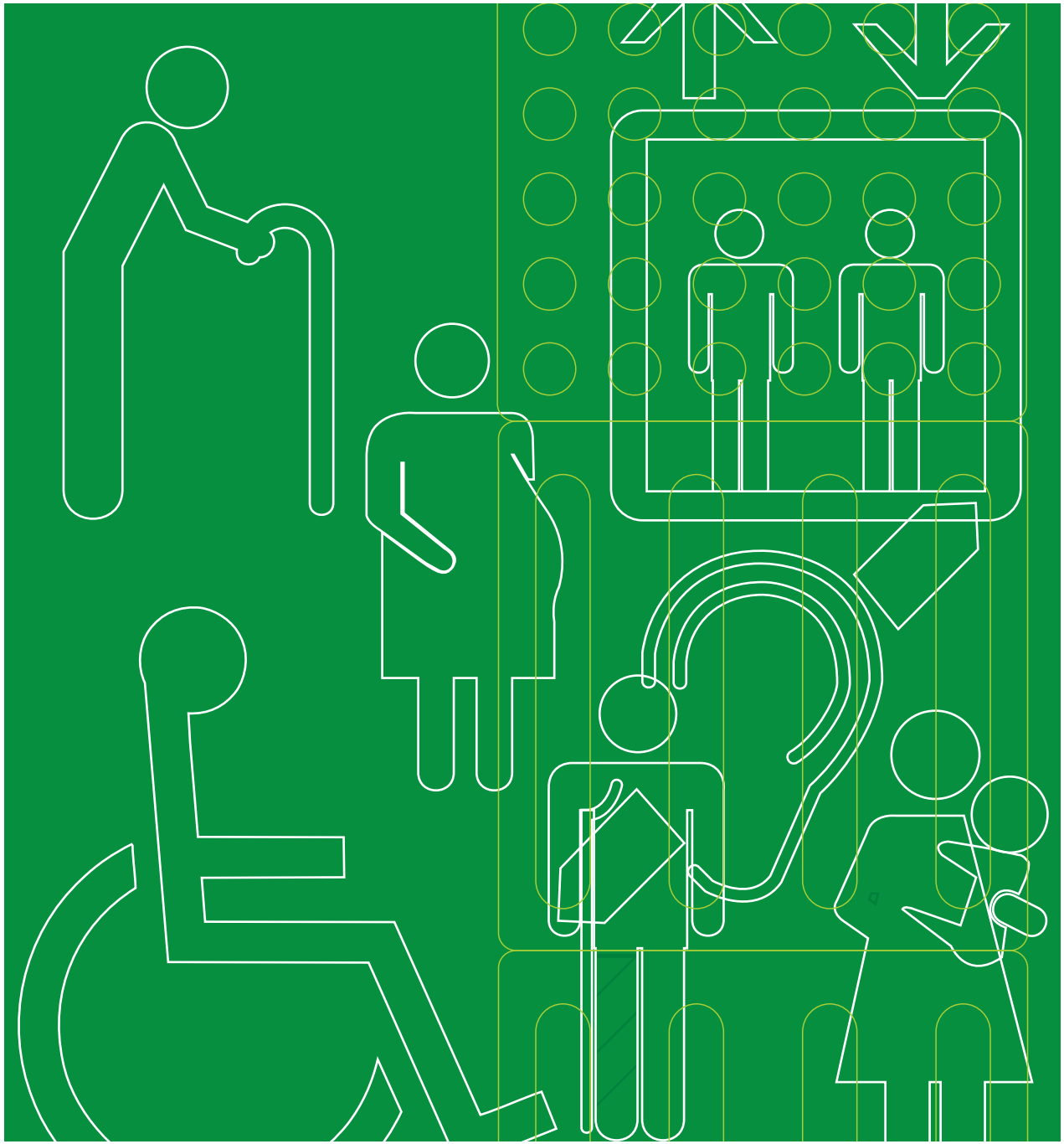
Best Practices and Guidelines



Introduction

6

The best practices and design guidelines are tools to assist the designers and users in realising universal accessibility. The guidelines are an extension of the design considerations in Section 5. Best practices and examples are illustrated for each subject. The intention is not to cover every aspect of design details on a particular subject. The designer should refer to relevant Ordinances, Design Manuals and Standards for compliance with statutory and other requirements.

The best practices highlight generic issues and list the major areas for continual improvement on universal accessibility. Best practices, practical solutions and options to achieve the objectives for future projects and facilities are documented. Designer for specific project can always design for a more accessible environment with reference to the guidelines.

6.1 Access Strategy
6.1.1 Planning for access

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6.1.1 Planning for access

Access planning (6.1.1a) for public buildings and community facilities offers great opportunities to design for everybody. It requires sensitivity to create an accessible environment. It is not just a regulatory requirement since more than the minimum would be required to achieve the target.

The process is an ongoing one involving many parties to create an accessible built environment by addressing various designs and operating issues.

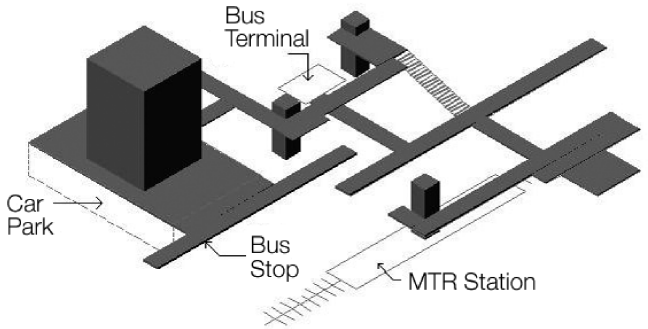
During the concept planning, it is a good chance to collaborate with the stakeholders to promote and facilitate integration of 'Universal Design' and provide innovative and good design solutions.

A strategy should be developed to cover the complete travel chain, from traffic drop off point to initial approach; to all parts of the building; to services and to information. The process involves collaboration with users, operators as well as co-ordination with government departments.

Major access issues (6.1.1b) include the following:-

- Access from transportation and on foot.
- Access to information and way finding.
- Access to entrance, all levels and functions.
- Access to equipment and service.

6.1.1a) Plan for access from street, footbridge and road.



6.1.1b) Planning access

6.1.2 Planning access to historical buildings

Historical buildings (6.1.2a) present unique challenge and limitations, yet access solutions in meeting the legal and functional requirements must be considered. Certain alteration and additions are required to bring the historical building in line with contemporary requirements although minimum intervention principal to the historical structure and building fabric should be observed.

In addition to the general approach to develop an access strategy outlined in 6.1.1 above, an audit (6.1.2b) is necessary to identify elements of significance that must be conserved and determine accessibility requirements (6.1.2c). If the audit identifies certain elements that are unique and structural alterations are difficult, options for access would be to identify an initial access point, convert an existing window into access doorway, and/or utilise the open courtyard for installation of a new lift. The access point for the disabled should be accorded with due respects and should never be a back ally or back door.

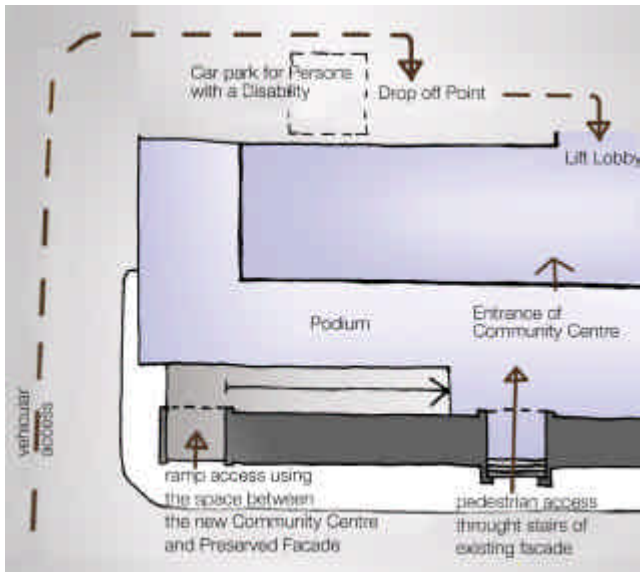
The possible future of the monument, the use of the building and the anticipated users are critical factors in formulating the access strategy. For example, the access solutions for a museum will be quite different to that of the Court of Final Appeal. Easy access would increase visitation to the museum and open up the market whereas security requirements may be the overriding factor which will only permit limited access to the Court.

In addition to the requirements arising from the functional use of the building, the requirements of the Authority under the Antiquities and Monuments Ordinance (AMO) are also prime considerations.

The additional check list items for historical buildings are:-

- Conduct building survey.
- Identify significant conservation elements.
- Identify existing and required access.
- Consider and evaluate access options in the context of AMO.

6.1.2a) Preserve old facade



6.1.2b) Work out elements to be preserved and access requirements

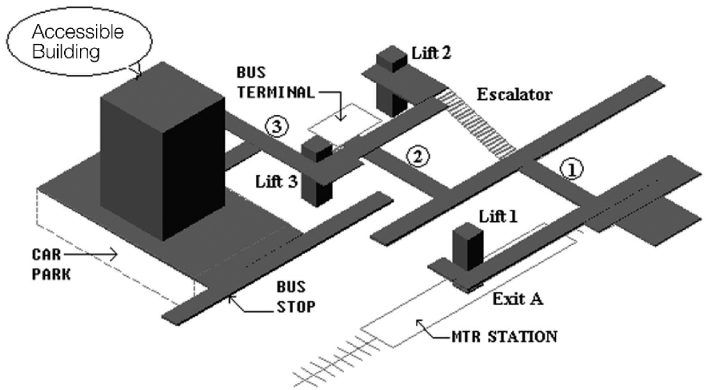
6.1.2c) Provide a ramp access to the building

6.1.3 Access plan

It takes a conscious effort to identify various accessible routes (6.1.3a) and ensure accessibility for different user groups. This includes the elderly, the visually impaired, the ambulant and wheelchair users, the speech and hearing impaired, as well as the fit and abled.

