										Use of walking cane to detect obstructions



Contents of the Universal Design Guide

These guidelines deal with the various provisions of universal design with focus on commercial buildings. They are organised based on functional areas inside and outside of buildings. Within each functional area, several essential components will be deliberated. The main functional areas consist of Carpark, Entrance, Horizontal Circulation, Vertical Circulation, Mechanical Circulation, Facilities, Retail and Food & Beverage. Within each functional area, the main components are elaborated.

Most of the functional components are also applicable to other building categories. They are indicated under every section according to colour codes as shown:

Categories	
Commercial	
Institutional	
Residential	
Healthcare	
Outdoor	



Generally, each component has two to four pages. At the top section of the page is the introduction of the component and design concerns together with photograph(s) as an example. The relevant building categories, represented in colour codes, will also be included in this section. The main data is given in point form with photographs illustrating the concerns. Drawings are added to further explain the guidelines. References to existing relevant Singapore Codes and guidelines are also indicated for ease of cross-referencing. They include Code on Barrier-Free Accessibility in Buildings (BFA), Code of Practice for Fire Precautions in Building, and A Guide to Better Public Toilet Design and Maintenance.

Conclusion

The importance and the benefits of universal design are widely recognised. Universal design increases the mobility and communication of people, which helps to integrate people of different abilities into the mainstream daily life. It enables everyone to enjoy the built environment and live a quality life. This “all inclusive” society that addresses the individual’s special needs will lead to innovative and creative response in the design of built environment.

It is hoped that this guide, which is first of its series, will set a new benchmark of universal design that encourages innovative ways in meeting functional needs without compromising aesthetics.





A well-designed parking space would make the building more usable to people of varying abilities. The convenience and safety of drivers and their passengers in accessing a building are thus critical issues that must be considered in the design of a building.



Lot located beside access lobby



Auto signs showing availability of lots



Clear signage to lot

Provisions & Locations

- Parking lots for drivers with disabilities should be located next or near to the carpark access lobby.
- Parking lots for drivers with disabilities should be located on the same side as the access lobby, so that users need not cross the road to reach the access lobby.

Signages

- Auto signs showing number and floor of available accessible lots should be provided.
- Clear signage should be provided to indicate location of accessible parking lots.

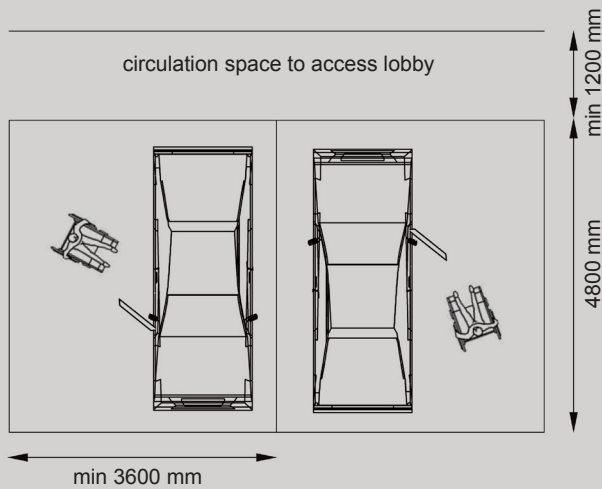
Kerb Ramps

- *Where the vertical rise is greater than 150 mm, a ramp should be provided.*
Reference BFA 3.7.1.4
- *Kerb ramp should be minimum 900 mm wide to allow for ease of wheelchair movement.*
Reference BFA 3.7.1.3
- Tactile indication should be provided at the start of a kerb ramp.
- *The gradient of a kerb ramp, including its flared sides, should as far as possible be gentler than a gradient of 1:10.*
Reference BFA 3.7.1.2 and 3.7.3.2

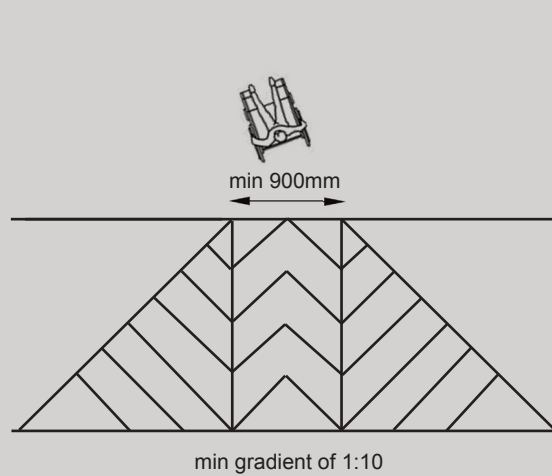


CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*parking lots*)

- 3.7.1.3 The width of a kerb ramp shall not be less than 900 mm.
- 3.7.1.4 Where the vertical rise is greater than 150 mm, it shall constitute a slope ramp and shall conform to the requirements of clause 3.8
- 3.7.1.2 The gradient of the flared sides shall not be steeper than 1:10.
- 3.7.3.1 Kerb ramps shall have flared sides where pedestrians are likely to walk across them . . .



Minimum Dimensions of Lots



Kerb Ramps

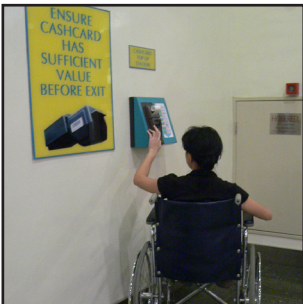
An access lobby is where one enters or exits the building. Therefore, the clarity of its location is important in addition to the need for ease of entry and exit. This aspect is critical in facilitating people of varying abilities.



Signage to access lobby



Close proximity of machines to exit



Entrance to access lobby

General Provisions & Access

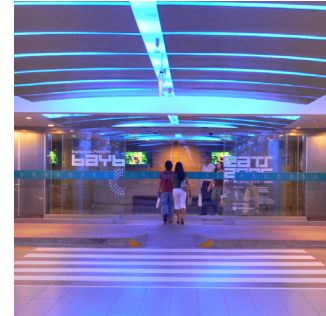
- Access lobby should be provided at every carpark floor.
- *Access pathway from the carpark to the access lobby should be level. If this is not possible, a kerb ramp should be provided.*
Reference BFA 9.6.1
- Signage clearly visible from all parts of the car park would be helpful for orientation.
- Automated door for easy access by people with physical disabilities and visual link between carpark and lobby would be preferred.

Safety Measures

- Tactile warnings, preferably in contrasting colours, should be provided to indicate a hazardous location at the doors, ramps and changes in direction.
- Adequate lighting is most desirable for the area around the lobby.
- When there is no change in levels to the access lobby, bollards with a minimum clear spacing of 900 mm would be needed to demarcate the pedestrian zone.
- The bollards should not be chained as chaining would impede human traffic flow.

Machines

- *Top-up machines should be located beside the entrance of an access lobby and should be of a comfortable wheelchair height.*
Reference BFA 9.7.1



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*access lobbies*)

- 9.6.1 An accessible path leading to the entrance of the building . . . shall be level or have a kerb ramp complying with clause 3.7.
- 9.7.1 Vehicle park auto-pay machines shall:
- (a) be located on the same level as the accessible vehicle parking lots; and
 - (b) have the operable parts complying with clause 3.10.2.



Adequate spacing between bollards to allow easy access by wheelchair users



Carpark access lobby with automated doors

b access lobbies

1 Carparks

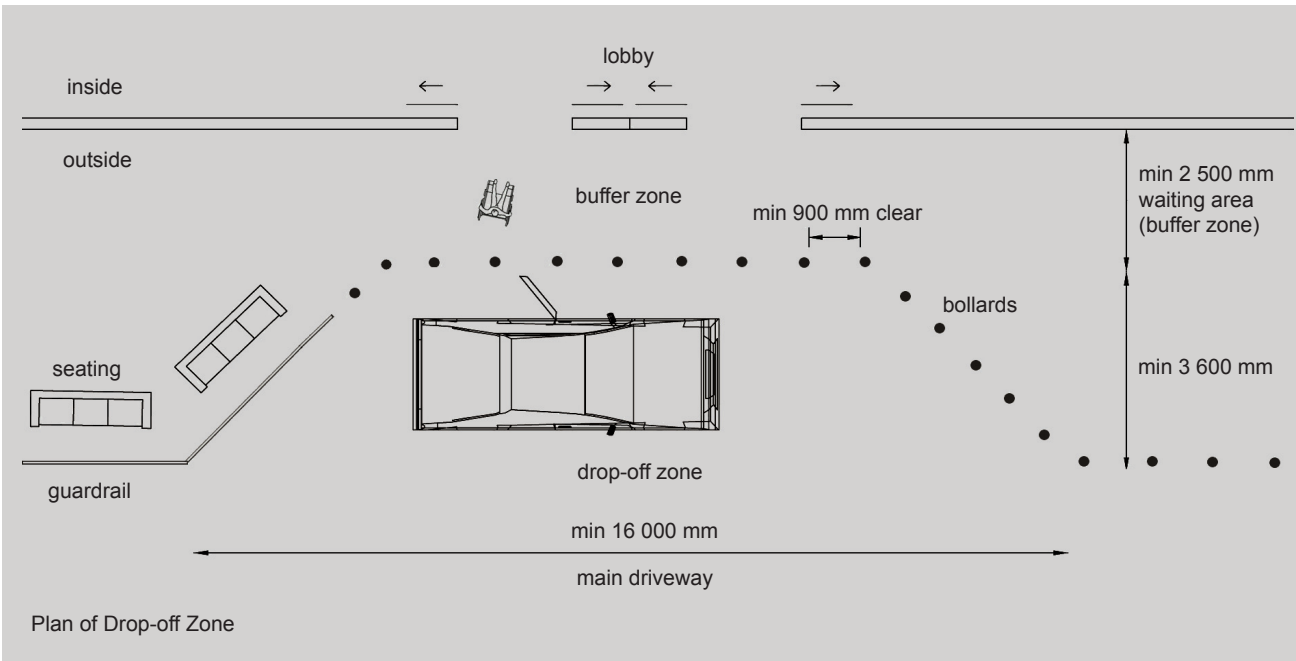






CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (drop-off zones)

- 3.3.1.1 A passenger alighting and boarding point complying with clause 3.3.2 should, where possible, be provided at the level of approach for persons with disabilities to alight from and board a vehicle.
- 3.3.1.2 Where transfer has to be made from a vehicular surface to a pedestrian surface, the driveway and the pavement or footway surfaces shall be blended to a common level or ramped.



The drop-off zone is often a busy area with continuous flow of people walking, waiting, boarding and alighting concurrently. To allow for these activities, adequate space should be provided according to the user volume.

Lay-by

- *A designated drop-off zone, for alighting and boarding, should be provided.*
Reference BFA 3.3.1.1
- A buffer between the building entrance and the car drop-off zone should have a minimum width of 2500 mm and be provided with seating and guard rail .
- *Drop-off zone, buffer zone and entrance should be of the same level to allow for easy movement. A kerb ramp should be provided when there is a change in level.*
Reference BFA 3.3.1.2
- The drop-off point should be sheltered from the weather.

Finishes

- Non-slip floor finish should be used throughout the area.
- Good drainage should be allowed for to prevent ponding.

Signages

- Signages should be provided to announce the building from afar, with additional signage nearer the approach and/or the entrance.



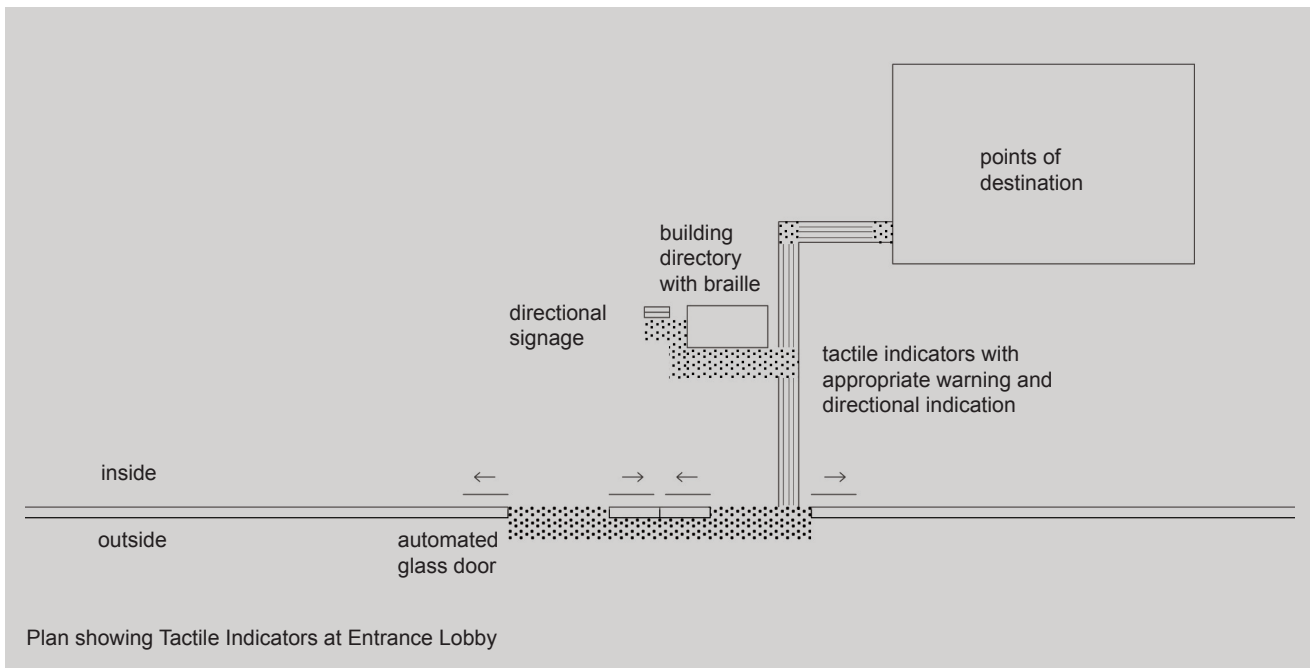
No change in level between driveway & entrance



Sheltered lay-by



Seating with guard rail in buffer area



Entry into the building begins with the lobby. To orientate users upon entering, sufficient directional devices should be provided at visible locations.

Doors & Entrances

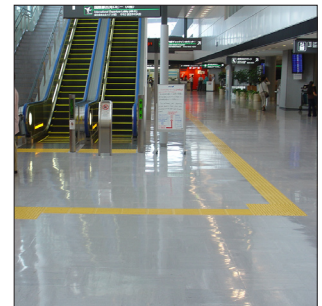
- At least one of the entrance doors should be automated for easy access to the building.
- Visual link between inside and outside is highly recommended for entrance doors.
- Changes in level at the entrance should be avoided.

Signages & Directories

- Tactile indicator should be provided, from the entrance to the major points of destination in the building.
- A building directory should be prominently displayed at the entrance lobby and be clearly visible upon entering.
- Braille directions and maps showing building layouts should be incorporated into the building directory.
- Clear signages should be provided to direct users to accessible routes.



Tactile and directional warning indicator at entrance



Tactile indicator



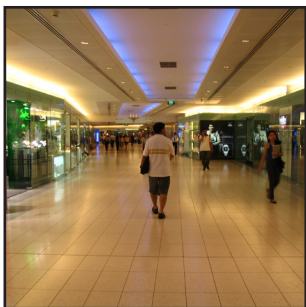
Directional signage





3 Horizontal Circulation

In the design of corridors, it is important to consider safety precautions and the different pace of user movement, as these will determine the physical dimensions and influence the placement of furniture and other objects.