The access plan can be developed into a diagrammatic access layout. This lay down the functional requirements for detail planning and can be used as an access guide. The access guide can provide information for the public at airport, border check points, tourist attraction and internet web sites to reach the facility.

Relevant standards and legislation such as the Transport Planning & Design Manual issued by Transport Department and the Design Manual Barrier Free Access issued by Buildings Department provides the statutory requirements.



6.1.3a) Identify various accessible routes

Develop an access layout:

a. From MTR Station to lift no. 1 and go up to the concourse.
b. Travel along the accessible route and take lift no. 3 to go up to the elevated walkway.
c. Come out of the lift and go to the “BUILDING”.

Consider way finding along accessible route:

a. Consider locations for signage, tactile map, talking sign at MTR station, cross roads and facility entrance.
b. Consider detail of information for way finding e.g. district map, street name, building name, lift, staircase and car park location.

6.1.3 Access plan

Successful implementation of the access plan requires attention to detail during design, construction and maintenance. The following are important items to consider:-

- Identify accessible route from public transport, surrounding streets and link bridges.
- Identify safe access and entry level from pedestrian path, elevated walkways and car park area.
- Consider access options to facilitate independent access.
- Consider access to all levels in a building and/or open space to facilitate a continuous accessible path.
- Consider building/facility and service layout options to facilitate unimpeded access and flexibility in use.
- Consider information, way finding (6.1.3b) at public transport station and street access entry points to major facilities.
- Consider directory signage, information counters and other public facilities such as telephone booth at principal entry points to facilities.
- Evaluate access and evacuation options including consultation with users/operators and relevant authorities.
- Prepare access plan including access requirements and management arrangements.

6.1.3b) Provide way finding clues

6.1.4 Evacuation plan

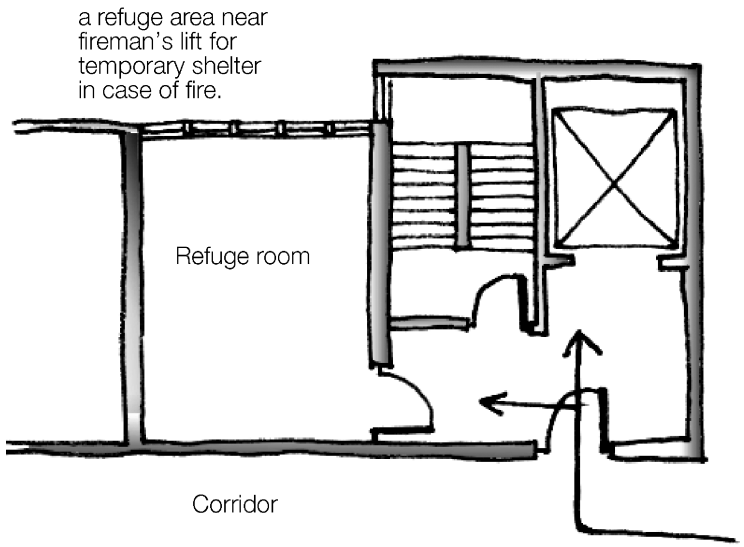
The current legislation in Hong Kong stipulates access requirements for the disabled. However, means of escape (MOE) for the disabled is also an area of concern as certain user groups are dependent on assisted escape. In addition, management arrangements are required to provide assisted escape for some disabled groups. Special arrangements are required for the ambulant and elderly people as well.

Options of assisted escape include:-

- Fire separating measures to contain the fire e.g. fire shutters.
- Refuge area to enable people to wait for rescue e.g. provision of a refuge room next to fireman's lift lobby (6.1.4a).
- Phased evacuation for the people most affected.
- Evacuation by fireman's lift under supervision.
- Evacuation by stairs with assisted device such as canvas bed or Evac chair.

The above list is not exhaustive and MOE for the disabled should be considered with the stakeholders in developing the evacuation plan. It requires awareness, risk assessment, management commitment and training.

In working out the details of the evacuation plan, considerations on emergency communication system, sound and visual alert system, security system and storage for assisted devices should be considered. Floor mounted exit signs (6.1.4b) and low level exit signs (6.1.4c) along escape routes can assist and guide both the able and the disabled to exit staircase. Consideration should be given to provide and display a plan in a conspicuous location showing fire escape routing with colour coding indicating MOE for the disabled.



6.1.4a) Consider options of assisted escape

6.1.4b) Consider floor mounted exit sign

6.1.4c) Consider low level fire exit sign

6.2 Walkways and Ramps

6.2.1 Accessible walking surface

Persons with special needs or with a disability shall have the same freedom of movement as ordinary persons within a building or at external area (6.2.1a).

Access should be made available for all people to approach, enter or leave a building and to use the facilities independently. A walkway with a gradient not steeper than 1 in 20 or a ramp of gradient not steeper than 1 in 12 would form an accessible route.

6.2.2 Walkways

Width of walkways shall not be less than 1050mm clear. Best practice is to provide 1200mm wide walkway to enable a wheelchair to turn, and preferably 1500mm to allow two wheelchairs to pass (6.2.2a).

Safety measures in the form of buffer planters, railings, safety barriers or warnings should be provided if a walkway passes through any pool, stream or water feature.

Walkways should be clear of obstruction (6.2.2b). Special consideration is required to recess or eliminate such obstacles when walkways cross over spaces with low headroom such as spaces under escalators and staircases, or when fittings projecting more than 90mm beyond the wall surfaces and below 2000mm high are found along the walkway.

A covered walkway or ramp is recommended where access is provided between platforms or facilities at different levels. A covered walkway (6.2.2c) should be provided linking two buildings where frequent access between the buildings is required.

6.2.1a) Free access to all

6.2.2a) Walkway as an accessible route

6.2.2b) Walkway to main entrance

6.2.2c) Covered walkway linking two buildings

6.2.2 Walkways
6.2.3 Ramps

6.2.2d) An accessible route

Surface and level changes

- Walkway surfaces should be stable, firm and should lie generally in a continuous plane with a minimum of surface warping.
- The cross slope of walkways should not exceed 1:50 except pavement on streets with the natural topography exceeding 1:20.
- Walkways should have continuous common surfaces and not interrupted by steps or changes in level greater than 6mm.
- Thresholds should not exceed 25mm in height and should be bevelled to facilitate smooth passage of wheels.
- The intersecting surface where a walkway crosses or joins streets, public footpaths, driveways or parking area should blend into a common level with slope no greater than 1:20, or a dropped kerb should be provided.

Drainage

- Fall and drainage shall be designed to minimize water ponding or flow of water across walkways.
- Channel cover gratings located in walkways should be designed with spaces less than 13mm (6.2.2d). Holes in channel covers should not be grater than 20mm. Refer to Section 6.4.2 for other considerations on channel cover gratings.
- Covers to a channel shall be flushed with the surface of the walkway.
- Outdoor walkways, ramps and their approach should be designed so that water will not accumulate on walking surfaces.
- Structural fall should be considered for effective rainwater discharge.

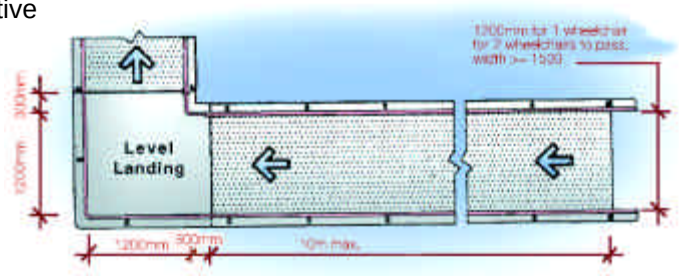
Braille and tactile guide

- Provide tactile guide path from the walkway entry point to lift zones, and functional areas such as reception counters.
- Locations of Braille and tactile layout plan and the main means of vertical circulation (i.e. lifts, staircases and escalators) should be provided.

6.2.3 Ramps

Ramps are sloping walkways and should have the least possible gradient. It is desirable to have more gentle slopes and slopes are recommended to reduce to a gradient of 1 in 20 if possible. The maximum gradient of a ramp shall be 1:12 measured between any two points on the ramp.

The minimum clear width of a ramp shall be 1050mm. Similar to walkways, width of a ramp should be at least 1200mm for a wheelchair to turn (6.2.3a) or at least 1500mm for 2 wheelchairs to pass. Handrails shall be provided on both sides of a ramp. Refer to Section 6.5 for handrail requirement.



6.2.3a) Provide ramp with handrail and level landing

6.2.3 Ramps

6

Gradient, rise and landing

- The recommended maximum rise for any run is 800mm.
- Landings for turning and resting should be provided. A minimum landing of 1500mm by 1500mm shall be located at the bottom and the top of each ramp. A landing of width and length not less than the width of the ramp should be provided when the ramp changes direction. The maximum length of a ramp run between landings shall not exceed 10m length of horizontal run or part thereof, and the landing should not be less than 1200mm long.
- Circular ramps are not recommended especially those with small turning radii, which would render wheelchairs difficult to manoeuvre.
- The cross slope of ramp surface should not be greater than 1:50.
- Landings shall be level and unobstructed by projections and door swings.
- If a ramp with a rise greater than 200mm leads down towards an area with vehicular traffic, a railing or barrier across the full width of its lower end, not less than 1500mm from the foot of the ramp should be provided for safety purpose.

Surfaces

- Ramp surfaces shall be stable, firm, and slip resistant (6.2.3b).
- Provide tactile warning strips at the head and foot of a ramp and at intermediate landings.
- Use contrasting colours for floor and wall along ramps.
- Similar to walkways, ramps should be clear of obstruction (6.2.3c). If unavoidable, they shall be extended downwards to the ramp level or be guided by tactile flooring materials.
- Outdoor pedestrian ramps should be provided with adequate drainage gullies at each side of the ramp to drain away excessive surface water running down the ramp.

Edge protection

- Ramps and landings with drop-offs should have edge kerb, railings, or projecting surfaces to prevent people from slipping off the ramp.
- Edge kerbs should have a minimum height of 100mm. For difference of adjacent levels greater than 600mm, lowermost solid protective edge should be 150mm high.

6.2.3b) Provide firm and slip resistant surface to ramps

6.2.3c) Ramp with recessed light fittings and raised letters on handrails to indicate direction

6.3 Car Parking

6.3.1 Linking places

The availability of public transport, provision of car parking spaces and lay bys greatly improves the mobility (6.3.1a) and participation opportunities of the elderly, people with disabilities and adults with young children in our community.

Covered passenger drop-off area, taxi and Rehabus lay-bys, as well as parking areas should be considered for community facilities in general, especially for those venues attracting international visitors. Accessibility and connectivity should be amongst the major considerations in planning our built environment.

Designers should also refer to statutory requirements and guidelines relating to the provision of designated car park for the disabled and street parking in the Transport Planning & Design Manual issued by Transport Department and the Design Manual Barrier Free Access issued by Buildings Department.

6.3.2 Accessible car parking

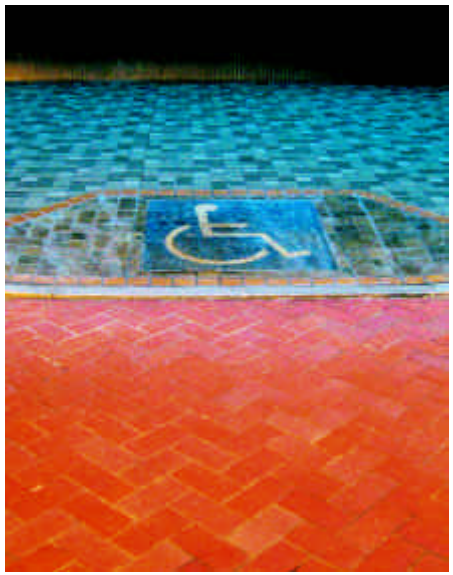
Accessible car parking (6.3.2a) means that sufficient space is provided next to the vehicle so that the wheelchair users and people requiring assisted devices can transfer and manoeuvre to and from the vehicle on level ground. The following items require attention:-

- The accessible car parking space should be on level ground and gradient of accessible parking area should not exceed 1 in 40.
- Locate designated parking bays (6.3.2b) for the persons with a disability close to the main building entry or lift lobby linking to the main entrance and upper floors.
- Provide safe passenger drop-off area for the elderly and people with disabilities near the main entrance if the parking space cannot be located close to the entrance or lift lobby.
- Provide safe accessible path to the building entry i.e. the main front door or the entry to the building used by most people.

6.3.1a) Travel with accessible mini-bus

6.3.2a) Provide accessible car park

6.3.2b) Locate parking space for persons with a disability near building entrance and lift



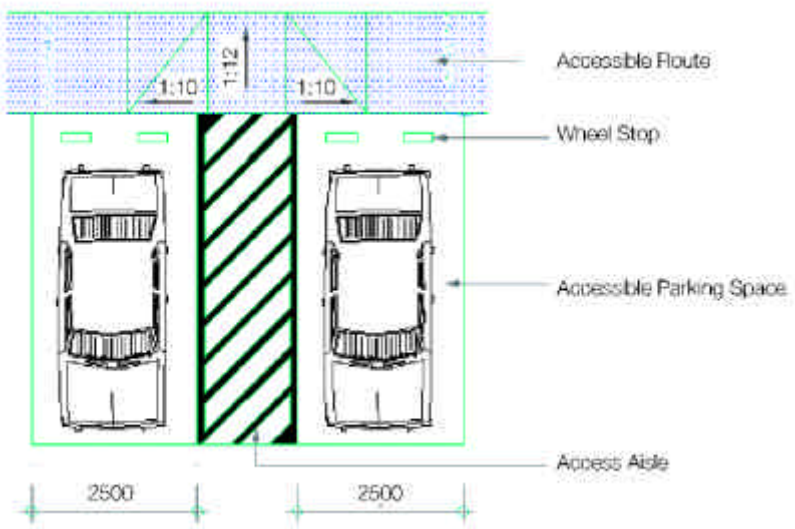
6.3.2c) Provide kerb ramp to walkway

- Provide conspicuous international symbol for the disabled in front of each designated car park space, not lower than 1500mm from the floor so that it can be seen over the car, with good colour contrast to the background.
- Provide kerb ramps (6.3.2c) for safe access to adjacent walkways.
- Post restricted speed limit sign at conspicuous locations in the car park.
- Provide adequate manoeuvring space at junctions where the vehicular access links up with the vehicular ramp to higher levels of the car park.
- Consider more gentle gradient like 1:8 for the vehicular ramp to allow for manoeuvring requirements of Rehabus (with lowering platform for wheelchairs and heavy loading of motorised wheelchairs), mini-vans and coaches.

6.3.3 Continuous accessible route

In planning for accessible parking, the principle of continuous accessible route and details such as signage, kerb ramps, car park entry and pay system etc. should be considered. The following items require attention:-

- The access aisle for share use of two accessible car or van parking spaces should be preferably 1500mm and 2400mm wide respectively (6.3.3a).
- Provide a ramp with handrail to eliminate any level difference between the car park floor and the main entrance or lift lobby.
- Provide slip resistant floor finish and paving at the accessible path.
- Post clear directory signage showing entrance to lifts (6.3.3b) and along accessible route to the car park (6.3.3c).



6.3.3a) Provide access aisle and kerb ramp

6.3.3b) Provide safe accessible path to building entrance

6.3.3c) Indicate direction of car park

6.3.4 Multi-storey car parking
6.3.5 Special vehicle parking

6.3.4 Multi-storey car parking

In planning multi-storey car parks, the general requirements for accessible car parking and accessible route should be compiled with. In addition, the following items require attention:-

- Consider provision of accessible car parking spaces at each level of the multi-storey car park.
- Post directory sign (6.3.4a) on each level of car park to indicate location of designated car park space.
- Provide ramps or wheelchair accessible lift linking different car parking levels for safe access.
- Provide simple and easily operated car park entry and pay equipment that can be easily approached by the driver. Systems that are restrictive and reply only on intercoms should be avoided.
- Post parking information (6.3.4b) and payment terms at entrance to a car park. If the pay arrangement involves paying at another location, suitable signage and direction should be posted.
- Provide suitable headroom for commonly used vehicles for a covered car park space and consider requirements for Rehabus and coaches.

6.3.5 Special vehicle parking

For facilities such as medical health care centres, elderly homes, rehabilitation centres and day care centers that require frequent service of special vehicles like Rehabus and ambulance, special consideration and designation of loading area (6.3.5a) and parking bays for these vehicles are required.

The designated space should be on level ground and close to the lift lobby, under cover (6.3.5b), with suitable headroom and manoeuvring space. The parking bay for the ambulance should allow for back access of wheelchairs and beds onto the ambulance.

6.3.4a) Post directory sign for location of disabled car park

6.3.4b) Provide information at entrance to car park

6.3.5a) Indicate passenger loading area

6.3.5b) Provide covered and accessible loading area

6.4 External circulation, landscaped areas and outdoor furniture

6.4.1 Entrance

External circulation leading to a building and the external landscaped areas form an important link in the travel chain. Best practices for the external areas are as follows.

The approach to an accessible entrance should be a paved walk or ramp with a slip resistant surface, uninterrupted by steps. External circulation leading to entrance(s) (6.4.1a) shall have a level space on the interior and exterior of the entrance.

Complete fencing off the entrance with bollards of narrow spacing at the entrances should be avoided. Consider and provide accessible entrance (6.4.1b) for all users to access the facilities independently.

6.4.2 Gratings

If gratings are located on walking surfaces, the size of the openings shall be as small as possible to avoid trapping wheelchairs (6.4.2a) or sticks. Spaces between gratings should not be greater than 13mm wide in one direction.

Elongated openings in gratings shall be placed so that the long dimension is perpendicular to the dominant direction of travel.

The gratings should be of appropriate material and securely fixed to avoid removal; otherwise, the uncovered drainage channel (6.4.2b) will form a difficult barrier.

6.4.3 Landscaped Areas

Design entrances to landscaped areas to be used by all users including the disabled, the aged and children.

6.4.1a) Provide accessible entrance

6.4.1b) Revolving 'turnstile' as an entrance for the wheelchairs/pushchairs

6.4.2a) Avoid trapping wheelchairs

6.4.2b) Avoid uncovered channels

6.4.3 Landscaped Areas

All users shall enjoy the same route of travel (6.4.3a) as far as possible and have equal opportunity to explore and experience all features at their own pace.