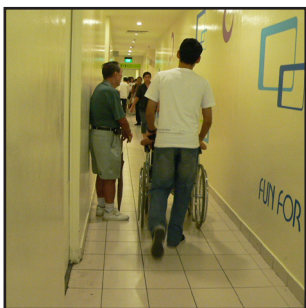


4000 mm wide corridor

Physical Design

- Corridor should be of a minimum width of 1800 mm. This is to allow for both an assisted person and a wheelchair to pass. Corridor width should be adjusted proportionately to the projected traffic volume.
- Corridor should have non-slip floor finish. Colours and/or textures could be used to aid orientation.
- *There should be no protruding objects along corridors. If unavoidable, ensure strict compliance with code.*

Reference BFA 3.4.4.5.1 and 3.4.4.1.1



This corridor is too narrow

Safety Measure

- Adequate lighting is important. An abrupt change in light intensity along circulation pathways may be hazardous and should be avoided.
- *Handrails and/or trailing bars shall be provided whenever possible, on at least one side of a corridor, for the visually impaired to trail along without impediment. Signage with corresponding braille along handrail/trailing bar shall be provided to indicate the location of facilities.*

Reference BFA 3.4.2.2

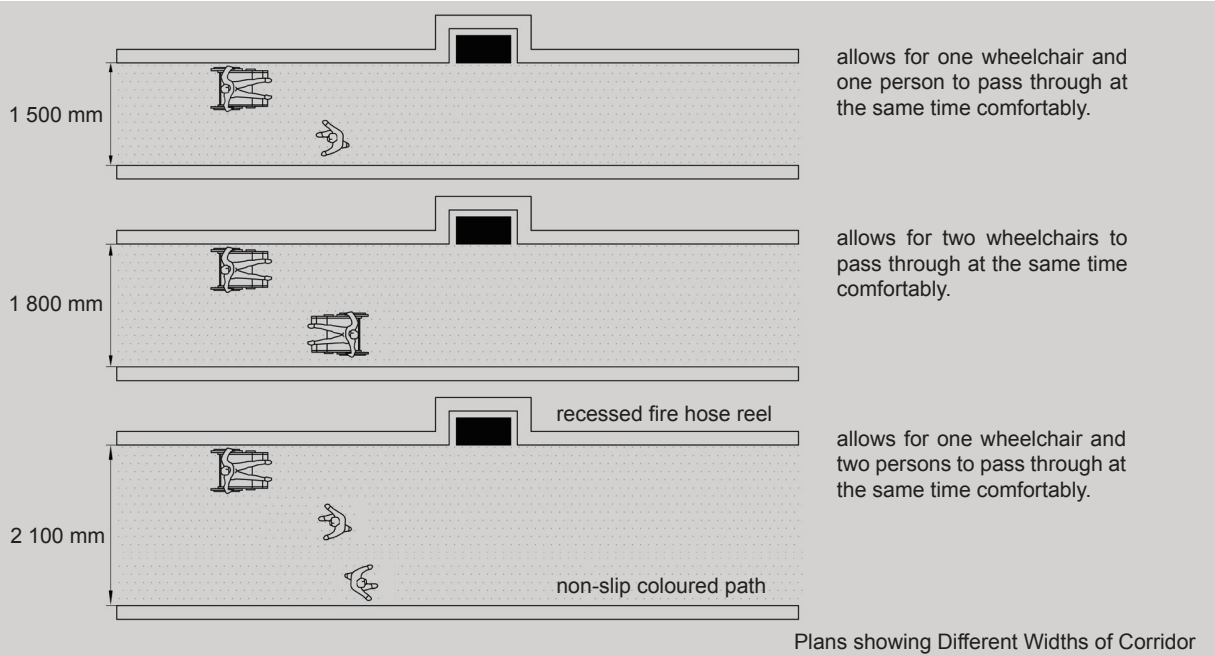


Protruding objects along corridor should be avoided



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*corridors/general*)

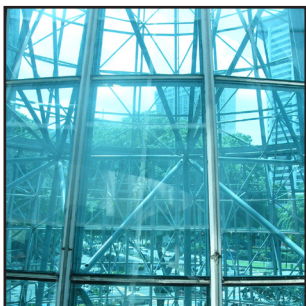
- 3.4.4.1.1 Obstacles, projections or other protrusions shall be avoided in pedestrian areas such as walkways, halls, corridors, passageways or aisles. The maximum height of the bottom edge of freestanding objects with a space of more than 300 mm between supports shall be 580 mm from the floor level.
- 3.4.4.5.1 Protruding objects shall not reduce the clear width required for an accessible route or manoeuvring space.
- 3.4.2.2 The wall finish shall be smooth or, in the case of rough walls, have trailing bars placed at a height of 840 mm from the floor level so that persons with visual impairment can trail along it without hurting their hands.



The layout of a shopping centre is crucial in getting people to their destinations. Designers are encouraged to provide clear visual cues for orientation throughout the shopping experience.



Water feature serving as an orientational device



Horizontal orientation with external views



Orientation with the help of building form



Orientation with aid of an atrium

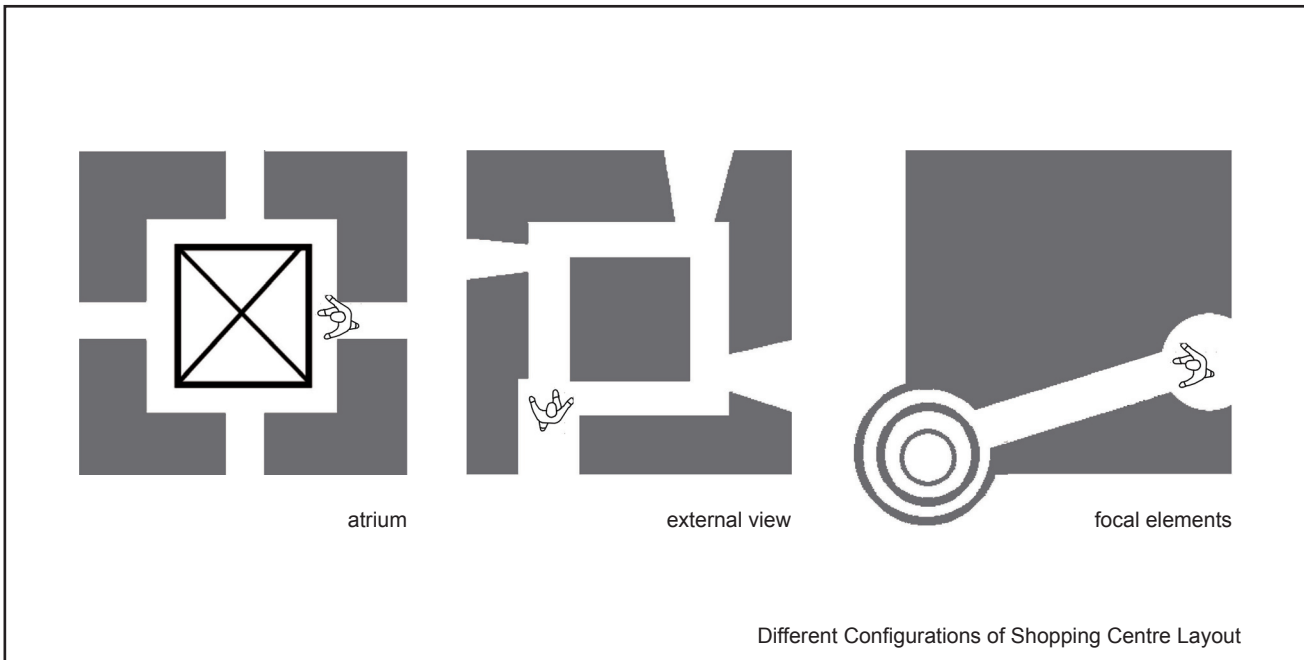
- Reference points should be provided to aid user in orientation. Atriums, external views and focal elements such as sculptures and architectural features are effective devices.
- *Dead-end spaces should be avoided as far as possible. When unavoidable, adequate space should be allowed for a wheelchair bound person to turn around.*

Reference BFA 3.1.3



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*corridors/orientation*)

3.1.3 The minimum clear floor space for a wheelchair to turn shall be 1800 mm x 1800 mm . . .



b corridors/orientation

3 Horizontal Circulation

Apart from ease of accessibility, comfort of the users travelling along the circulation path should also be taken into design consideration.



Seating along a corridor



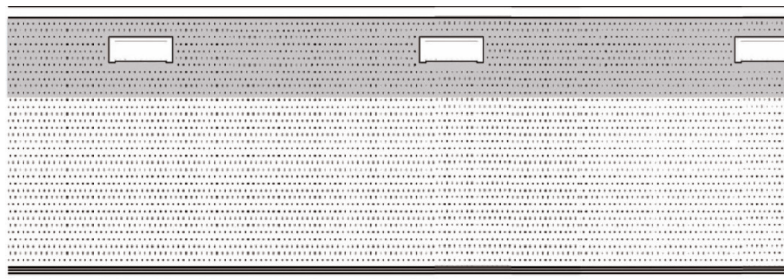
Seating within a wide corridor



Seating around pillar

- Seatings should be provided at the lobby, atriums, along corridors or at a designated area.
- *Seating areas should be at frequent intervals not exceeding 30.0 m. Number of seats to be provided should be determined according to the use and traffic flow.*
- Reference BFA 3.4.4.6.1
- Designated sitting areas should be easily accessible and visually linked to the main circulation pathways.
- For safety reasons, seats should be placed away from railings overlooking a void.
- *Seats with armrests to assist elderly persons to get up should be provided.*

Reference BFA 3.4.4.6.2



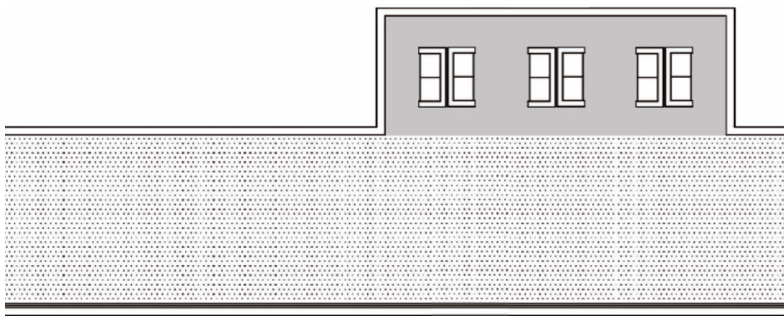
Seating Provision along Corridor

seating along corridor at intervals, without interfering the circulation space.



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*seating*)

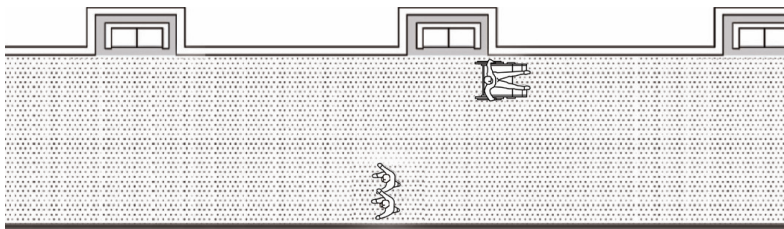
- 3.4.4.6.1 Long paths of travel should be avoided and resting areas should be provided at frequent intervals not exceeding 30.0 m.
- 3.4.4.6.2 Where seats are provided they should have armrests to assist persons with disabilities to get up from the seats.



seating at a designated area visible from main circulation space



Seats within a lobby



recessed seating at intervals



Seats with armrests

c seating

3 Horizontal Circulation

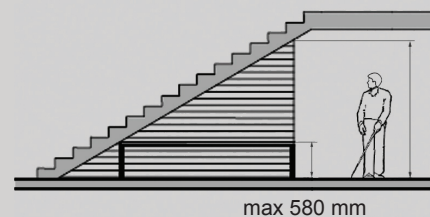
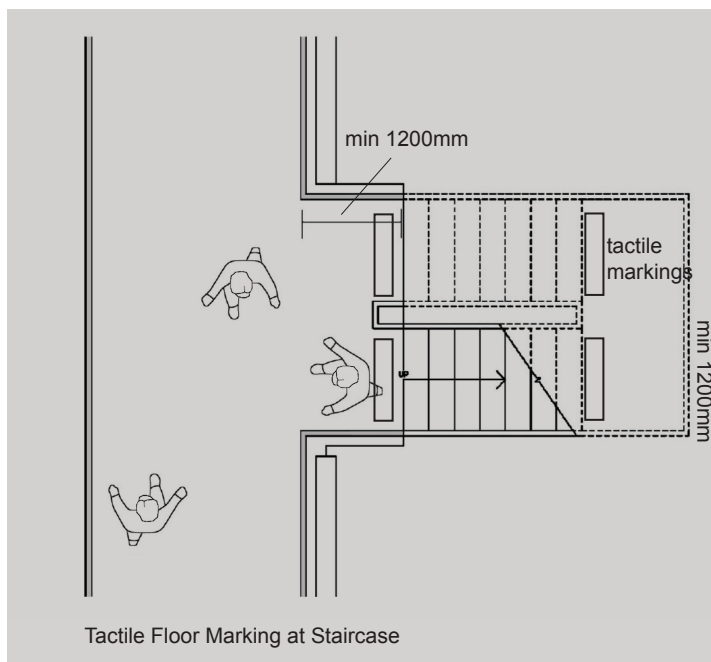






CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (staircases)

3.4.5.2.1 A detectable guardrail or other barrier having its leading edge at or below 580 mm from the floor level shall be provided where the headroom of an area adjoining an accessible route is reduced to less than 2000 mm . . .



Besides escalators, lifts and ramps, staircases are one of the most important means of travelling between different levels. As such they are designed with great sensitivity.