The landscaped area should be sized appropriately or subdivided into 'gardens'. The path through the garden should not be long and require too much effort to traverse.

The scent and colours of planting (6.4.3b), sounds of water and wind features should offer a rich experience to users. Different elements such as water (6.4.3c), tactile and sculpture (6.4.3d) should be used to provide a sensory experience to the users.

Paths:
A network of unobstructed paths should connect directly with all entrances, exits and main activity centres, as well as going around and through pieces of site furniture and equipment.

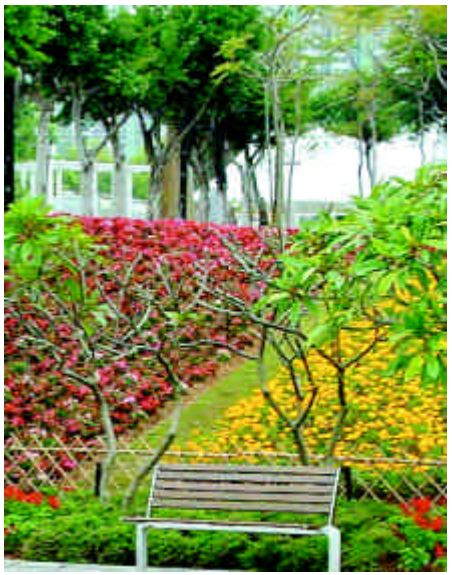
Paths should be stable, smooth, firm, slip resistant and anti-skid. Joints should be tight and flush. The paths should be of appropriate gradient and sufficient width. Levelled alcove spaces should be provided at reasonable intervals as resting area.

Where possible and practicable, the path for the visually impaired should be differentiated from the physically handicapped; as the tactile path for the former could be an inconvenience for the latter.

Users should be informed of their location in the garden, e.g. by landmarks, features or different surface materials along the walk and paths. (See also section 6.2 on Walkways and Ramps)

Way finding:
Way-finding cues (6.4.3e) and signage should be sufficient and readily apparent; these include relief tiles, Braille text at the entrance and at each display, audio systems and text (in different languages) to

6.4.3a) Use ramp as an accessible route



6.4.3b) Use colours and scent

6.4.3c) Use water and sound

6.4.3d) Use sculpture with braille sign

6.4.3e) Provide Braille map with audio device at park entrance

provide a variety of methods from which a user may choose to receive information.
(See also section 6.8 –Way finding and Signage)

Water features, such as paddling pools, waterfalls, streams and channels should allow the disabled and children to get close safely.

Garden furniture and elements should be sized and positioned to accommodate multiple users simultaneously. Users, both standing and seated (6.4.3f), as well as people of short stature should be able to reach all components comfortably.
(See also section 6.4.6 on Outdoor Furniture)

6.4.4 Playgrounds and Exercise Area

Paving

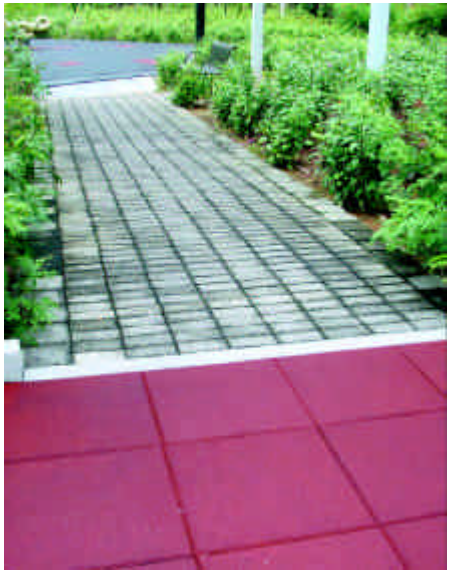
Paving in playing areas can be in different colours, for example, use different colours of impact absorbing surfacing materials (6.4.4a) to indicate different functions, different areas and changes in level. Different textures can also provide clues as to different areas of the playground.

Provide different play components in order to offer opportunities for children with various abilities to play together, encourage independence and offer a wide range of experiences and challenges.

Provide seats and shelters at reasonable intervals to give opportunities for opting out of activities. Adequate covered seating with back rest and arm rest should be considered for users and their companions or carers at appropriate locations for supervision.

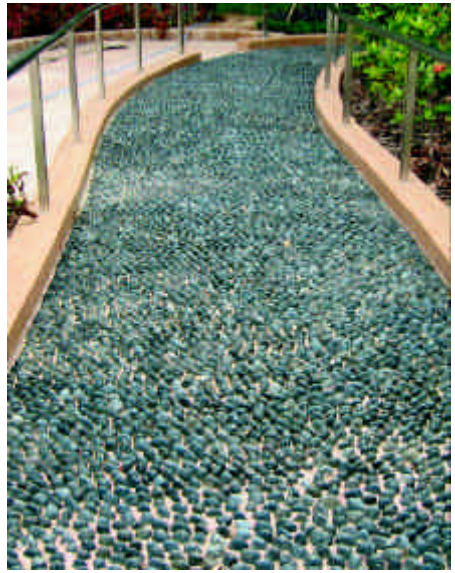
Design features in playgrounds and exercise areas to stimulate the use and development of all the senses. Communication can be through more than visual cues, for example, touch (6.4.4b) and sounds can be used. The foot massage trail is also a good option (6.4.4c).

6.4.3f) Raised water bed to allow close contact with water for the wheelchair users



6.4.4a) Use different colours for different playing areas

6.4.4b) Provide textured surface play equipment



6.4.4c) Provide foot massage trail with handrail

6.4.4 Playgrounds and Exercise Area
6.4.5 Water Sports Facilities

Where tunnels and bridges are provided, they should be sturdy enough and wide enough to accommodate wheelchair users. Tunnels with sequences of solid walls, window openings and exit/entry places reflect sound differently and can give clues to location, so long as materials that echo are used.

Appropriate transfer platform should be provided to allow children of different abilities to access different levels of modular play equipment. Adequate handrails and grab rails should be considered.

If a prime access to the equipment is the only route, adequate space for transfer and manoeuvring for wheelchair users and their carers should be provided.

Platforms, resting places and places to turn around should be provided. Different colours could be used on the floors of the platforms and railings at different levels to cue children about how far they are from the ground.

6.4.5 Water Sports Facilities

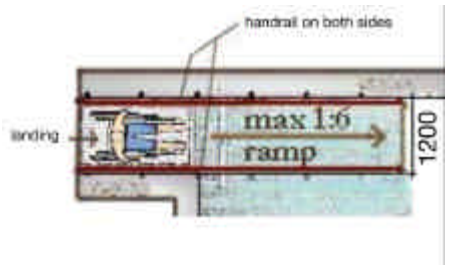
Swimming pools, lap pools, wading pools, diving pools used for scuba or general swimming, and whirlpools and Jacuzzis shall be accessible.

Accessibility to water facilities should be by means of any of the following:

- A sufficiently wide ramp with a slip resistant surface extending into the shallow end of the pool. Such ramps shall have a slope not exceeding 1:6 (6.4.5a). Best practices are to provide a ramp 1200mm wide with handrails on both sides and with a slope of 1:8.

- A lifting device such as a disable chair lift (6.4.5b).

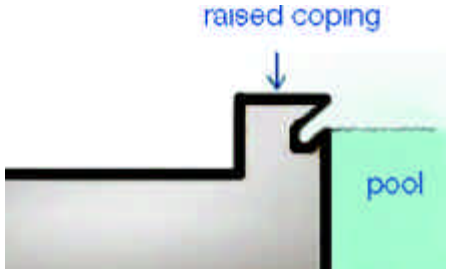
When the water level of the pool is above the level of the path of travel, a raised coping may be utilised as a transfer area. (6.4.5c)



6.4.5a) Provide ramp access to pool

6.4.5b) Provide a chair lift to assist the needy to access into the water

6.4.5b) Chair lift to assist access into the water



6.4.5c) Raised coping as the transfer area

6.4.6 Outdoor Furniture

6.4.6 Outdoor Furniture

Outdoor furniture and features such as lighting pole, bollards, seating benches and freestanding signposts must be positioned to allow for unobstructed access routes.

Use colour or colour bands to make street furniture distinguishable from the background of the route.

Free standing objects mounted on posts should not overhang for more than 300mm and below 2000mm from ground level.

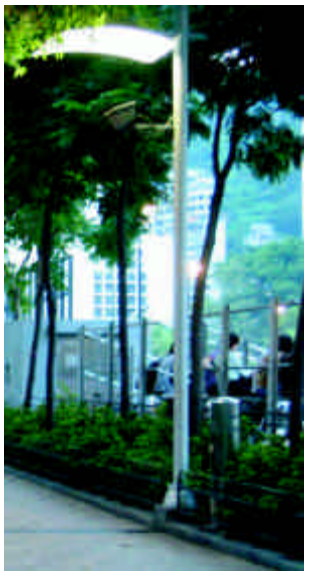
Provide protection to warn users, especially small children, the elderly and visually impaired if the headroom is reduced (6.4.6a) along the route.

Where obstructions or outdoor furniture within a walking zone cannot be avoided, use a paved textured surface around the unavoidable obstacle from the line of walk. It should be placed 1000mm in front of the obstruction and extending 300mm to the side. Tree grilles to a width of 1000mm can be used around trees. An obstacle-free route of minimum 1800mm in width should be retained.

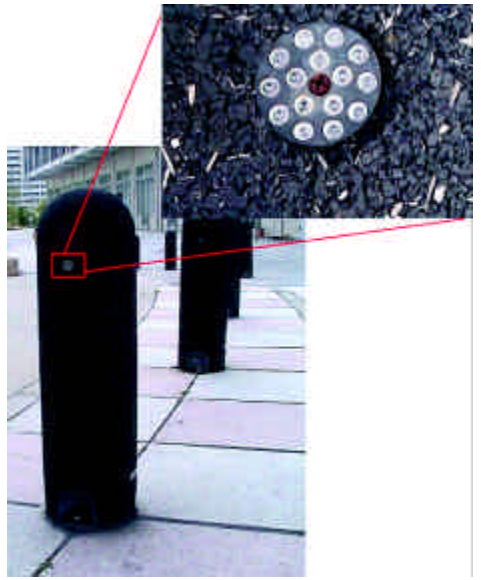
As a remedial measure, a colour band of 150mm deep, with its bottom edge 1500mm above ground level could be incorporated to any posts or columns or other obstructions within a route. The band should contrast in colour and luminance with remainder of the post or column.

Lighting posts:
Locate lighting pole (6.4.6b) outside the accessible route. If it is unavoidable that lighting poles have to be located within the accessible route, use a contrasting colour finish to the base of the pole up to 1500mm high or provide a colour band at about 1500mm above ground level.

6.4.6a) Potted plants put under the stairs as a remedial method
X Should be avoided in new design



6.4.6b) Locate lighting pole outside accessible route



6.4.6c) Provide reflector to bollards

6.4.6 Outdoor Furniture

Bollards:
Low-level bollards and chain-linked posts are hazardous. If bollards are to be used, they should be at least 1000mm high and should not be linked with chains. A colour and luminance contrast feature (6.4.6c) should be provided to bollards.

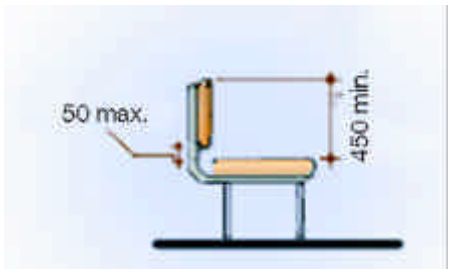
Bench seats:
Provide seating at regular intervals (6.4.6d) along accessible routes. They should be readily accessible to all users but do not obstruct access routes. Allow a minimum 2000mm in width if the benches are not set back from the access route. Seats at different heights should be considered for children's facilities. The seat level should be generally 430-485mm above ground.

They should be located in safe and well lit areas. Allow an area of 400mm in front of the seat. A tactile warning surface could be used when they form an obstruction. The following requires attention:-

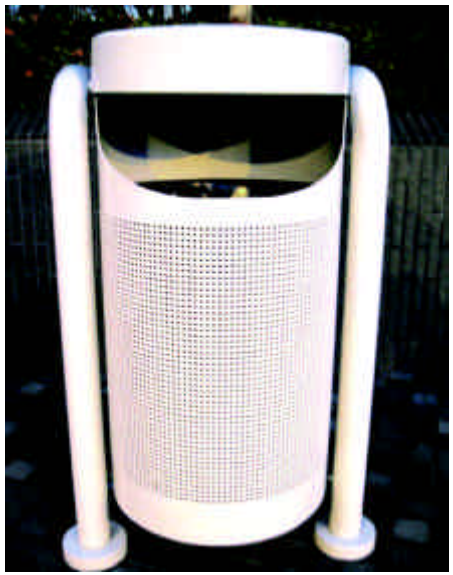
- Provide a firm wheelchair parking area 900mm wide on both sides of seating.
- Seats should be provided with a back support and arm rests on both sides of the sitting position. The back support should extend to a point 450mm minimum above the seat (6.4.6e).
- Use materials which do not significantly retain heat or cold.
- The surface of benches installed in areas exposed to weather should be slip-resistant and should not accumulate water.

Litter bins:
Litter bins (6.4.6f) should be of big opening for easy dropping of litter by one hand.

6.4.6d) Provide bench seats at regular intervals



6.4.6e) Size of Bench



6.4.6f) Provide litter bin with big opening

6.5 Internal circulation, doorways and handrails

6.5.1 Accessible route

Following the principle of Equitable use, it is necessary to provide at least one accessible route to connect accessible building or facility entrances, all accessible elements and spaces that are on the same site and within the building. The accessible route shall, to the maximum extent feasible, coincide with the route for the general public.

Colour and luminance contrast between walls and ceilings, and between walls and floors should be considered.

Provide a passing space of approximately 1500mm by 1500mm at reasonable intervals if an accessible route has less than 1500mm clear width. A T-intersection of two corridors or walks is an acceptable passing place.

Provide unobstructed turning space (of minimum 2000mm diameter) at corners and unobstructed space for approaching and opening doors.

Walks, corridors, passageways, aisles, or other circulation spaces shall have 2000mm minimum clear headroom (6.5.1a and 6.5.1b). If vertical clearance of an area adjoining an accessible route is less than 2000mm, a safety barrier of minimum 600mm high should be provided to warn the users, especially the visually impaired persons. Any protruding objects from the side wall should not obstruct people walking along the passageway.

A space to provide for umbrella stack and 'parking' of wheelchairs (6.5.1c) should be considered, especially in public facilities like exhibition halls and museums so that those with walking difficulty can use a wheelchair inside the building.

6.5.1a) Planting placed to underside of an escalator with low headroom

6.5.1b) Avoid protruding object along passageway

6.5.1c) Provide a 'parking' space and umbrella stack in the entrance lobby

6.5.2 Doorways

6.5.2 Doorways

Lobby doors should be positioned for easy, unobstructed approach and passage (6.5.2a), and should ideally be automatic sliding doors. When a door into a lobby is open, there should be a minimum turning circle of 1500 by 1500mm remaining within the lobby. This requirement shall be required particularly in fixed-seating venues.

Minimum manoeuvring clearances at doors that are not automatic or power-assisted shall be provided. The floor or ground area within the required clearances shall be level and clear. Revolving doors should not be the only means of access.

The minimum space between two hinged or pivoted doors in series shall be 1200 mm plus the width of any door swinging into the space. Doors in series should swing either in the same direction or away from the space between the doors (6.5.2b).

Entry systems must not rely only on audible intercoms and must incorporate inclusive entry procedures. New technologies and improved designs for providing accessible entry systems should be considered.

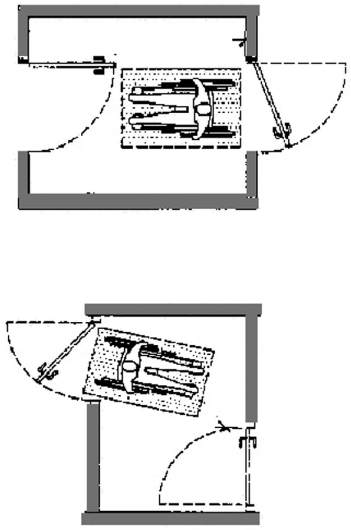
Entry systems for doors, gates and barriers should be designed to be accessible, located horizontally at 900mm above floor level and, where possible, should incorporate additional vertical systems.

All numbers and letters on entry systems should be identifiable by raised symbols. The depth of embossing should be at least 1.5mm.

Thresholds are preferably visible, for instance, with contrasting colour.

If doorways have two independently operated door leaves, then at least one leaf shall meet the width of a single leaf door and that leaf shall be an active leaf.

6.5.2a) Easy approach to entrance



6.5.2b) Arrangement and minimum space to be provided in lobbies or vestibules

6.5.2 Doorways

Doors and hardwares:
Sliding doors should be power-operated where possible. Sliding automatic doors with no guard rails are more convenient for wheelchair users and visually impaired people.

If an automatic door is used, then it should be opening and closing slowly and low-powered. Automatic doors shall not open to back check faster than 3 seconds and should require less than 66.6N to stop door movement. If a power-assisted door is used, its door-opening force should be minimum and not exceeding 22N.

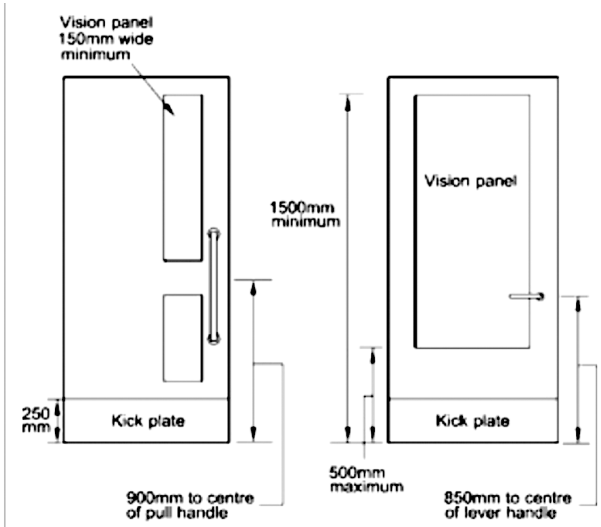
A vision panel of minimum width 150mm should be fitted to all doors to provide a viewing area, except where privacy is needed (for example, toilets, changing rooms or counselling rooms). The base of the vision panel should preferably be no higher than 500mm above floor level, and should extend to a minimum height of 1500mm (6.5.2c).

Beading around the vision panel should be flush with the door.

Fully glazed doors should be highlighted with conspicuous permanent contrasting strips or continuous features. The leading edge of the door should be with colour and luminance contrast.