Staircase Dimension

- The width of stairs is to be of minimum width of 1200 mm and should be adjusted according to the expected flow of traffic.
- A flight of stairs should have a minimum of 3 risers. Provision of 1 or 2 steps should be avoided as a safety precaution.
- After a maximum of 16 risers an intermediate landing should be provided.
- Floor landings shall have a level platform of the same width as that of the stairs.
- *Staircases of widths wider than 2300 mm should be separated by a handrail into segments between 1100 mm and 1800 mm.*

Reference Code of Practice for Fire Precautions in Building 2.2.8

Staircase Safety

- *The minimum clear headroom for all vertical circulation routes shall be 2000 mm.*
- *A detectable guardrail or other permanent barrier should be provided where the headroom is less than 2000 mm. Such elements should be at a maximum height of 580 mm so that they can be detected by the visually impaired.*

Reference BFA 3.4.5.2.1



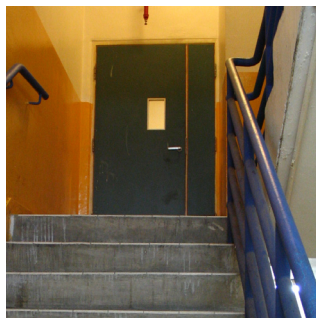
Wide staircase with intermediate railings



Circular stair with an acceptable minimum tread dimension

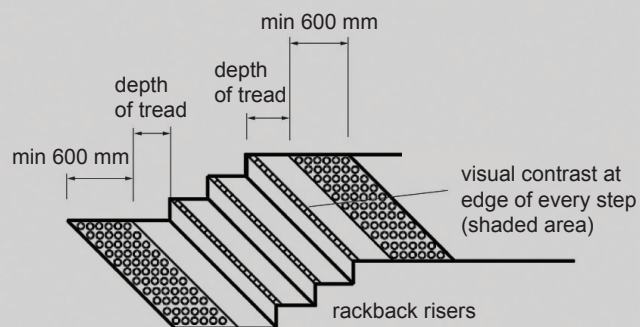
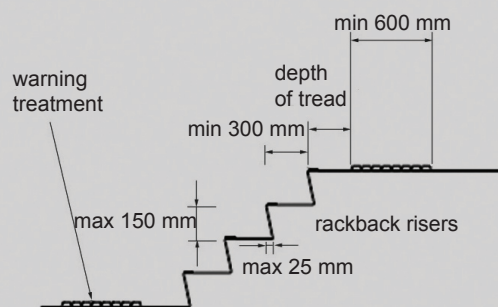


Guardrail provided at the soffit of staircase



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*treads & risers*)

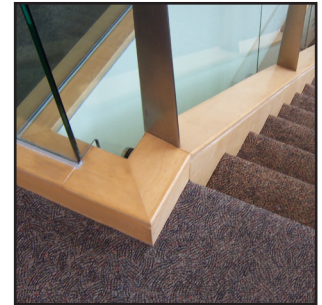
- 3.9.2.1 A flight of steps shall have:
 - (a) uniform risers of maximum 150 mm and treads of minimum 300 mm; and
 - (b) no open risers . . .
- 3.9.3.2 All steps should be fitted with non-slip nosing strips between 50 mm and 65 mm in width with permanent contrasting colours.
- 3.9.3.1 Nosings shall:
 - (a) have no abrupt undersides as shown in . . . ; and
 - (b) project not more than 25 mm over the back edge of the step . . .



Safety Measures for Steps

Appropriate dimension, materials and detailing of treads and risers are important for a comfortable and safe transition between levels in both directions.

- *Risers should be a maximum dimension of 150 mm and treads should have a minimum dimension of 300 mm.*
Reference BFA 3.9.2.1a
- Risers and treads should be of consistent dimensions.
- *Treads and the walls of staircase should be of contrasting colours to alert persons with visual impairment of the presence of steps.*
BFA 3.9.2.2
- The screeding of treads should be level and outward sloping treads should be avoided.
- *Treads should be of a non-slip finish with special non-slip nosing of permanent contrasting colour.*
Reference BFA 3.9.3.2
- Nosings should be an integral part of the steps. If nosing strips are used, they should be securely fastened to the steps.
- Tactile strips should be provided at the start and end of every flight of stairs.
- *Protruding nosings should be avoided as they may be hazardous and rakeback risers are recommended.*
Reference BFA 3.9.3.1
- *Open risers and transparent treads should be avoided for staircases that forms part of the main circulation.*
Reference BFA 3.9.2.1



Carpet provides good slip resistance



Special non slip nosing of permanent contrasting colour



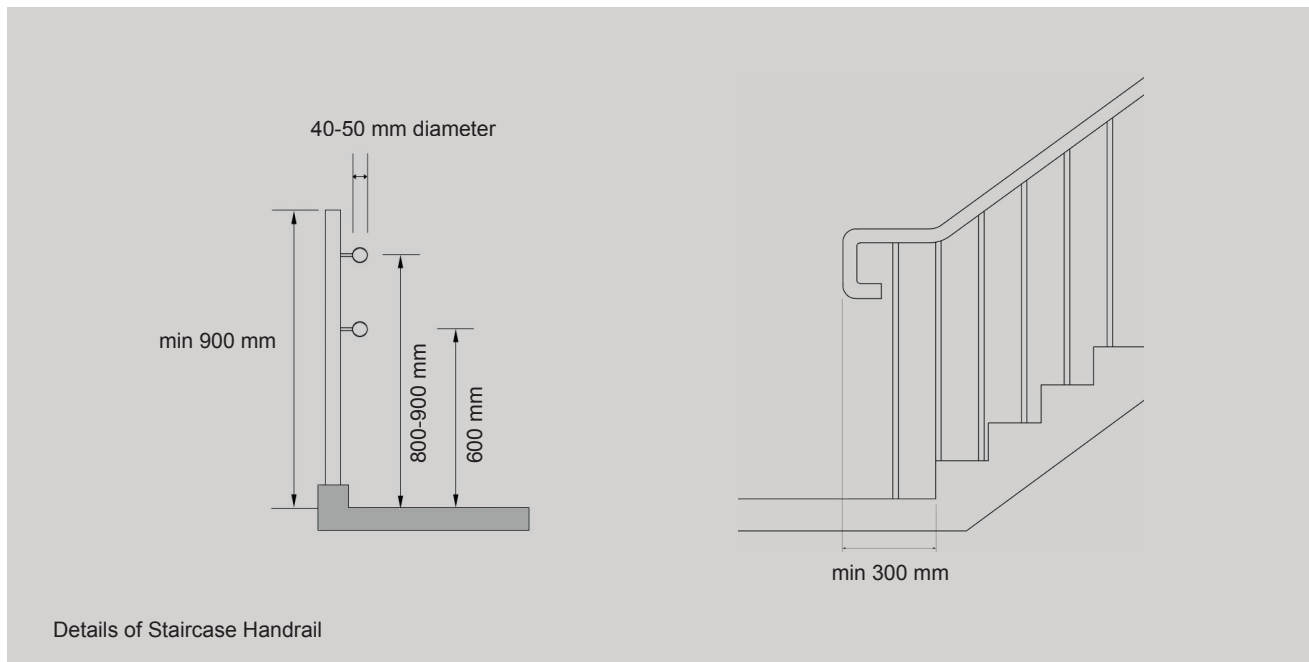
Open risers



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*staircases/handrails*)

3.9.5.1 Handrails for stairs shall:

- (b) be installed on both sides;
- (c) be positioned between 800 mm and 900 mm measured from the pitch line vertically to the top of the handrails; and
- (d) be continuous throughout the entire length and extend not less than 300 mm beyond the top and bottom step.



Handrails are essential elements of staircases that provide support for users and protect them from mishaps.

- *Handrails should be provided on both sides of the stairs.*
Reference BFA 3.9.5.1b
- *The height of the handrails is to be between 800 mm and 900 mm measured from pitch line vertically to the top of handrails. Railings that act as a barrier should be of minimum 900 mm high.*
Reference BFA 3.9.5.1c
- Additional handrails for children are recommended. It should be provided at 600 mm from pitch line vertically to the top of handrails.
- *Handrails shall be continuous throughout the entire length and extend at least 1 tread depth or 300 mm beyond the top and bottom step.*
Reference BFA 3.9.5.1d

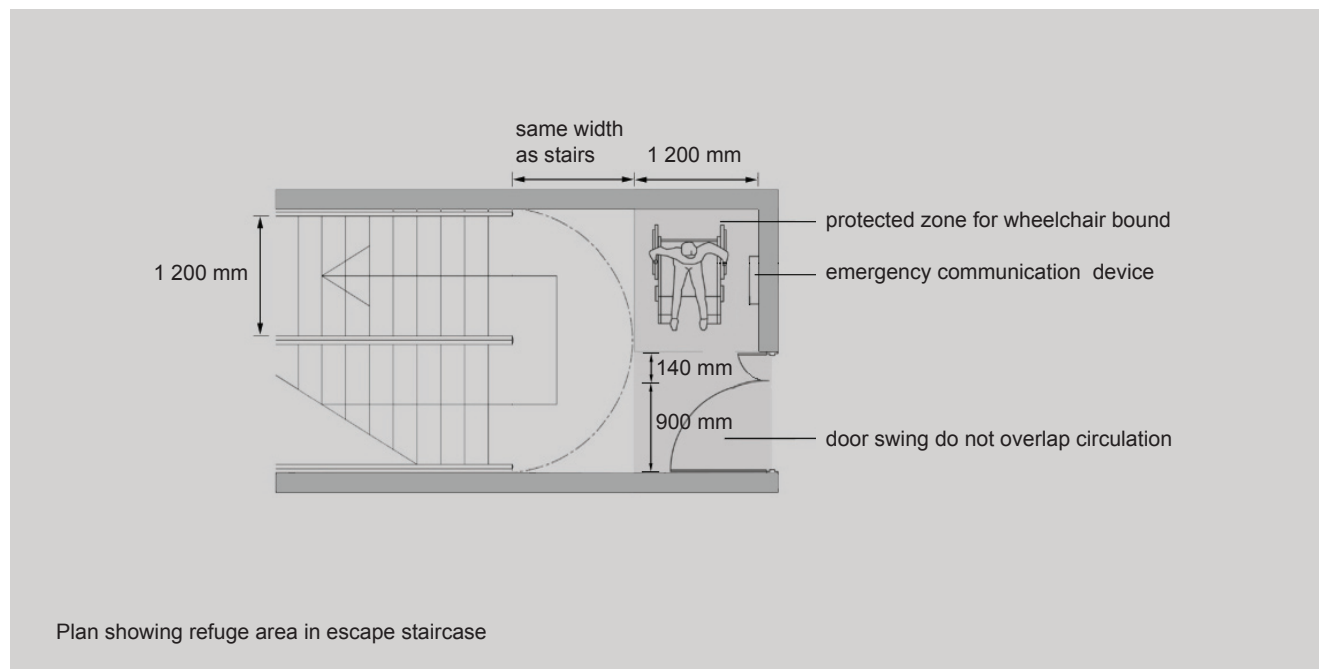


Handrails on both sides



Continuous handrails provided for a stair of complex geometry

a staircases/escape



Escape staircases are vital in the case of any emergency for occupants to evacuate. The design of escape staircases should aim to provide all occupants with a safe and efficient exit.

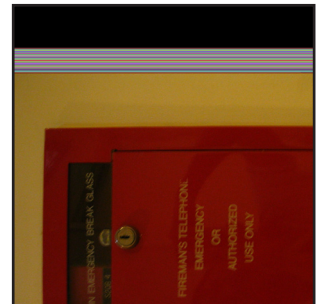
- Wheelchair users require a clear space at escape staircase floor landing as refuge area for them to stay protected while waiting for assistance.
- Escape staircases are to be lit adequately via an emergency power supply during emergency.
- A communication device e.g. telephone or intercom should be provided at each full landing to facilitate communication with the building management team for assistance.



Clear space at landing



Adequate lighting from regular as well as alternative sources



Communication device



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (ramps/general)

3.8.3.1 The minimum width of a ramp shall be 1200 mm.

3.8.2.1 The gradient of a ramp shall:

(a) comply with Table 2; and

Changes in Vertical Rise (mm)	Gradient not steeper than
0 to 15	1 : 2
more than 15 to 50	1 : 5
more than 50 to 200	1 : 10
Exceeding 200	1 : 12

(b) be constant between landings.

3.8.1.2 Where the horizontal run of an approach ramp exceeds 9.0 m in length, an alternative stepped approach, complying with the requirements in clause 3.9, in addition to the ramp approach, may be provided for the ambulant disabled and shall not exceed 1200 mm.



When there is a large change in elevation, both stairs and ramps can be provided.



Ramps for universal access should be of consistent and gentle gradient, with adequate landings.

Ramps provide universal access to complement staircases. Thus, the design of ramps should aim to satisfy the needs of the users by having appropriate gradient, regular landings, comfortable travelling distance, as well as other safety precautions such as non-slip floor finish and handrails.

Width

- *Ramps should have a minimum clear width of 1200 mm and should be wider where heavier traffic is expected.*

Reference BFA 3.8.3.1

Gradient and Maximum Run

- *The gradient of a ramp should not be steeper than 1:12 and be consistent between landings.*

Reference BFA 3.8.2

- *The maximum length of a single run should be as follows:*

Gradient of Ramp	1:12	1:13	1:14	1:15
Maximum length of run	9	10	11	12

When there is a large change in elevation that requires multiple ramps and landing combinations, other solutions should be considered.

Reference BFA 3.8.1.2

Alternative Approach

- *While ramps allow for universal access, they have their limitations. Lengthy ramps that are longer than 9m, are often undesirable, particularly in the case of main entrances. Where there is a larger change in elevation, an alternative approach should be considered.*

Reference BFA 3.8.1.2. Note 2



Minimum clear width of 1200 mm



Gentle gradient ramp



Gentle gradient outdoor ramp

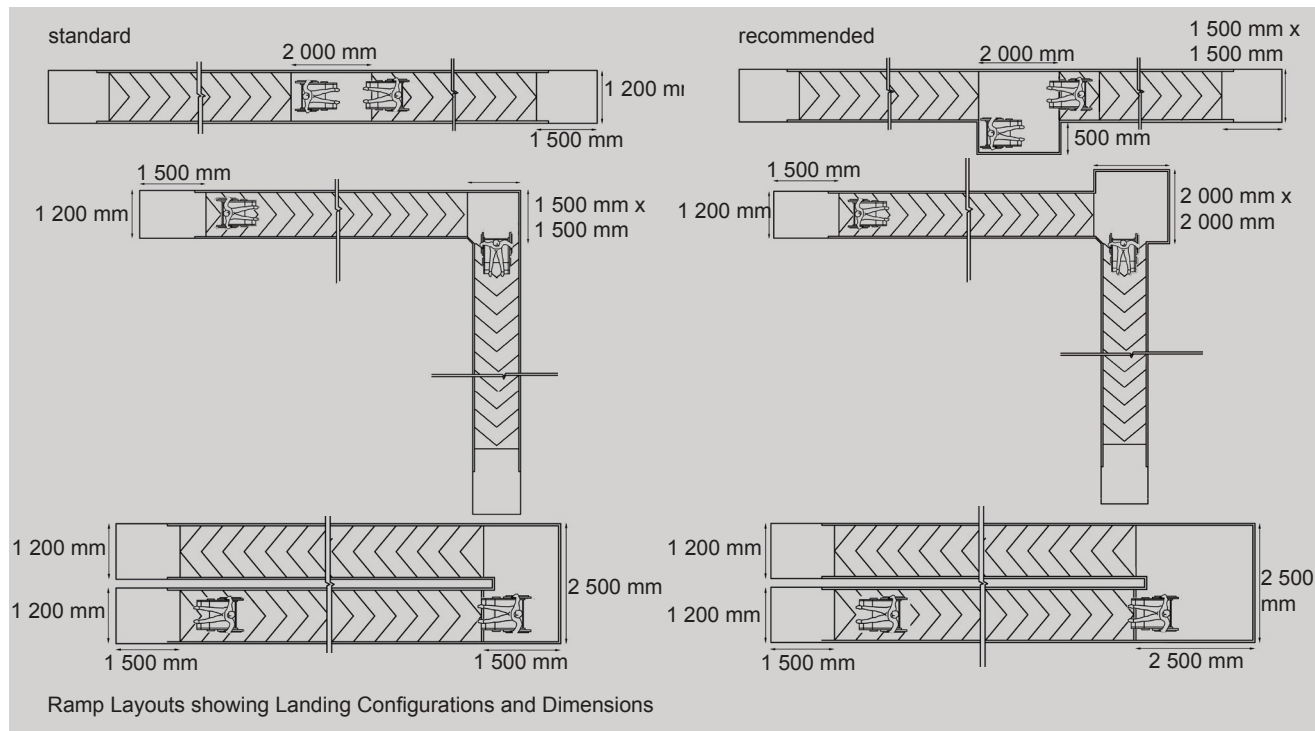


CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*ramps/landings*)

3.8.5.1 Ramps shall have a level landing at the top and bottom of each run and also where the run changes direction.

3.8.5.2 Landings shall:

- (a) have a level platform of not less than 1500 mm;
- (b) be provided at regular intervals of not more than 9.0 m of every horizontal run; and
- (c) conform to clause 3.5.4 if served by a doorway.