Handles, pulls, latches, locks, and other operating devices on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist to operate (6.5.2d). Lever-operated mechanisms, push-type mechanisms, and U-shaped handles are acceptable designs. When sliding doors are fully open, operating hardware shall be exposed and usable from both sides (6.5.2e).

If a door has a closer, then the sweep period of the closer shall be adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 75mm from the latch, measured to the leading edge of the door.



6.5.2c) Vision panel to be provided at low levels


6.5.2d) Doors fitted with high and low viewing eye and lever handle


6.5.2e) Sliding door with hardwares usable on both sides

6.5.3 Handrails

Handrails should be provided to all ramps, staircases and steps. They can also be used alongside with a tactile guide path, along corridors, as protective barriers and guard against hazards, and can be a directional guide to doorways or positions of signage.

Where continuous handrail is necessary, for example, in elderly residence, or handrail is used as a means for way-finding by the visually impaired, the arrangement at openings such as doorways, service ducts, hose reels (6.5.3a) should be carefully considered to avoid conflict or breaking of the handrail.

The following items require attention:

- The entire component should be securely fixed to the building structure and conveniently located so they can provide secure hand grip for persons to take their entire weight when required. Handrails should not rotate within their fittings.
- Railing designs that allow children to climb must be avoided.
- Heights of handrails are preferably to be provided in pairs for adults and children, one at a height between 850 - 950mm and a lower one at a height between 450 – 500mm, measured vertically from the surface of the ramp or finished floor level to top of handrail.
- Handrails shall be continuous without interruption, except at doorways and openings (6.5.3b and 6.5.3c), and with recessed brackets so that a hand can move from end to end without interruption.
- The gripping surface shall be free of any sharp or abrasive elements.
- The handrail material should be consistent throughout the entire length to avoid sending false messages to visually impaired persons due to change of material.
- Handrails may be located in a wall recess if the recess is of a maximum depth of 75mm and extends at least 450mm above the top of the rail.
- Handrails should be installed to resist a load of not less than 1.3kN applied vertically or horizontally.

6.5.3a) Arrangement of continuous handrail with services layout

6.5.3b) Continuous handrail along corridor

6.5.3c) A removable handrail where openings are required

6.6 Lifts and platform lifts
6.6.1 Passenger lift

6.6 Lifts and platform lifts
6.6.1 Passenger lift

Passenger lifts provide access between different levels and facilitate all users of the building to travel from one floor to another.

The obligatory requirements for barrier free provision of lift shall be in accordance with the Design Manual Barrier Free Access. Best Practices are as follows.

Lift car:
The minimum internal lift car dimensions should be 1100mm wide by 1400mm deep. A passenger lift with internal dimension of 2000mm by 1400mm and door opening of 900mm is recommended where possible.

Lift car that travels between two floor levels can be provided with opposing doors to allow the wheelchair user to travel in one direction.

The wheelchair user needs sufficient space and time to access the lift and an unobstructed area, say 1800mm by 1800mm should be considered in front of the lift.

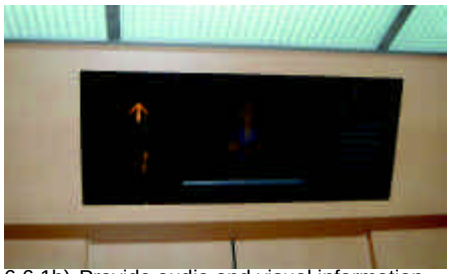
Use non reflective wall and ceiling finish and slip resistant floor finish.

Control button and signal:
The provision of a large call button at foot level (6.6.1a) in the lift lobby is recommended for people with disabilities.

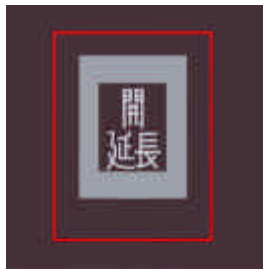
Clear audio and visual signaling (6.6.1b) and messages shall be provided.

It is very useful to provide an extended door opening control button inside (6.6.1c) and outside the lift so that the opening time of the doors can be extended with a single press action for access by consecutive wheelchair users and elderly people.

6.6.1a) Good arrangement of waiting area for lift – call button at two levels, audio and visual signaling



6.6.1b) Provide audio and visual information panel inside the lift car



6.6.1c) Provide extended door opening control button

6.6.1 Passenger lift
6.6.2 Platform lift

Detection device for re-opening of lift doors should take account of slow movers and wheelchair users.

The call buttons shall be conspicuous with colour and luminous contrast to its surrounding. Light touch call buttons are recommended.

Other provisions:
Signage indicating the floor level should be provided on the wall opposite the lift doors on each landing.

Provision of information (6.6.1d) with braille markings for frequently visited facilities should be displaced near the floor buttons.

The hand rail inside the lift car can be extended to turn up at lift door opening side as indication.

Provision of a seat inside the lift should be considered for lifts that are intended to serve mainly elderly people.

6.6.1d) Provide information of facility inside lift car

6.6.2a) Platform lift for vertical transportation between two levels

6.6.2 Platform lift

Platform lifts are used for vertical transportation to travel between two levels and they could be used when space is restricted.

Lift car:
Platform lifts should be enclosed with minimum internal dimensions of 1100mm wide by 1400mm deep with a clear opening width of 900mm.

The doors should not require the simultaneous operation of two mechanisms to open them and preferably be automatic.

Provide an unobstructed area of 1500mm by 1500mm in front of the platform lift entrance. This area should be level and kept clear of obstructions to allow access to the lift controls.

Use non-reflective and slip-resistant wall and floor finishes.

When vision panels are fitted, the base of the vision panel should not be higher than 500mm above floor and should be of a minimum height of 1500mm.

Control button and signal:
The controls should be capable of being used independently by the user and should be higher than 900mm from floor level and not more than 1200mm.

The platform lift should incorporate audible and visual alarm as well as emergency systems. Clear audible and visual instructions should be provided.

6.7 Stairways, escalators and travellators

6.7.1 Steps and Staircases

Staircases and steps should not be used as the main means of vertical circulation if alternative means such as ramps (6.7.1a) or lifts (6.7.1b) are feasible. This is because staircases cannot be used by wheelchair users and are not easily negotiated by a number of users, e.g. ambulant disabled persons, pregnant women, young children and elderly.

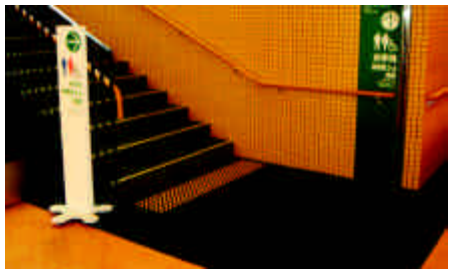
PNAP 266 - The 150mm level difference between the floor next above the external ground or adjoining flat roof as required under B(C)R 35 and 49(1) may be exempted if means to guard against the ingress of water to the inside of the building are provided. Slopes not steeper than 1:20 or ramps not steeper than 1:12 should be used to replace the 150mm step at all entrances/exit to buildings wherever feasible. The priority choices in means of access provision are shown in the table below (6.7.1c).

An alternative accessible route, e.g. by means of a lift or a ramp, should be provided nearby within sight from the position of the staircases. If the accessible route is not available within sight, appropriate signage (6.7.1d) should be provided to guide users in need to the accessible route.

Stairlifts are not means of barrier free access. Facilities requiring barrier free access will not be considered satisfying the barrier free access requirement if only stairlifts are provided without an alternative accessible route. Stairlifts (6.7.1e) should not be used in any new design of buildings. The use of stairlifts in existing building should be the last option to be considered only if all other means, such as ramps, lifts, alternative routes, lifting platforms and provision of alternative facilities, are not feasible.

If staircases or steps must be used as means of vertical circulation, the recommended design requirements in the current version of the Design Manual for Barrier Free Access should be followed as far as practicable. DMBFA97 4.4.2(a) to (g)

6.7.1a) Use ramp for vertical circulation



6.7.1d) Provide signage for accessible route

6.7.1b) Use lift for vertical circulation

Priority	Means of access	Approach space requirement (150mm rise)
1st	The whole width of the entrance / exit is accessible with a slope not steeper than 1:20	3000mm (if there is no door) + 1500mm (landing for door)
2nd	The whole width of the entrance / exit is accessible with a ramp not steeper than 1:12 (railings are required on both sides)	1800mm (if there is no door) + 1500mm (landing for door)
last	150mm step with a 1:12 ramp attached (railings are required on both sides of ramp)	1800mm for a perpendicular ramp (no door) + 1500mm (landing for door) or 1500mm for a ramp parallel to the entrance

6.7.1c) Table showing the priority choices in means of access provision for entrances

6.7.1 Steps and Staircases

DMBFA97 - 4.4.2(e)

The top nosing of any flight should not be less than 300mm from the point at which the adjoining wall returns. Best practice should be 600mm (6.7.1f) in order to have the tactile warning strips not placed along the passageway.

DMBFA97 - 4.4.2(g)

Best practices :

(a) light fixtures should not be mounted only at the ceiling of the landings in order to avoid the person's own shadow casting on the steps while traveling downwards;

(b) natural lighting, if provided, should not be provided only at the end of the landings in order to avoid glare; and

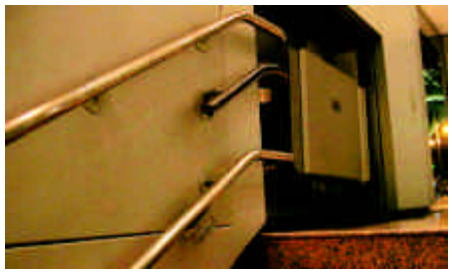
(c) a lighter colour steps and wall/ceiling background with darker colour/luminous contrast of the nosing tiles, tactile warning strips and railings would achieve a better result than the vice-versa with darker background and lighter objects, because the illumination level would be higher with the same light source.

In places intended to be used frequently by children, such as school, children playground, park, library (with Children section), museum, swimming pool, etc., an additional handrail (6.7.1g) should be provided at a lower height of, say 700mm to 800mm above any nosing, floor or landing for use by children.

In addition to the handrails provided on both sides of the staircases, intermediate handrails (6.7.1h) should be provided for staircases with a width wider than, say, 3600mm for external staircases or 2400mm for internal staircases (1800mm for fire exit staircases under MOE). The intermediate handrails should be capable of being used from both sides.

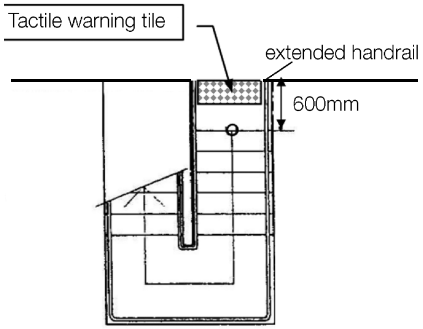
When handrails are not continuous, they should return to the wall (6.7.1i), floor or post, so that they do not become obtrusions.

Protect the underside of staircases (6.7.1j), where the headroom is 2000mm or less from the finished floor level, with a guard rail or design in such a way to



6.7.1e) X Should not be used in new buildings

O Use in minor AA&I works if alternative accessible route is not possible



6.7.1f) Tactile warn tiles at 600mm

6.7.1g) Provide an additional handrail at lower height

6.7.1i) End of handrail returns to the wall

6.7.1h) Provide intermediate handrails for wide staircase that are capable of being used from both sides

6.7.1j) Protect people from walking under part of staircase with headroom less than 2000mm with a planter design

stop people from walking underneath that part of the staircase. Generally, people with a guide stick can detect an area of obstruction up to 685mm high from the ground level.

6.7.2 Escalators

Escalators are effective means of circulation, capable of moving large crowds continuously and efficiently, however escalators do not provide barrier free access routes. If escalators are used, the following best practices should be considered.

An alternative accessible route, e.g. lift or ramp, should be provided nearby within sight from the position of the escalators (6.7.2a). If the accessible route is not available within sight, appropriate signage (6.7.2b) should be provided to guide the users in need to the accessible route.

The recommended clear signals (6.7.2c) for going up/down for escalators under DMBFA97: 5.9.1(a) should be provided if the environment and situation allow.

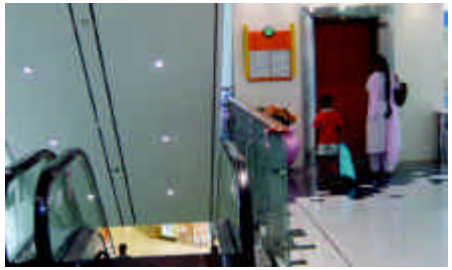
Tactile warning strips (6.7.2d) should be provided around the escalator pits both at the top and bottom of the escalator.

Sufficient illumination should be provided at the top and bottom of the escalators.

Sufficient clearance from any obstruction should be provided to any open side of the escalators (6.7.2e).

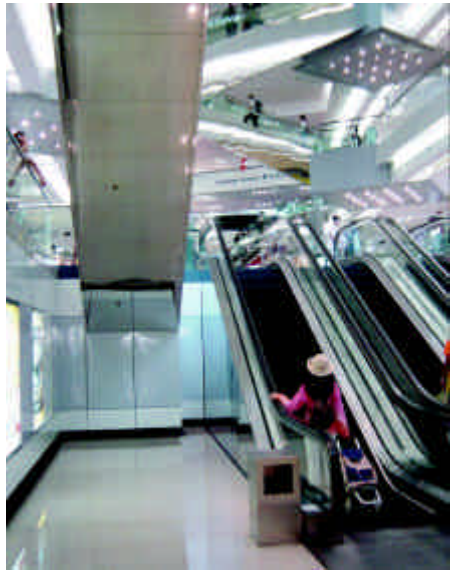
Escalators should not be used to replace staircases when they are switched off, because the steps of the escalators are not negotiable by many users. If the escalator is installed in a place accessible by users at time when the escalator is not switched on, a lift (not locked) or a staircase should be provided in close proximity to the escalator.

The underside of an escalator where the headroom is 2000mm or less from the finished floor level, a guard rail (6.7.2f) or other form of barrier shall be provided to stop people from walking underneath that part of the escalator.



6.7.2a) Provide a lift near the escalator

6.7.2c) Provide clear signal for going up/down



6.7.2e) Provide sufficient clearance between escalators

6.7.2f) Protect the underside of escalators

6.7.2b) Provide signage for an accessible route

6.7.2d) Provide tactile warning strip

6.7.3 Travellators

Travellators are means of horizontal circulation for moving large crowds continuously and efficiently, where a long horizontal point to point travel is required, such as traveling in airport terminals, and train stations. Travellators are not common in Hong Kong. If travellators are used, the following best practices should be considered.

Tactile warning strips should be provided at the entrance and exit of the travellators (6.7.3a).

The direction of travel should be clearly indicated (6.7.3a).

The level of the travellator should align with the floor level at the entrance and exit (6.7.3a). The raised type of travellator with the main level of the travellator raised and connected with a ramped section of travellator at the entrance and exit should be avoided.

6.7.3a) Provide tactile warning strip and signage to indicate direction of travel, and align the level of the travellator with the floor level

6.8 Way Finding and Signage

6.8.1 Way finding and signage strategy

Way finding and signage (6.8.1a) strategies should include the following:-

- **Information** about services and facilities;
- **Direction** to facilities and functional spaces, reception, advice, exits and key areas;
- **Identification** including room signs and room numbers, facilities and equipment, stair signs and floor numbers; and
- **Safety** notice such as warnings, prohibitions, hazards, fire exits and refuges.

Words, pictorial signs and symbols should be used consistently within the same site and building.

6.8.2 Information

Facilities for persons with a disability should be clearly and consistently signposted at ramps, carparking spaces, entrances, toilets, baby caring facilities, lifts, reception areas, counters (6.8.2a), accessible routes and exits externally and internally.

6.8.1a) Signage is essential

6.8.2a) Signage about services and facilities for the users

Such facility should be identified by international sympbols of accessibility. Inaccessible routes shall have directional signage to indicate the route to the nearest accessible entrance.

6.8.3 Directory and floor plan

Directories and floor plans, where provided, should be located at the main entrance to a building (6.8.3a), or in a designated place on the floor of entry, and at other strategic locations on different floors and levels. Although they should be located at a prominent position, they should not obstruct the general pedestrian flow.

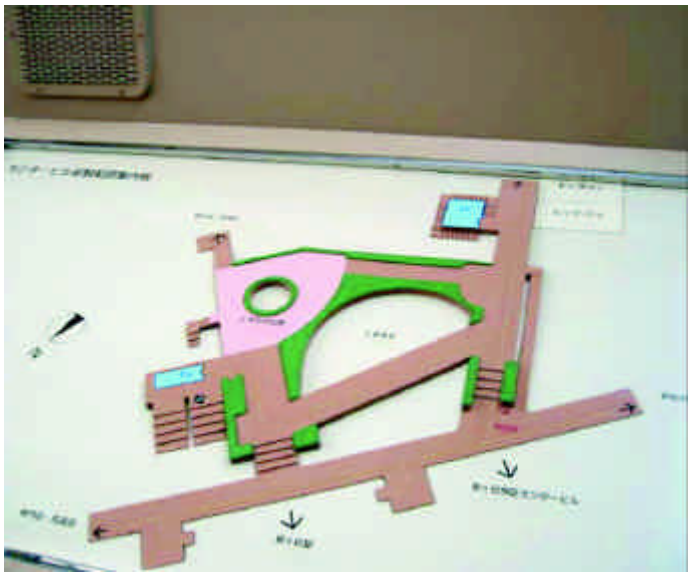
Bottom level of directories should be at a maximum height of 900mm from floor level. They may be free standing or wall mounted and with 'You are here' indicated. For free standing ones, they should ideally be slightly inclined from the horizontal, in line with the building's orientation.

Visual directory and map:
The directory should show the layout plans in simplified form indicating individual rooms, entrances and circulation areas, toilets and other accommodation.

Floor levels should be represented in graphical form and reflected in the directory. For good legibility, the information surface of the directory should be faced with non-reflective and glare resistant material. Characters and symbols should contrast with their background.

Tactile map:
Tactile maps should be considered at major locations showing directions to the building (6.8.3b). In buildings where finding locations independently on a routine basis is a necessity, tactile maps or prerecorded instructions containing information on locations of main entrances, toilets (6.8.3c) and other major facilities can be very helpful to visually impaired people.

6.8.3a) Comprehensive visual and tactile directory at main entrance


6.8.3b) Tactile map with Braille showing direction to the building

6.8.3c) Tactile and Braille layout plan

6.8.3 Directory and floor plan
6.8.4 Identification and room signs

Tactile borders:
Raised borders around signs containing raised characters may make them confusing to read unless the border is set far away from the characters. Raised borders and decorative elements that are not required should be separated 9.5mm minimum from tactile characters.