The importance of landings may not be apparent to most. However, they are essential components when used by people with disabilities, especially when the ramp stretches a long distance.

Landings

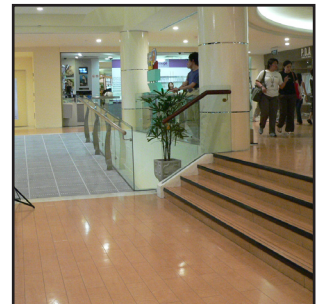
- When the ramp exceeds the maximum length as specified earlier, landings should be provided.
- *Full level landings should be provided at the top and bottom of each turn of ramps.*
Reference BFA 3.8.5.1
- Landings should be more generous to provide for easy manouvering and for resting. For straight and 90 degree turn ramps, a 2000 mm by 2000 mm landing is recommended. While a 180 degree turn ramp should have a landing of 2500 mm by 2500 mm.
- All landings should not overlap with any circulation route.



Landings provided at the change in direction



Full landing platform that does not overlap with other circulation route



Clear landing should not overlap with other circulation route



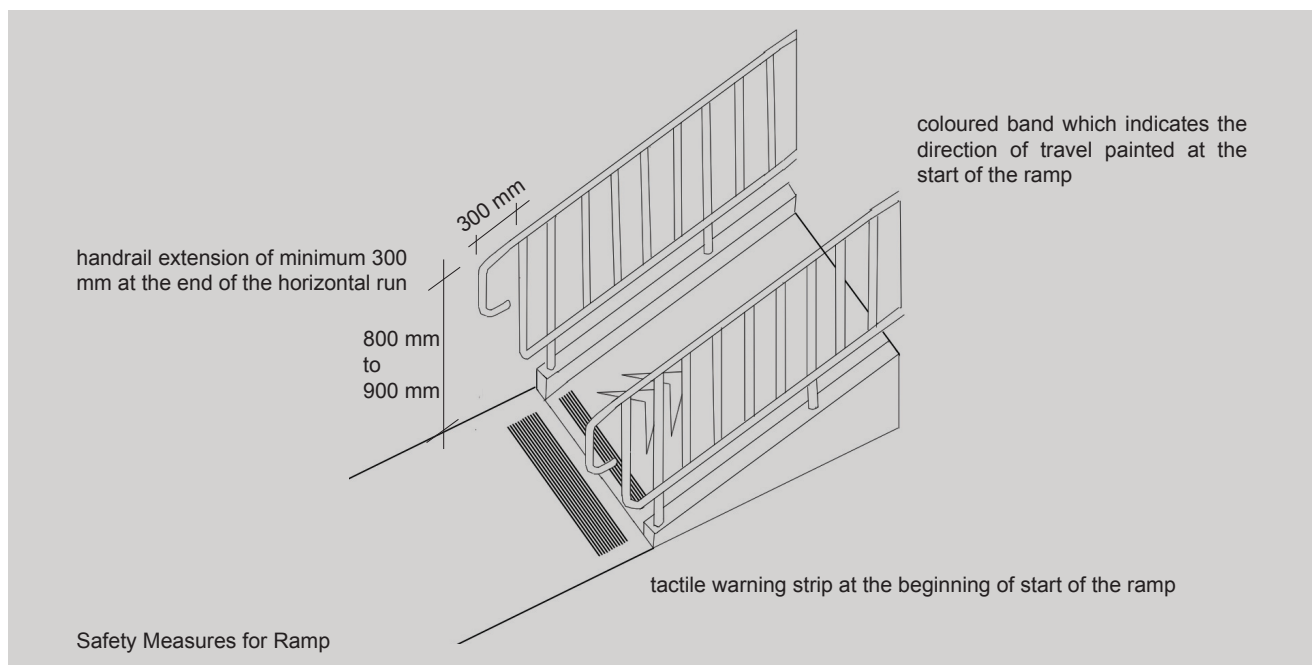
CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*ramps/handrails*)

3.8.6.1 A ramp run with a rise greater than 150 mm shall have handrails that:

- (a) are on both sides;
- (b) comply with clause 3.6.2; and
- (c) are placed at a height of between 800 mm and 900 mm above the floor level.

3.8.6.2 Handrail extensions . . .

- (a) shall extend horizontally for a distance of not less than 300 mm beyond the top and bottom of the ramp to provide support for persons who may need help to negotiate the ramp; and
- (b) should not project into another path of travel.



The design of ramps for universal access is difficult due to the long distance it requires, as such there is a need to reconcile the limitations of space and the accessibility requirements, in order to provide safe, easy and comfortable access to all users.

Provision of Handrails

- *Handrails should be provided for ramps with a rise greater than 150 mm.*

Reference BFA 3.8.6.1

- *Handrails should be placed at a height of between 800 mm and 900 mm above the floor level. Railings that act as a barrier should be of minimum 900 mm high.*

Reference BFA 3.8.6.1

Handrails Extension

- *Handrails should be extended at least 300 mm at the end of a horizontal run.*

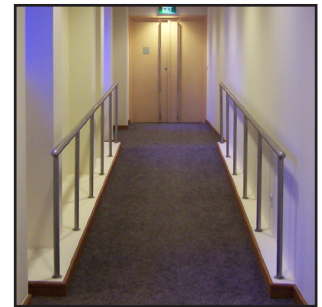
Reference BFA 3.8.6.2.a

- *Handrails extension should not project into another path of travel.*

Reference BFA 3.8.6.2.b

- *Handrails should be continuous throughout the entire length of the ramp.*

Reference BFA 3.8.6.1.b



Ramps with raised curbs and railings at both sides



Handrails extension at the end of the run



Handrails of two varying heights with extension at the end



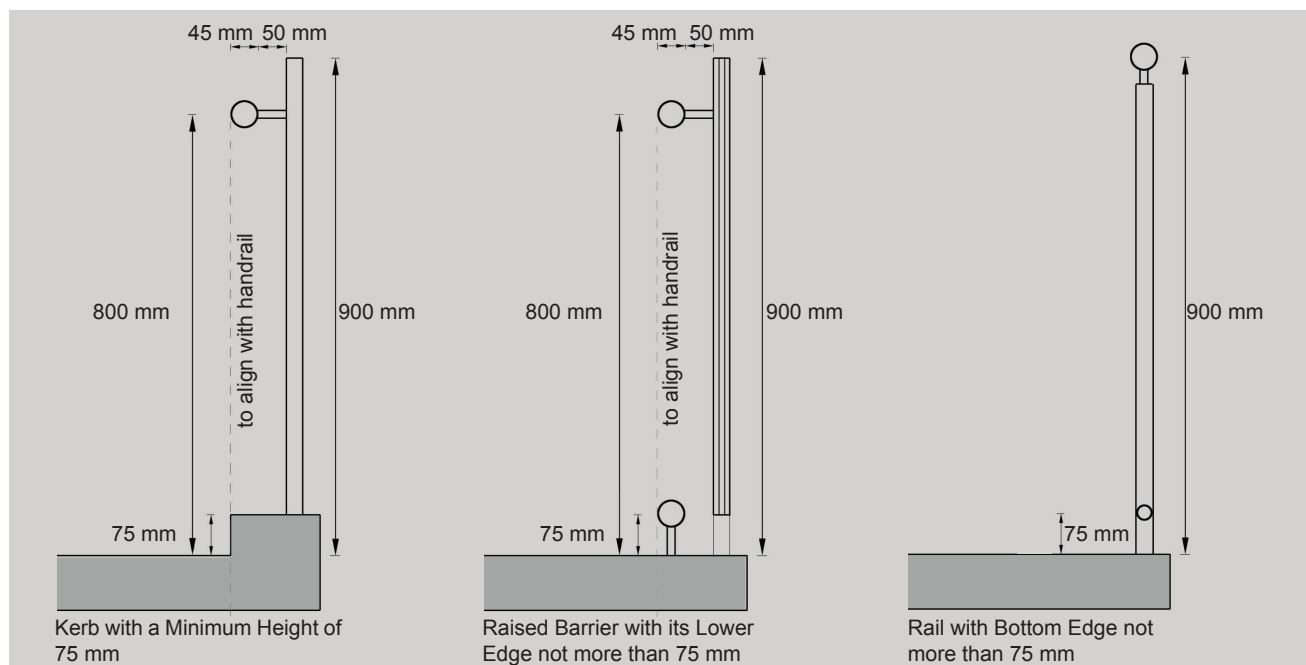
CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*ramps/safety*)

3.8.8.1 Outdoor ramps and their approaches shall be designed so that water will not accumulate on the walking surfaces.

3.8.4.1 Ramps and landing surfaces shall be slip-resistant . . .

3.8.7.1 Ramps and landings not adjacent to a wall shall have an edge protection such as:

- (a) a kerb with a minimum height of 75 mm;
- (b) a raised barrier with its lower edge not more than 75 mm from the ramp or landing surface;
- (c) a rail with the bottom edge not more than 75 mm from the ramp or landing surface.



To provide universal access to all users, ramps should be designed as an integral part of the circulation of a building, so as to ensure the smooth flow of human traffic and to provide a safe and protected access.

Design and Planning for Safety

- *Outdoor ramps and their approaches should be sheltered wherever possible and should have a good drainage to prevent ponding.*

Reference BFA 3.8.8.1

Finishes

- *Floor surfaces should be non slip, yet should not obstruct use of moving aids.*

Reference BFA 3.8.4.1

- Tactile warnings, in contrasting colours, should be provided at the start and the end of the ramp. Markings to indicate the direction of traffic flow is desirable.

Edge Protection

- *Ramps and landings that are not adjacent to a wall should have an edge protection. For a kerb, it should be at a minimum height of 75 mm. For a raised barrier, the gap between the protective barrier and the floor should not be more than 75 mm. For a handrail, the bottom rail should be at a maximum height of 75 mm.*

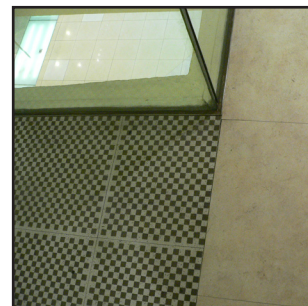
Reference BFA 3.8.7.1



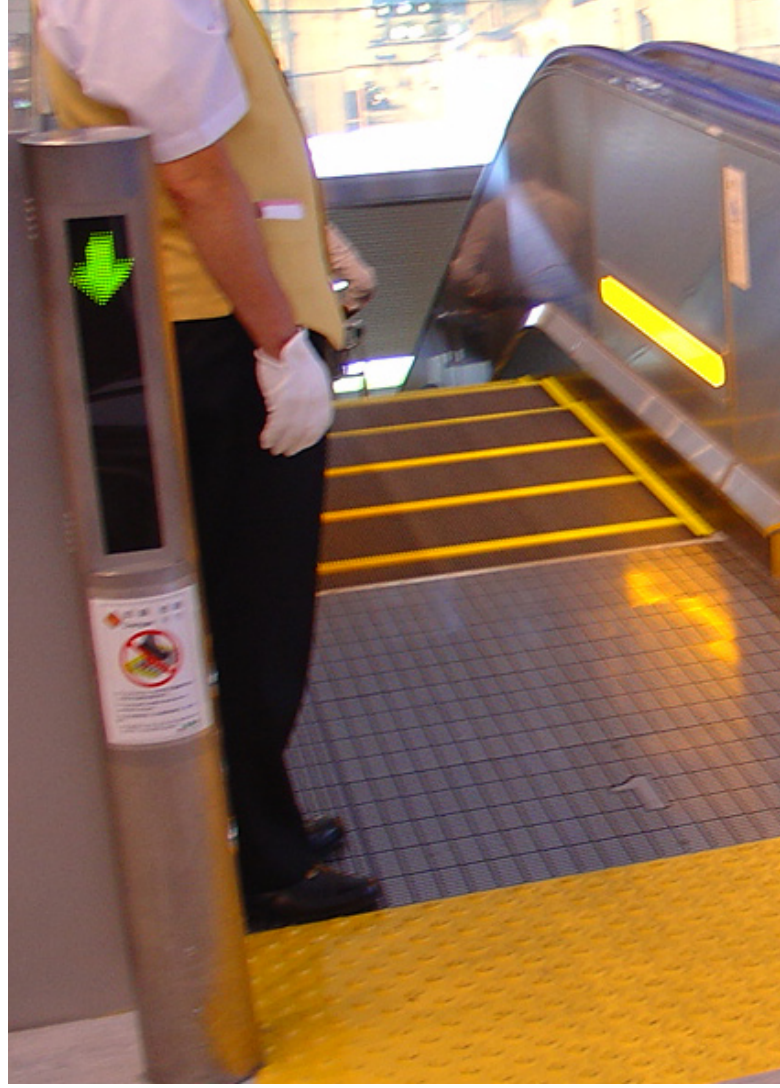
Landing at the start of the ramp



Tactile warning strip & clear indication of direction

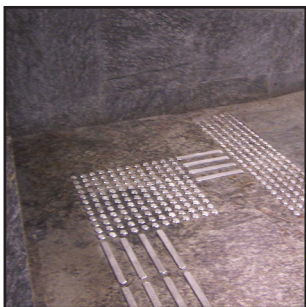


Slip resistant floor surface





Lifts are the most common form of vertical transportation and are an integral part of the accessible route. As such, attention should be paid to the design in order to accommodate the needs of people with different abilities.



Tactile warning

Lift Provisions

- *Lift should be near the entrance of a building or escalators and should be made accessible with no change in level from the entrance.*

Reference BFA 5.1.1

- *The lift should serve all levels.*

Reference BFA 5.1.2

- *All lifts should be made accessible to wheelchair user by having a minimum clear door width of 900 mm.*

Reference BFA 5.3.1



Braille at call buttons

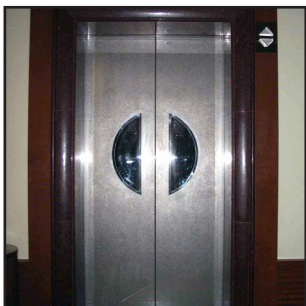
Call Buttons

- *The call button at the lift lobby should have a clear floor space of at least 900 mm by 1200 mm with no obstruction, to allow access by a wheelchair user.*

Reference BFA 5.4.2.1

- *The call button shall be placed at a height of between 900 mm and 1200 mm to accommodate persons with different abilities.*

Reference BFA 5.4.2.1



Lift door with an area of transparency

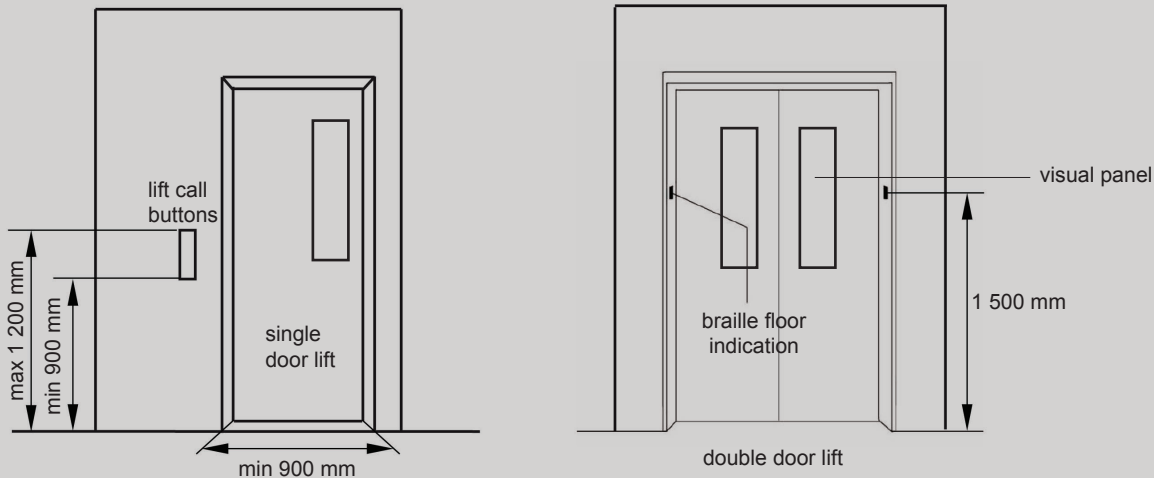
Indicators

- Tactile indicators should be provided on the floor leading towards the lift.
- Braille floor indications should be provided on both sides of the door jamb of the elevator entrances on all floors and placed at 1500 mm above floor.
- All doors should have a visual panel at eye level of not less than 500 cm².



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*lifts/lobbies*)

- 5.1.1 Where lifts are provided in a building pursuant to the Building Control Regulations, at least one lift shall be made accessible from the entrance level for vertical circulation.
- 5.1.2 The lift shall serve all levels intended for access by persons with disabilities.
- 5.3.1 The lift car shall have a clear door opening of not less than 900 mm.
- 5.4.2.1 The call button located outside the lift shall:
 - (a) have a clear floor space of at least 900 mm by 1200 mm with no obstruction placed to prevent a wheelchair user from reaching the call button;
 - (b) be placed at a height of between 900 mm and 1200 mm from the floor level; and
 - (c) be dedicated to call the lift for persons with disabilities.



User Friendly Provision and Dimensions for lifts

The lift's control and operation mechanism should be located and designed for easy use by people of all abilities. As such, these mechanisms should not impede any user from having full control of the lift movement.



Lift buttons



Lift car fitted with mirror

Lift Car Provisions

- *The minimum size of the lift car shall be 1200 mm wide by 1400 mm deep.*
BFA 5.2.1
- *Grab bars shall be placed at a height of 900 mm from the floor level and be fixed on both sides and at the rear of the lift car. This is to provide support for elderly passengers.*
BFA 5.5.1
- *All lift interiors shall be fitted with at least one mirror. In a crowded lift, the mirrors enable a wheelchair bound person to see a reflection of the lift location display, without having to turn around.*
- *A visual information display system should be suitably colour contrasted as it is easier for persons with visual impairment to read.*
BFA 5.4.1.6

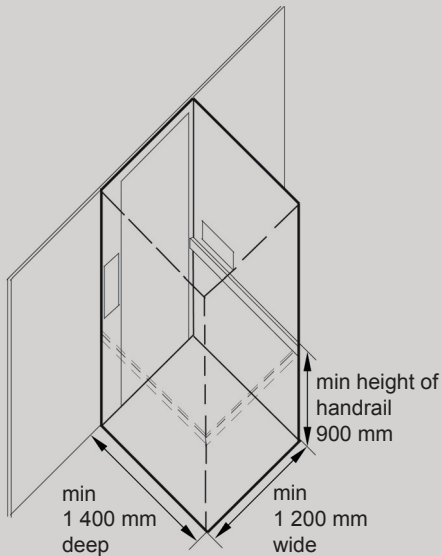
Special Recommendations for Visually Impaired

- *Braille and tactile marking indicators should be provided and placed to the left of lift call and control buttons. Such markings shall not be placed below the call and control buttons. Tactile markings should have a minimum dimension of 15 mm to 20 mm high and should be raised a minimum of 1 mm and have contrasting colour background. Braille should be in Arabic numerals or symbols.*
Reference BFA 5.4.1.1 and 5.4.1.2
- *The control buttons inside the lift shall be placed at a height of between 900 mm and 1200 mm from the floor level and may be placed vertically or horizontally or both vertically and horizontally.*
BFA 5.4.3.1
- *Lift call and control buttons shall not be touch-sensitive but should require a light positive pressure to activate them.*
BFA 5.4.1.4

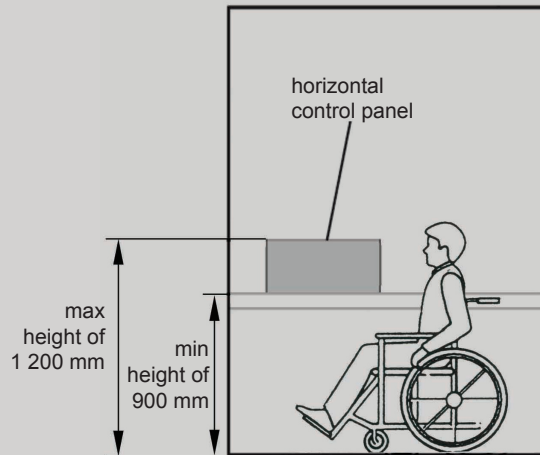


CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (lifts/lift cars)

- 5.4.1.1 Braille and tactile markings shall be provided to the left of lift call and control buttons. Such markings shall:
 - (a) not be placed below the call and control buttons; and
 - (b) be in Arabic numerals or symbols.
- 5.4.1.2 Tactile markings shall . . .
- 5.4.3.1 The lift control buttons located inside the lift:
 - (a) shall be placed at a height of between 900 mm and 1200 mm from the floor level;
 - (b) and may be placed vertically or horizontally or both vertically and horizontally.
- 5.5.1 Grab bars shall:
 - (a) comply with clause 3.6;
 - (b) be placed at a height of 900 mm from the floor level; and
 - (c) be fixed on both sides and at the rear of the lift car.



Dimensions of Lift Car



Elevation of Side of Lift Car from the Interior

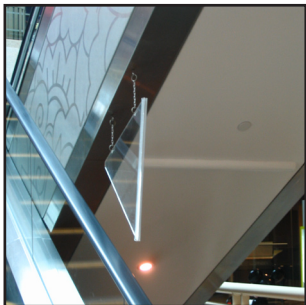
Escalators are efficient in moving a large number of people. Attention should be paid to ensure safety on the escalators as well as landings. The provision of a buffer area at the landings is recommended for slower moving passengers and to avoid congestion.



Additional railing at landing



Yellow marking on steps



Headroom warning

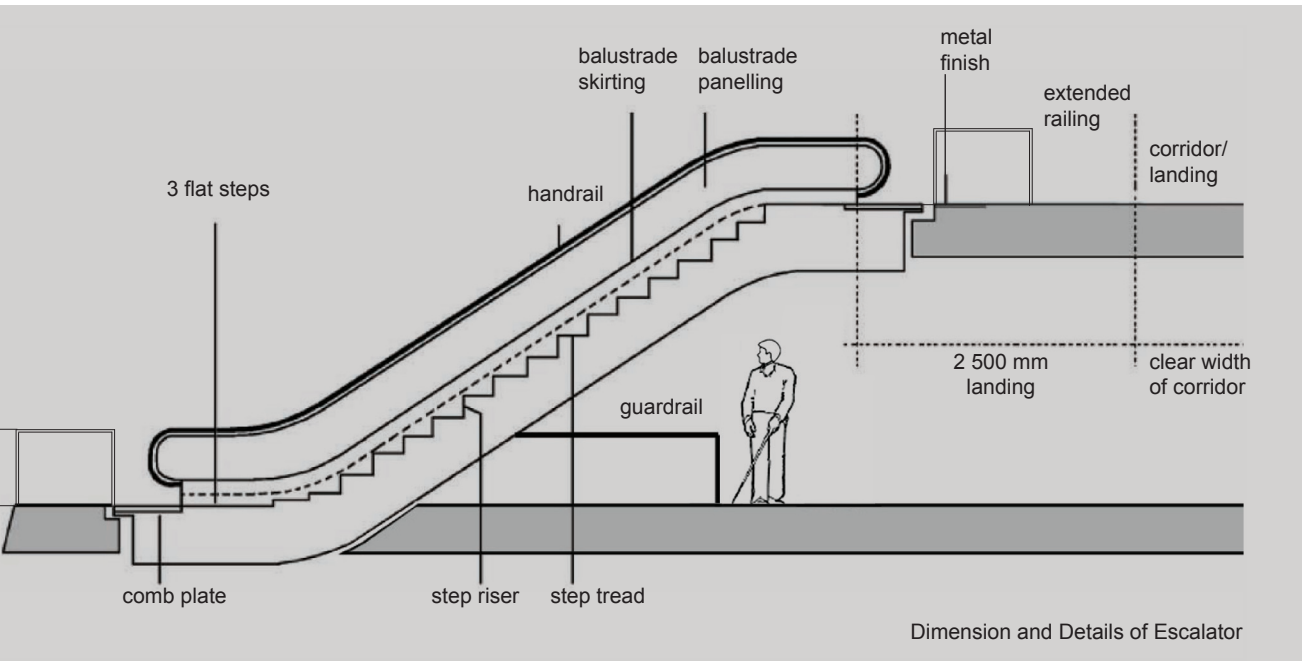
Escalator Provisions

- Escalator width to be specified according to traffic volume.
- Moving handrails shall be at a height of 900 mm and on both sides of the escalator.
- Escalator steps should be clearly differentiated with markings of contrasting colour.
- Minimum of 3 flat steps at the beginning and the end of the escalator shall be provided.
- It is highly recommended for escalators to be arranged to facilitate continuous floor to floor movement.

Escalators Safety

- Railings around the escalator void should be placed to meet closely to the escalators.
- Additional railings extended from the escalator handrail should be provided to increase the buffer area in crowded areas.
- Visual and tactile warnings should be provided at landings to indicate the presence of an escalator.
- Clear signage should be provided to indicate the direction of escalator movement.
- Headroom warning shall be provided under the escalator.

900 mm



b escalators/safety features

5 Mechanical Circulation



guidelines
UNIVERSAL DESIGN



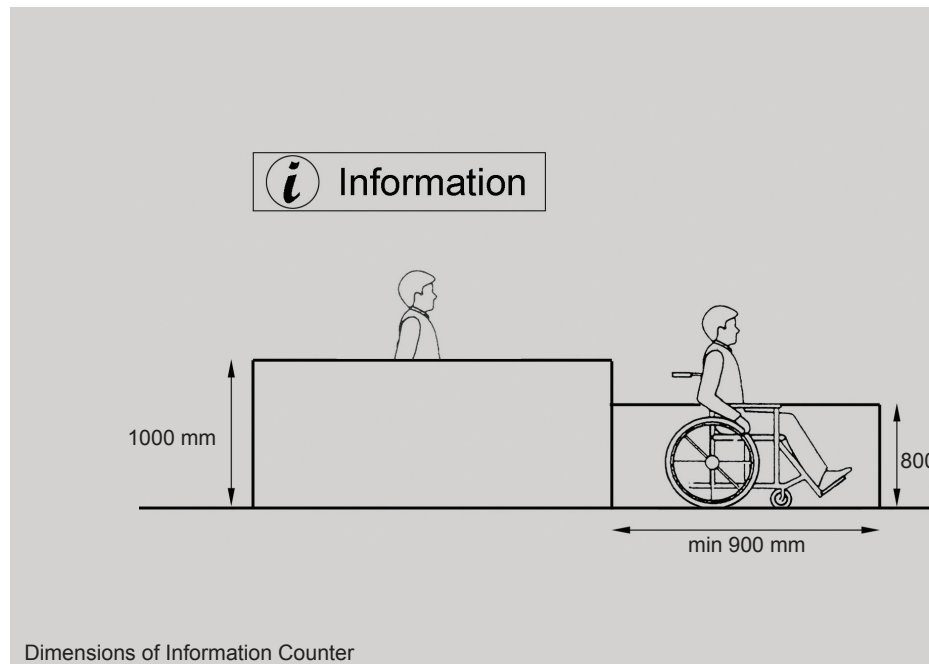
Non-Invasive Laboratory Consultation Suites



Clear signage to guide the users



Separate queue area designated



Information counters provide the users essential information and customer service needed. It is hence important to ensure visibility and accessibility to all users.

Location

- Information counter should be placed at a prominent location where it is clearly visible upon entry. Otherwise, clear signage should be provided to guide the users.
- Queue areas should not affect circulation including the clear width of adjacent corridor.
- Signage should be clear and of contrasting colour.

Counter Tops

- Writing surfaces or service counter height shall not be more than 800 mm from the floor.

BFA 3.11.3.1

- Counter tops with two varying heights should be provided. The lower counter (maximum 800 mm) should provide for adequate knee space for the wheelchair users.

Services

- Storage for pram and other heavy belongings should be provided. Loan of wheel chair should be available.



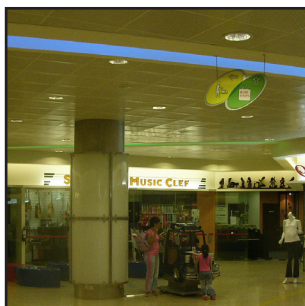
Information counter at prominent location visible upon entry



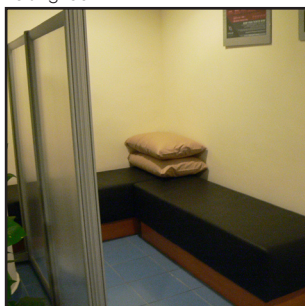
Information counter at prominent location visible upon entry



Clear signage to guide the users



Clear signage to direct users to the nursing room



Breastfeeding area separated with a partitioning

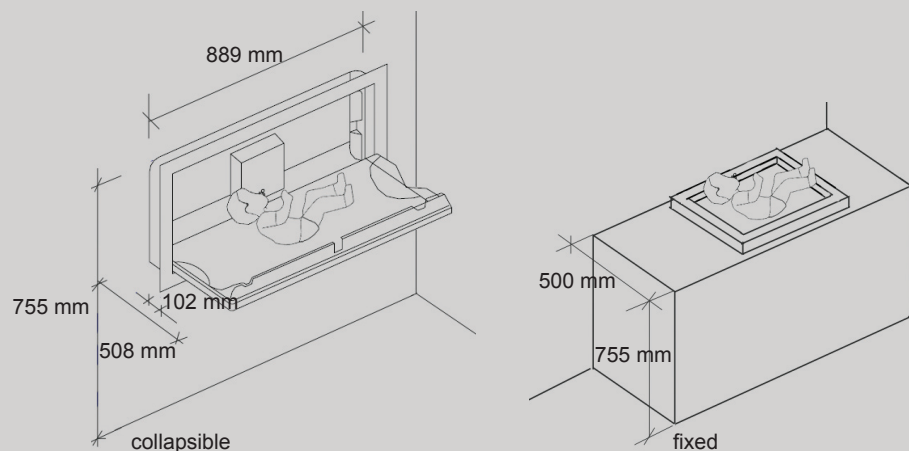


Attractive front entrance

CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*nursing rooms*)

G.3.3.3.1 Where a family room is not provided, a diaper-changing station should be provided in both the male and female toilets or in individual washrooms for persons with disabilities so that both fathers and mothers can use the facility.

G.3.3.3.2 The diaper changing station must be stable with safety straps and barriers length-wise to ensure the safety of the infants. If it is to be located in individual washrooms, a flap-type station is recommended to save space and to avoid causing obstruction to wheelchair users.



Dimensions of Diaper-Changing Station

With the increasing number of nursing mothers, special facilities dedicated to them has become essential in most public buildings. Such facilities should be conveniently located and should provide privacy and comfort to the users.

Diaper-Changing Stations

- *The recommended dimensions of a collapsible diaper-changing station, in the closed position, are 889 mm in length by 508 mm in height and 102 mm in thickness.*

BFA G.3.3.3.3

- All diaper-changing stations and counters should be of height 755 mm from the floor.

Nursing Rooms

- *A separate nursing area with partitions should be made available to mothers to protect their privacy.*

BFA G.3.3.2.1

- *Comfortable seating, preferably of the armchair-type, should be provided for the convenience of the mothers.*

BFA G.3.3.2.3



Diaper changing counter



Breastfeeding area, separated with a sliding door

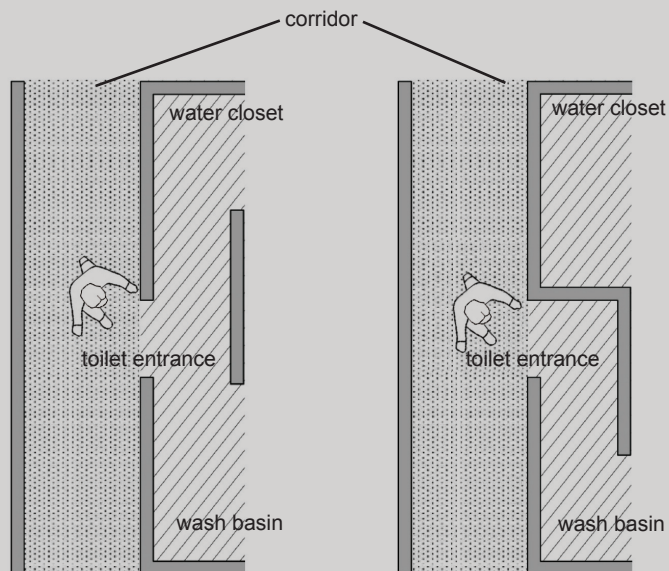
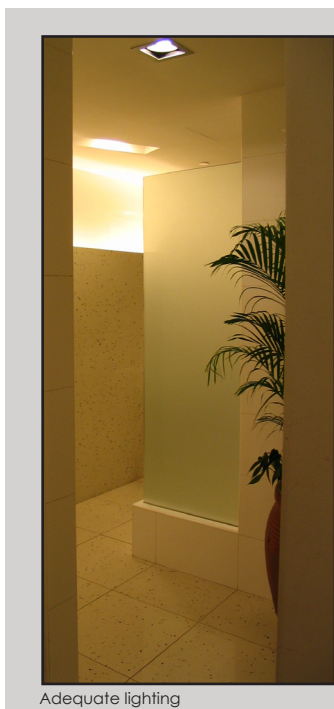


Armchair and sink provided



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS *(toilets/planning and design)*

- 4.1.1 At every level of a building where toilets are required by the Public Utilities Board to be provided, at least:
- (a) one individual washroom for wheelchair users, as described in clause 4.9, shall be provided for both the male and female; or
 - (b) one water closet compartment for wheelchair users, as described in clause 4.10, shall be provided in both the male and female toilets.
- 4.1.7 (a) be clearly visible and have tactile finish in accordance with clause 10.5.



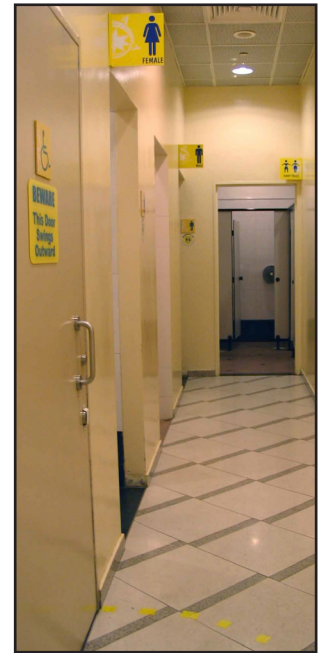
Layout of Toilet Entrance

The toilet is a necessary provision that should be included as part of the facilities in public buildings. It is important to place them discreetly and yet easily identified and accessible.

- *Provision of toilets is required at every level of a building and they should include at least one water compartment for wheelchair users in both male and female toilets. Alternatively, one unisex individual washroom for all wheelchair users should be provided.*
Reference BFA 4.1.1

- *Signs at washroom entrances should be clearly visible and have tactile finish.*
Reference BFA 4.1.7a

- Signage should also be of contrasting colour.
- All corridors leading to wheelchair-friendly toilets should have adequate turning distance for wheelchair access.
- Entrance layout, wherever possible, should be designed without having doors and still be protecting the privacy of users.
- Adequate lighting should be provided.
- All toilets should have non-slip floor finish.
- Emergency telephone numbers should be displayed at designated areas within the toilet.
- Within a toilet, corridors leading to the wheelchair-friendly compartment should be of an adequate width of a minimum 1200 mm.



Clear signage



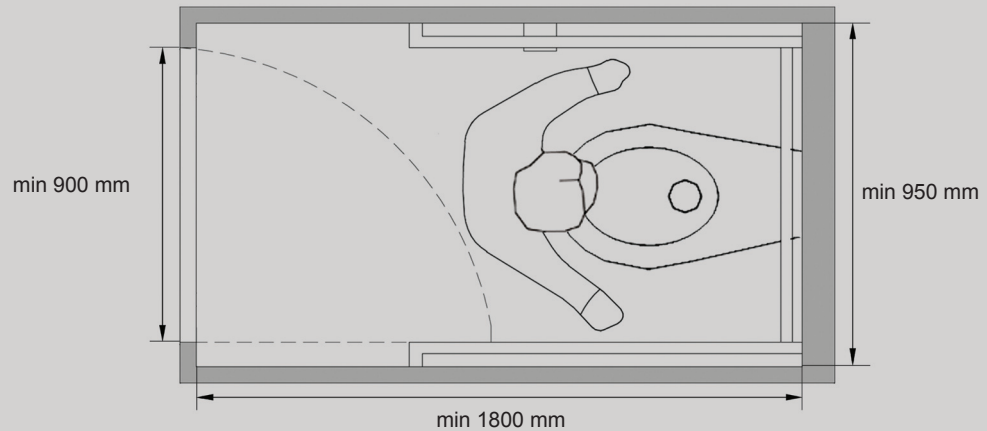
Doorless entrance to toilet



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*toilets/water closet compartments*)

4.3.1 Grab bars shall be provided in individual washrooms or water closet compartments as illustrated in . . . and shall comply with the following requirements:

- (a) be in accordance with clause 3.6;
- (b) be mounted at a height between 280 mm and 300 mm from the top of the water closet seat;
- (c) one horizontal grab bar to be mounted on the side wall closest to the water closet extending from the rear wall to at least 450 mm in front of the water closet seat;
- (d) one foldable grab bar to be mounted on the wide side of the compartment adjacent to the water closet as shown in . . .



Plan of Water Closet

It is a common practice that standard water closet compartments are given minimum dimensions but these small compartments do not normally serve the ambulant disabled well. Considering users with different abilities, water closet compartments should be designed to cater for their convenience and safety.

- The total number of compartments provided shall be designed according to demand and in accordance to the requirements of NEA standards.
- There should be no change in floor level from the area leading to the toilet as well as within the toilet area.
- It is recommended that a toilet compartment should have a minimum width of 950 mm in width and 1500 mm in depth.
- Provide inward swinging doors if space permits.
- L-shaped grab bars should be provided on both sides of the water closet in all toilet compartments to enable the ease of use by the ambulant disabled.
- *Grab bars should be provided in individual washrooms or water closet compartments and be mounted at a height between 280 mm and 300 mm from the top of the water closet seat.*

BFA 4.3.1b



Water closet with L-shape bar



Grab bars behind doors



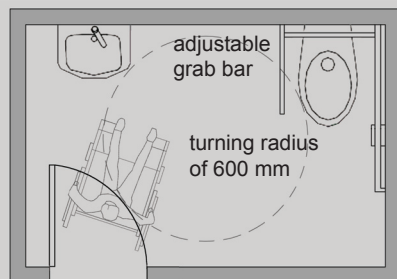
Ramps provided for change in level



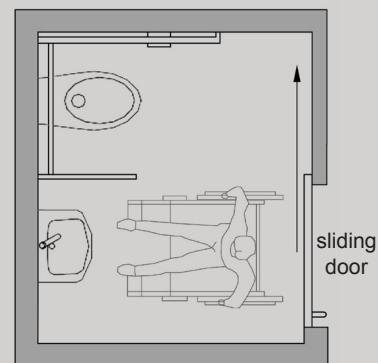
CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*toilets/doors*)

4.2.1 Washroom and water closet compartment doors shall:

- (b) be designed to swing outwards unless an additional space of 600 mm is provided within the compartment for the door swing or be provided with a sliding/folding door;
- (f) be capable of being locked from the inside by a device that is operable with one hand and activated by a force not more than 22N and which does not require:
 - (i) fine finger control;
 - (ii) tight grasping; and
 - (iii) pinching or twisting of the wrist.



Wheelchair-Friendly Washroom with an Inward Swinging Door.



Wheelchair-Friendly Washroom with Sliding Door

Doors can be the largest obstacle and yet a necessary item in a toilet, especially in the case of a wheelchair-friendly toilet. Therefore there is a need to install doors that allows users to open with ease and without impeding other users.

Door Dimensions for Wheelchair-Friendly Toilets

- *A clear opening of at least 900 mm with the door in the fully open position should be provided.*
BFA 4.2.1a
- *Provision of sliding door is recommended.*
Reference BFA 3.5.4.2
- *Compartment doors of a wheelchair-friendly toilet should swing outwards unless adequate space is provided for the manouvering within the compartment.*
Reference BFA 4.2.1b
- *Outwards swinging doors should not overlap corridor space.*
- *A horizontal pull-bar of at least 600 mm long should be provided on the inside of an out-swinging door, that is located 130 mm from the hinged-side of the door and fixed at a height between 900 mm and 1100 mm.*
BFA 4.2.1c
- *A vertical/horizontal pull-bar of at least 140mm long should be provided on the outside nearer the latch side of the door and placed at a height between 900 mm and 1100 mm.*
BFA 4.2.1d

Typical Door Provisions

- *Spring-type or gravity hinges should be provided so that the door closes automatically.*
BFA 4.2.1e
- *Doors should be capable of being locked from the inside by a device that is easily operable with one hand. Reference BFA 4.2.1f*



Inwards swinging door

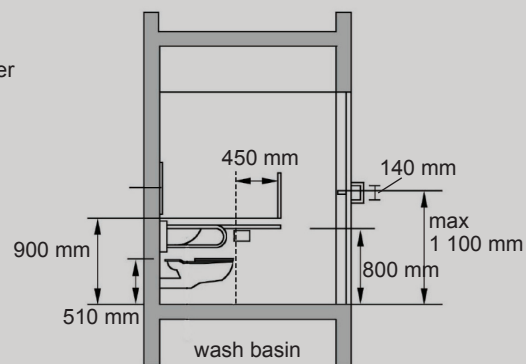
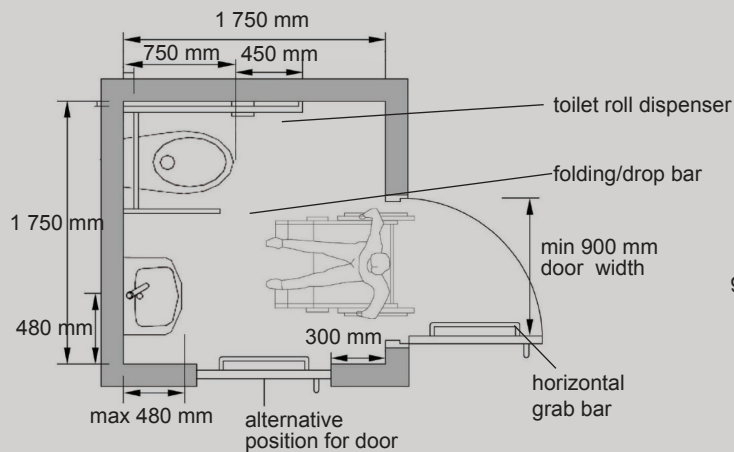


Grab bar at door



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS *(toilets/wheelchair-friendly)*

- 4.2.1 Washroom and water closet compartment doors shall:
- (b) be designed to swing outwards unless an additional space of 600 mm is provided within the compartment for the door swing or be provided with a sliding/folding door;
 - (f) be capable of being locked from the inside by a device that is operable with one hand and activated by a force not more than 22N and which does not require:
 - (i) fine finger control; (ii) tight grasping; and (iii) pinching or twisting of the wrist.
- 4.7.1 Water closet shall comply with the following requirement:
- (f) have flush control:
 - (i) complying with clause 3.10;
 - (ii) which is sensor-operated or hand-operated and located on the transfer side of the water closet;



Plan & Section of Wheelchair Friendly Toilet

Wheelchair-friendly toilets are catered specially for the wheelchair-bound users. Therefore, the design should take into consideration their special needs. The installation of sanitary equipment and other fittings should ensure their easy usage.

- *Compartment of clear internal dimensions of not less than 1750 mm x 1750 mm should be provided. Reference BFA 4.9.1*
- *Water closet should be located between 460 mm to 480 mm from the centre line of the water closet to the adjacent wall and have a clear dimension of 750 mm from the front edge of the water closet to the rear wall to facilitate side transfer.*

BFA 4.7.1a

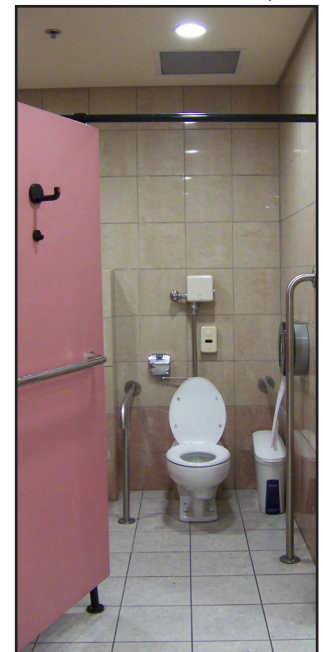
- *The foldable grab bar is to be mounted on the wide side of the compartment adjacent to the water closet, of a height between 280 mm and 300 mm from the top of the water closet seat. It should extend not more than 100 mm from the front of the water closet seat and be 380 mm to 400 mm to the centre line of the water closet. BFA 4.3.1d and 4.3.2*
- *One vertical bar is to be provided on the side wall closest to the water closet and where possible, one horizontal grab bar, at least 700 mm long, should also be mounted on the wall behind the water closet. BFA 4.3.1e and f*
- *A wheelchair-friendly toilet compartment should have a toilet roll dispenser mounted below the grab bars and not more than 300 mm from the front edge of the seat and at a height between 50 mm to 250 mm from the top of the water closet seat.*

BFA 4.10.1e

- *Seats of the water closet should be 510 mm from the floor level such that it meets the height of the wheelchair seat or seat extenders, if provided.*
- *Flush control should be located on the transfer side of the water closet. Reference BFA 4.7.1f*



Sliding door of wheelchair-friendly toilet



Wheelchair-friendly compartment



CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS *(toilets/wheelchair-friendly)*

4.7.1 Water closet shall comply with the following requirement:

(f) have flush control:

(ii) which is sensor-operated or hand-operated and located on the transfer side of the water closet;

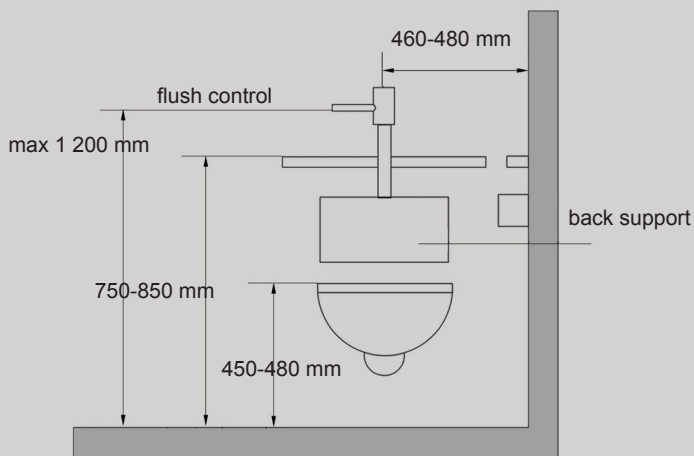
(iii) located not more than 1200 mm from the floor;

G.3.1.1 The following sanitary facilities should be provided in the toilets for use by young children:

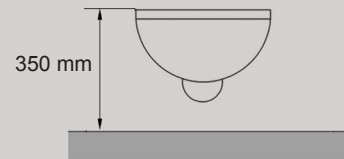
(a) at least one water-closet complying with clause G.3.1.2;

(b) at least one urinal complying with clause G.3.1.3; and

(c) at least one wash basin complying with clause G.3.1.4.



Adult-size Water Closet



Child-size Water Closet

The installation of water closets for non-wheelchair bound users should comply with the comfortable adult seating height and back support. Flush systems should also be within reach of the users.

- *There should be no spring-activated seat.*
BFA 4.7.1c
- *Water closet should have a back support where there is no seat lid or tank. A back support reduces the chance of imbalance or injury caused by leaning against exposed valves or pipes.*
BFA 4.7.1d
- Provide dispenser for disposable seat covers.
- *Water closet should be preferably of the wall-hung or corbel type as it provides additional space at toe level.*
BFA 4.7.1e
- *Flush control should be sensor-operated or hand-operated, be located not more than 1200 mm from the floor.*
Reference BFA 4.7.1f
- *Water closet should be equipped with a self-closing water spray head connected by a flexible hose beside the water closet seat for cleaning purposes.*
BFA 4.7.1g
- *If a separate children's toilet is not provided, a child-sized water closet of height 350 mm from the floor or seat adaptor should be provided within both the female and male toilet.*
BFA G.3.1.2.1 and Reference BFA G.3.1.1



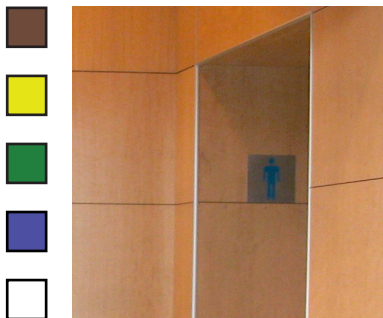
Automatic flush sensor



Water closet with back rest

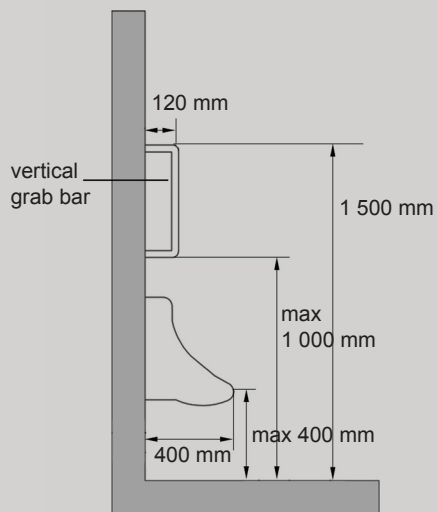


Water closet at child's height

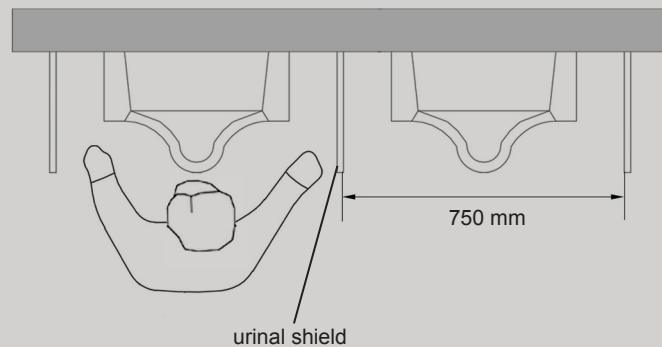


CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*toilets/urinal*)

- 4.8.1 Where urinals for the ambulant disabled are to be provided under clause 4.1.6 they shall comply with the following as illustrated in . . . :
- (a) be of the wall-hung type with a rim not more than 400 mm from the floor;
 - (b) have a minimum clear floor space of 750 mm wide by 1200 mm deep without steps in front of the urinals; and
 - (c) not have privacy shields extending beyond the front edge of the urinal rim unless such shields allow a clear width of not less than 750 mm.
- 4.8.2 Grab bars, complying with clause 3.6, shall be provided on both sides of the urinals and shall:
- (a) extend from 1000 mm to 1500 mm above the floor level; and
 - (b) have a clear space of 120 mm between the grab bar and wall surface.



Details of Urinal



Besides the provision of standard urinals, there is a need for the installation of vertical grab bars on top of the urinal to assist the ambulant disabled. Urinals for children should also be provided.

- *Urinals should be of the wall-hung type with a rim not more than 400 mm from the floor and have a minimum clear floor space of 750 mm wide by 1200 mm deep without steps in front of the urinals.*

BFA 4.8.1a and b

- *Urinals should not have privacy shields extending beyond the front edge of the urinal rim unless such shields allow a clear width of not less than 750 mm.*

BFA 4.8.1c

- *Grab bars should be provided on both sides of the urinals and shall extend from 1000 mm to 1500 mm above the floor level and have a clear space of 120 mm between the grab bar and wall surface.*

BFA 4.8.2

- *Flush controls should be located not more than 1200 mm from the floor.*

BFA 4.8.3

- *If a separate children's toilet is not provided, at least one urinal mounted at the height of 400 mm from the finished floor level should be provided in the male toilet for young children.*

BFA G.3.1.3.1



Urinal

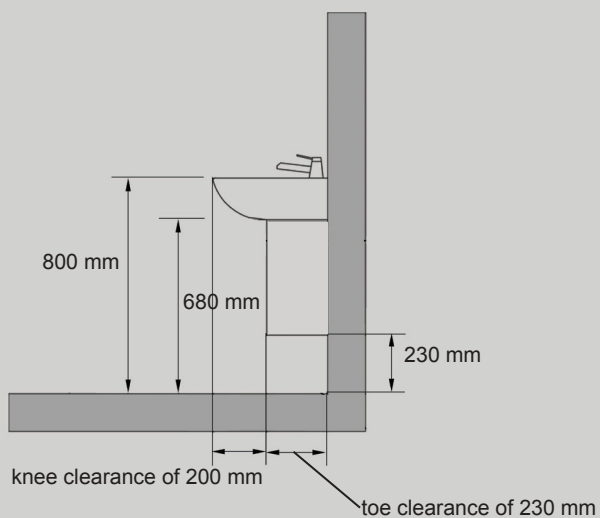


Urinal at child height

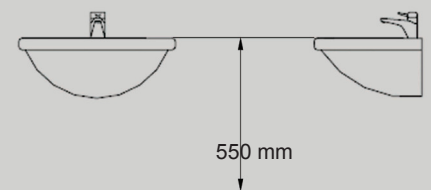


CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*toilets/wash basin*)

G.3.1.4.1A child-sized wash basin should be provided to enable young children to wash their hands without assistance. The wash basin should be equipped with a lever type or automatic stop taps. The height of the wash basin should be about 550 mm as illustrated in . . .



Details of Wash Basin



Child Friendly Wash Basin

Wash basins are important components in toilets. They are normally installed outside water closet compartments for the convenience of users. The arrangement should be extended to suit wheelchair users and children alike.

- *Wash basins shall be of a standard size with dimensions of approximately 520 mm by 410 mm.*

BFA 4.6.1a

- *It should be mounted such that the minimum distance between the centre line of the fixture and the side wall is 460 mm and the top edge is between 800 mm and 840 mm from the floor.*

BFA 4.6.1b

- *Wash basins should have a knee space of at least 750 mm wide by 200 mm deep by 680 mm high with an additional toe space of at least 750 mm wide by 230 mm deep by 230 mm high and have a minimum clear floor space of 750 mm wide by 1200 mm deep of which a maximum of 480 mm in depth may be under the wash basin.*

BFA 4.6.1d

- *The hot water and drain pipes located within the knee space or toe space should be properly insulated for protection.*

BFA 4.6.2

- *Faucets and other controls should be sensor operated. If they are hand operated, they should be easily operable with one hand.*

Reference BFA 4.6.3

- *The front apron of a vanity counter shall have a minimum clearance of 750 mm wide by 720 mm high.*

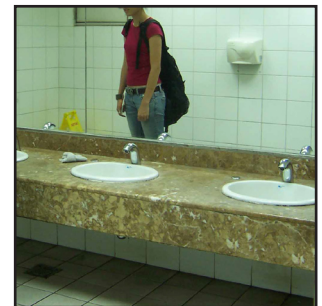
BFA 4.6.4

- *Washbasin provision outside of toilets should have at least one installed for children at the height of about 550mm.*

BFA G.3.1.4



Wash basin located in the middle of the toilet



Wash basin at child's height



Automatic tap

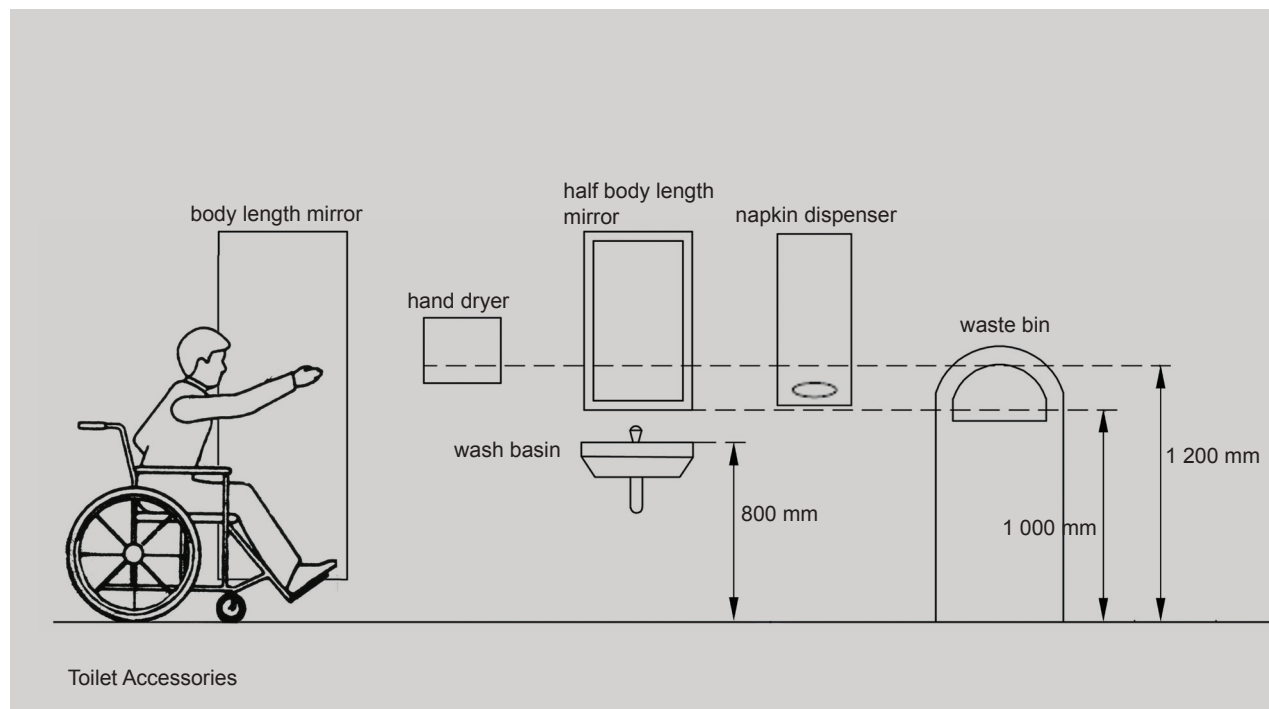


CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*toilets/accessories*)

G.3.2.1 A child protection seat, as illustrated in . . . , should —

- (a) be equipped with straps that can be extended over shoulders and between legs to ensure the safety of a baby; and
- (b) preferably be mounted on solid wall for stability

G.3.2.2 A child protection seat should be provided in one of the water closet compartments in both male and female toilets, as shown in . . . , to allow parents to seat their baby safely in the restroom with them.

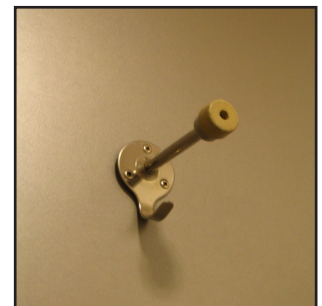


Toilet accessories are essential components for the functioning of toilets. Therefore they should be installed at appropriate positions to ensure universal usage.

- *Half height mirrors should be positioned at a height of not more than 1000 mm from the bottom edge of the mirror to the floor.*
BFA 4.4.1a
- *An additional body length mirror should be provided.*
- *Towel and soap dispensers, hand dryer, waste bin and sanitary bin shall be in contrasting colour and tone and positioned such that the operable parts and controls are between 1000 mm and 1200 mm from the floor.*
BFA 4.4.1b
- *Accessories should be placed in close proximity to the accessible basin to avoid having a person wheeling a chair with wet hands.*
BFA 4.4.1 Note 1
- *All accessories installed should not hinder the main circulation path within the toilet.*
- *All compartments should be equipped with a coat hook mounted on a side wall not more than 1300 mm from the floor and projecting not more than 40 mm from the wall.*
BFA 4.10.1f
- *At least one compartment should be fitted with a child protection seat.*
Reference BFA G.3.2.1 and G.3.2.2



Full body mirror



Coat hook mounted on door



Playgrounds facilities have become increasingly popular in commercial buildings. The design of the playground should accommodate children of all ages and ability, and at the same time, provide them with a safe playing environment.

Play Equipment

- *Outdoor or indoor play equipment for children of various ages should be provided. The floor surface of the children's play area should be cushioned or shock proofed to ensure the safety of the children.*

BFA G.3.5.1

- Play equipment should be made of non-toxic materials and have rounded edges to ensure child safety.



Cushioned/ shock proofed floor surface

Parents' Supervision

- Barriers should be provided around the playground if it is located near a carpark or driveway.
- Playgrounds if enclosed should allow for visual supervision by parents.
- *Ample seats should be provided near the play equipment for parents supervising their children.*

BFA G.3.5.2



Play equipment with rounded edges

Equipment for wheelchair-bound children

- All raised platforms and steps should be fitted with handrails or handholds for children to grab and climb safely.
- There should be enough room at the platforms for the manouvering of wheelchairs.
- Ramps leading to playground equipment should have rails and raised edges to prevent wheelchair bound children from slipping off the sides.



Ample seats for parents supervising their children.





Supermarkets tend to be crowded and cluttered, as such, the narrow lanes may become barriers to some. It is good practice to ensure that the design of supermarkets cater to the convenience of all users through well designed routes and signage as well as thoughtful arrangements and layouts.



Adequate width provided at check out lanes



Adequate width provided for aisles



Appropriate height for service counter

Routes and Shelves

- *An accessible route shall be 1200 mm to allow for both a wheelchair user and a walking person to pass . . .*

BFA 3.4.1.1a

- *Check out lanes should have a clear minimum dimension of 900 mm.*

BFA 3.4.1.1b

- There should be no dead-end aisles. Turning points at the end of lanes must be wide enough for a wheelchair to turn around.
- Shelving should be full height and the same item should be placed repeatedly on different reachable levels. Alternatively a call button should be provided in prominent areas so that assistance could be called for.

Counters

- The height of paying counters should be 850 mm.
- The height of the service counter should be 850 mm.

Visibility

- The field of view should be such that all goods are visible from the eye level position of a wheelchair user.
- Signage to products should be clear and of contrasting colour.
- Adequate lighting should be provided.

Refer to Section 2, Lighting

Safety

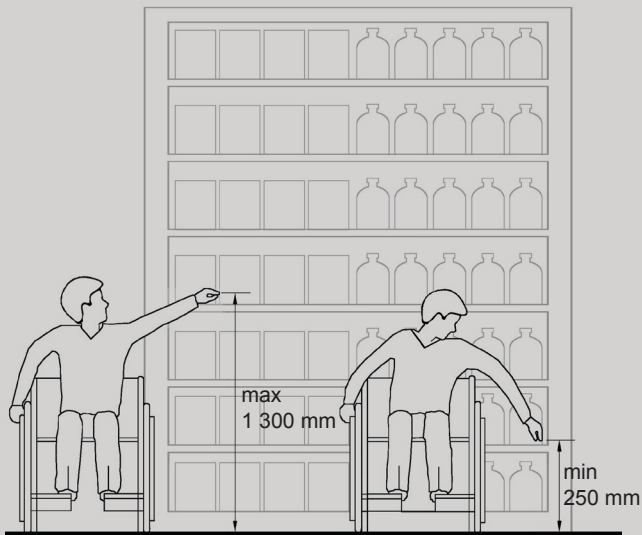
- Wet sections should be of a non-slip surface and well drained.



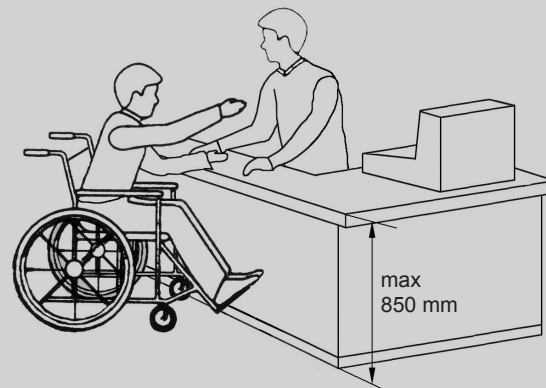
CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS (*retail/supermarkets*)

3.4.1.1 The minimum width of:

- (a) an accessible route shall be 1200 mm to allow for both a wheelchair user and a walking person to pass as shown in Figure 6 except where additional manoeuvring space, described in clause 3.5.4, is required at doorways;
- (b) an accessible checkout lane shall be at least 900 mm as shown in . . .



Supermarket Shelves



Paying Counters

The fun of shopping can be stifled by inconsiderate design and planning layouts. Shops that try to display as many items as possible often impede the movement of some shoppers. Greater attention needs to be paid to the circulation in and around shops and kiosks.



Provision of automated doors



No change in level through the entrance



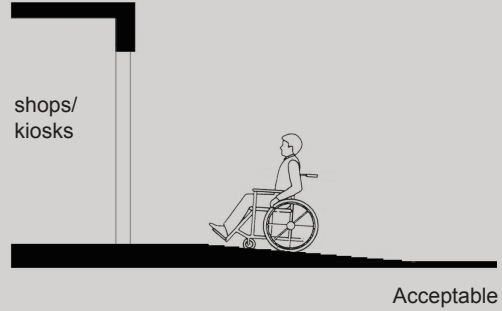
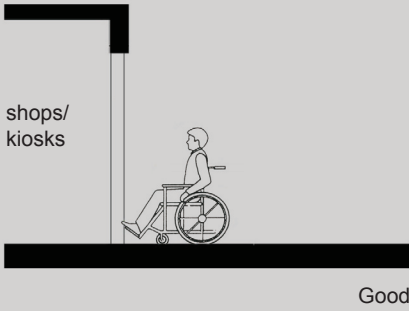
An example of a cluttered and narrow corridor

Shops

- There should be no barrier between the access corridor and shops. If doors are unavoidable they should be automated.
- There should be no change in level from the access corridor to the shop. In cases where a change in level is inevitable, a ramp of suitable gradient should be provided.

Kiosks

- Vending machines should be located along accessible routes.
- The clear width of corridors around the kiosks should not be impeded. (Refer to Chapter 3a Horizontal Circulation, Corridors and Chapter 7a Retail, Supermarkets for details on the dimensions of shelves and counters as well as field of view and signages.)



Sections of Shopfront



b shops and kiosks

7 Retail

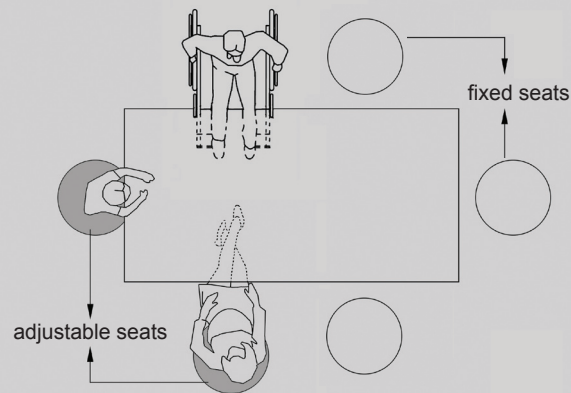
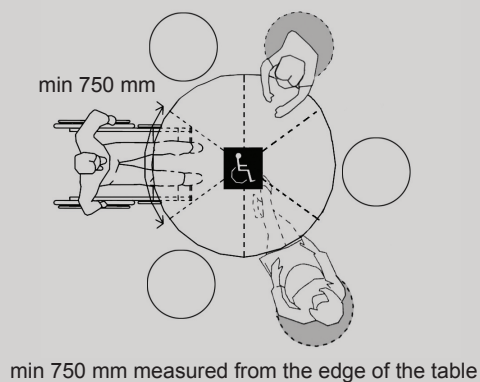






CODE ON BARRIER-FREE ACCESSIBILITY IN BUILDINGS *(food courts & cafes)*

- 7.3.3 Where the eating outlet or establishment is provided with fixed seats, the minimum clear space between the seats shall be 750 mm measured along the edge of the table as shown in . . .
- G.3.8.1 A variety of table and chair arrangements or flexible arrangement of tables and chairs should be provided in eating outlets or establishments to cater to groups of different sizes.
- G.3.8.3.1 Adequate baby chairs with side and backrests, and a safety belt or T-bar should be provided in eating places.
- G.3.8.3.2 The baby-chairs should be stable and preferably be portable.



Arrangement of Tables and Seats in Food Court

Food and beverage sections are always major magnets in any commercial or institutional building. Yet the design of certain cafes and foodcourts still unwittingly deny some users the pleasure of dining in comfort and with convenience.

Tables and Seats

- Two in every ten tables are to be accessible to wheelchairs, or a minimum of at least 2 tables are to be accessible to wheelchairs, the option results in a greater number of wheelchair accessible tables. Only 50% of the seats at such tables are to be fixed. The remaining seats are to be adjustable. Adequate baby seating should be provided.

Circulation

- *A clear circulation path of at least 1200 mm is to be provided in front of stalls.*
BFA 7.2.1
- Spacings between stools should be at least 900 mm and tables should be well spaced out to allow for easy movement of wheelchair users.
- Dining areas should be accessible to all. This is not required for a split level less than 33% of the total area. Whatever offered in the split level area should be available at the main dining area.
- Raised platforms or stages should be accessible.



Wheelchair accessible tables



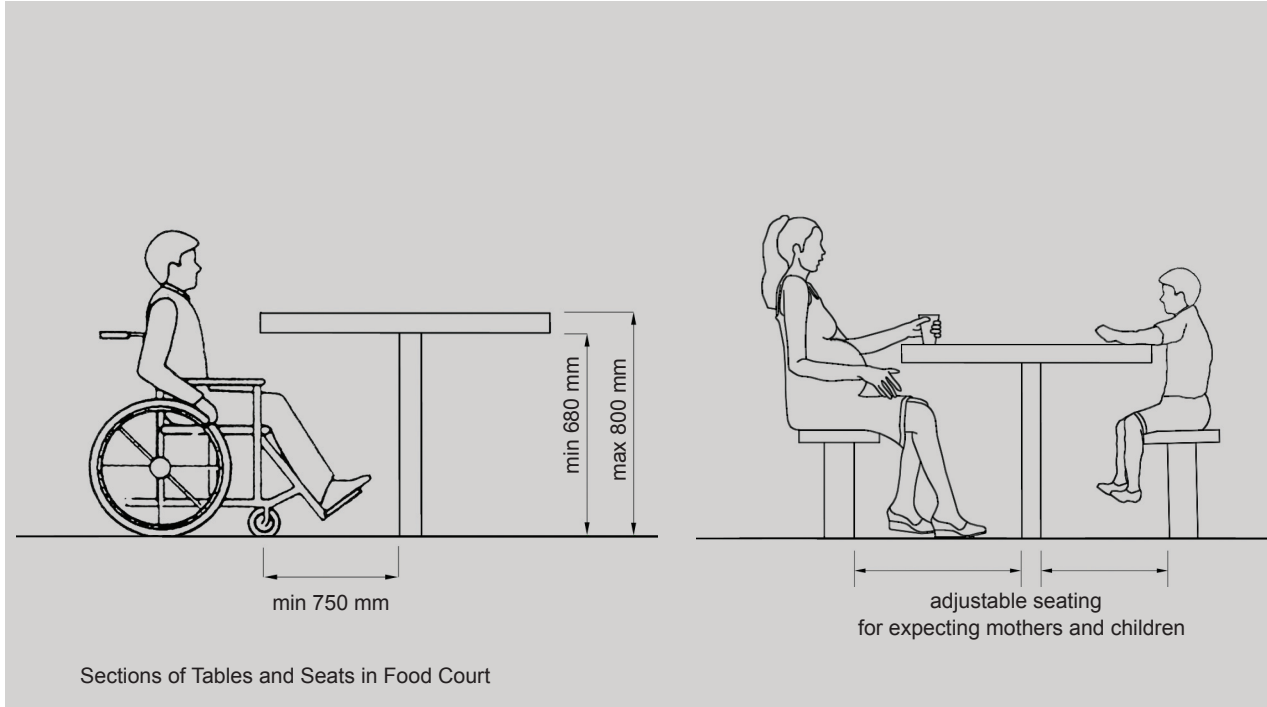
Clear and wide circulation paths in front of stalls



Provision of baby seating

8 Food and Beverage

a food courts and cafes



It is important to ensure that all food and beverage places are accessible easily by all through the provision of appropriate furniture, amenities and clear circulation paths

Counters

- The height of serving counters should be 850 mm.
- At least 50% of all tray slides must be within reach, at a maximum height of about 850 mm.
- Condiment shelves should have a maximum height of 1370 mm.

Facilities

- Washbasins should be provided within eating areas and must be accessible. At least one wash basin should be at a lower height of 800 to 840 mm from the floor to cater for wheelchair users and children.

Visibility

- Adequate lighting should be provided.
Refer to Section 2, Lighting
- There should be clear and distinctive signage.
Refer to Section 2, Signage

Safety

- Non-slip floor finish should be provided.
Refer to Section 2, Floor Finishes



Appropriate height of tray slides and counters



Provision of washbasin within dining areas



An example of accessories cluttering up the corridor

1. Architectural Services Department. *Universal Accessibility: Best Practices and Guidelines*, Hong Kong, 2004.
2. Building and Construction Authority. *Code on Barrier-Free Accessibility In Buildings*, Singapore, 2002.
3. Driskell, David, ed. *Design Guide: Universal Access to Outdoor Recreation*, PLAE, Inc., Berkeley, California, USA, 1993.
4. Goltsman, Susan M., Gilbert, Timothy A. & Wohlford, Steven D. *The Accessibility Checklist: An Evaluation System for Buildings and Outdoor Settings*, MIG Communications, Berkeley, California, USA, 1993.
5. International Union of Architects & Federation of Architects' Colleges of the Mexican Republic. *Towards A "Universal Accessibility": Recommendations for the Development of Public Policies*, Spain, 2005.
6. Levine, Danise, ed. *The NYC Guidebook to Accessibility and Universal Design*, IDeA Publications, Buffalo, New York, USA, 2003.
7. Mace, Ronald L. *The Accessible Housing Design File: Barrier Free Environments*, John Wiley & Sons, Inc, USA, 1991.
8. National Environment Agency & Restroom Association. *A Guide to Better Public Toilet Design & Maintenance*, Singapore, 2002.
9. Null, Roberta L. & Cherry, Kenneth F. *Universal Design: Creative Solutions for ADA Compliance*, Professional Publications, Inc, Belmont, California, USA, 1998.
10. Scottish Building Standards Agency. *The Building (Scotland) Regulations 2004*, Scotland, 2004.
11. Singapore Civil Defence Force. *Code of Practice for Fire Precautions in Building*, Singapore, 2002.
12. Steven Winters Associates. *Accessible Housing By Design: Universal Design Principles In Practice*, McGraw-Hill, USA, 1997.
13. Wilkoff, Wm. L. & Abed, Laura W. *Practicing Universal Design: An Interpretation of the ADA*, Van Nostrand Reinhold, New York, USA, 1994.
14. United States Access Board. *Americans with Disabilities Act (ADA)*, USA, 1990.

This Guidebook is produced with the assistance of
the Department of Architecture,
School of Design & Environment, National University of Singapore
September 2006

Note

This Guidebook is intended as a guide only. BCA shall not be responsible for any loss, damage or injury that may be suffered by any person in connection with the use of the facilities designed based on the recommendation in this Guidebook.

The information contained in this Guidebook is current at the time of printing.
All rights reserved. Reproduction of this Guidebook in whole or part without permission from BCA is strictly prohibited.