6.8.4 Identification and room signs

Many people with disabilities have limitations in movement of their heads and have reduced peripheral vision. Signage positioned perpendicular to the path of travel is easiest for them to notice (6.8.4a). People can generally distinguish signage within an angle of 30 degrees to either side of the centerlines of their faces without moving their heads.

Room sign:
Signage indicating room names and room numbers should be placed on the wall next to the door on the door handle side or on the nearest adjacent wall.

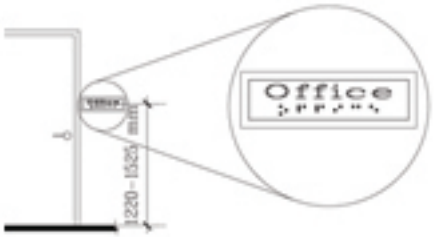
Characters shall be located at 1220mm minimum and 1525mm maximum above floor level measured to the baseline of the characters (6.8.4b). A small embossed arrow should be used to indicate direction.

Braille should be located 1015mm minimum and 1525mm maximum above the floor measured from the baseline of the braille cells (6.8.4c).

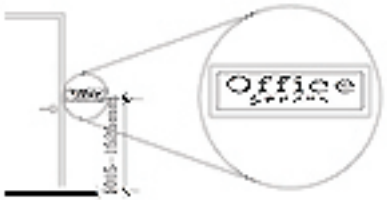
Room tactile sign:
Where a tactile sign is provided at double doors, the sign should be located to the right of the right hand door. Where there is no wall space at the latch side of a single door or to the right side of double doors, signs should be located on the nearest adjacent wall.

The mounting location for signs containing tactile characters should allow a person to approach within 75mm of the sign without encountering protruding objects or standing within the swing of a door. A clear floor space of 455mm by 455mm minimum,

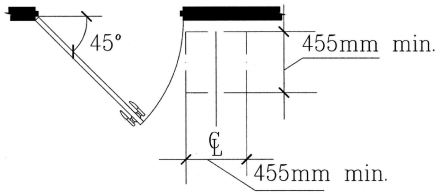
6.8.4a) Signage perpendicular to the path of travel



6.8.4b) Room sign



6.8.4c) Braille in room sign



6.8.4d) Room sign location

centered on the sign, should be provided beyond the arc of any door swing between the closed position and 45degree open position(6.8.4d). Tactile signs can be permitted on the push side of doors with closers and without hold-open devices.

6.8.5 Safety

Fire exits signs (6.8.5a), fire escape plans, sign of emergency alarm and warning signs on hazards should be provided for the users.

6.8.6 Illumination and colour contrast

Illumination on signage:
Signage should be well lit (6.8.6a). Illumination levels on the sign surface should be in the range of 100 to 300 lux and shall be uniform over the sign surface. Signs shall be located such that the illumination level on the surface of the sign is not significantly exceeded by the ambient light or visible bright lighting source behind or in front of the sign.

Contrast:
Materials for signs should have a non-reflective surface. An eggshell finish is recommended. Signs are more legible for persons with low vision when characters contrast with their background by at least 70 percent.

Contrast in percent shall be determined by[2]:
Contrast = $[(B_1 - B_2) / B_1] \times 100$, where
B_1 = light reflectance value (LRV) of the lighter area and
B_2 = light reflectance value (LRV) of the darker area.
[2 from ADAAG Standard]

Colour:
Signage, and symbols within signs, should have colour and luminance contrasted with their background (6.86b). The greatest readability is usually achieved through the use of light-colored characters or symbols on a dark background.

6.8.5a) Sign showing direction of exit

6.8.6a) Signage should be lit

6.8.6b) Sign with colour contrast

6.8.7 Text

Visual test:
Text on signs should be clear and simple with font style like 'sans-serif'. Visual text should not be made up of capital letters only. Characters should preferably be uppercase or lowercase or a combination of both, conventional in style, and preferably not be italic, oblique, script, highly decorative, or of other unusual forms.

Avoid long lists of items on signs. Shorter columns are easier to read and remember.

The text dimension of English letters and visual characteristics are listed in the table below for reference. In general, Chinese characters can be one size larger.

Tactile text and Braille (6.8.7a and 6.8.7b):
For tactile text, all characters should preferably be uppercase in simple font style such as sans-serif. Characters should preferably not be italic, oblique, script, highly decorative, or of other unusual forms.

Tactile characters shall be raised 1mm minimum above their background and should be accompanied with braille directly below the text. The depth of any embossing should be at least 1.5mm. Raised characters are preferred to be at least 15mm high but not higher than 50mm measured vertically from the baseline of the character based on the uppercase letter "I".

Braille shall be located below the corresponding text and preferably be justified to the left. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated 6.4mm minimum from any other tactile characters.

6.8.7a) Braille map

6.8.7b) Model with Braille

Table of visual character dimensions in signage

Height of Floor to Baseline of Character	Minimum Viewing Distance	Minimum English Character Height
less than 1100mm	as appropriate	as appropriate
1100mm to less than or equal to 1800mm	less than 1850mm	16mm
	1850mm and greater	16mm, plus 3.2mm 300mm of viewing distance 1850mm
1800mm to less than or equal to 3000mm	less than 4600mm	50mm
	4600mm and greater	50mm, plus 3.2mm per 300mm of viewing distance above 4600mm
greater than 3000mm	less than 6400mm	75mm
	6400mm and greater 75mm	75mm, plus 3.2mm per 300mm of viewing distance above 6400mm

6.8.8 Pictorial symbols

Internationally recognized pictorial symbols or pictograms, with explanatory text, should be used wherever possible.

Pictograms shall have a field height of 150mm minimum. Characters or Braille should preferably not be located in the pictogram field (6.8.8a).

6.8.9 Orientation

The design of distinct functional areas and routes in a building should be clearly identified through colour, signage and in other ways, to assist orientation within a building. Landmarks that can easily be distinguished by visually impaired individuals are useful as orientation cues. Such cues include changes in illumination level, bright colors, unique patterns, wall murals, location of special equipment or other architectural features.

6.8.8a) Pictorial symbol with characters and Braille

6.9 Tactile Surfaces
6.9.1 Tactile on walking surfaces
6.9.2 Use of tactile surfaces

6.9 Tactile Surfaces
6.9.1 Tactile on walking surfaces

Tactile surfaces are used for guidance paths (6.9.1a), information and warning to openings and edges for the visually impaired.

There are three types of tactile surfaces (6.9.1b and 6.9.1c) that are commonly used to guide and alert people.

Directional tile:
It consists of raised parallel bars to guide people along the direction of a tactile path.

Warning tile:
It consists of raised truncated domes arranged in square grid parallel to the sides of the tile to alert people of potential hazards such as top and bottom of stairs, door openings and at pedestrian crossings.

Positional tile:
It consists of raised small dots arranged in staggered positions to indicate change of walking direction.

The obligatory requirements and guidelines for tactile path and tactile arrangements shall be in accordance with the following:-

- Design Manual of Barrie Free Access 1997 published by Building Department; and
- Transport Planning & Design Manual - Facilities for People with Disabilities issued by Transport Department.

6.9.2 Use of tactile surfaces

In designing an access to a facility or building, the selection of floor materials may be different for exterior or interior environment. In all cases, it is important to bear in mind that the tactile surfaces should be firm and slip resistant (6.9.2a). Broken tiles or incorrectly laid tiles give wrong information to the user and become an obstacle.

Tactile surfaces should be in colour and luminous contrast with adjoining surfaces, either light-on-dark, or dark-on-light. The material used to provide contrast should be an integral part of the walking surface.

6.9.1a) Provide tactile guide path to building entrance

6.9.1b) Use different tactile surfaces for their intended purpose

6.9.1c) Warning tile at top of staircase

6.9.2a) Firm and slip resistant tactile surfaces

6.9.2 Use of tactile surfaces
6.9.3 Detectable warnings at vehicular areas

The material used to provide contrast is recommended to contrast by more than 70%.
Contrast in percent is determined by:[2]
Contrast = $[(B_1 - B_2)/B_1] \times 100$, where
B_1 = light reflectance value (LRV) of the lighter area and
B_2 = light reflectance value (LRV) of the darker area.
[[2] from Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities (ADAAG) Standard]

It is desirable for tactile surfaces used on interior surfaces (6.9.2b) to differ from adjoining walking surfaces in resiliency or in the sound made by contact with the guiding stick of the visually impaired.

Tactile surfaces should convey meaningful and continuous information to the user. For example, the tactile guide path to the lift lobby should lead to the lift button position and then the lift door opening position. The call buttons and other associated information in Braille should convey the necessary information to complement accessibility.

6.9.3 Detectable warnings at vehicular areas

A continuous detectable warning strip should be provided to the boundary between the areas of a walkway which crosses or adjoins a vehicular road, and the walking surfaces should not be separated by curbs, railings or other elements between the pedestrian areas and vehicular areas.

6.9.2b) Tactile path to lift services

6.9.3a) Tactile warning strip at crossing

6.10 Assistive Listening Systems
6.10.1 The hearing problem

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6.10.1 The hearing problem

A hearing-impaired person has to hear the signal, with or without hearing aids, in order to understand it and loudness is just one part of the listening equation. For most people with hearing loss, the comprehension of verbal messages takes more than audibility. Their comprehension also depends upon the nature of their hearing losses.

The most common problem in hearing which affects older persons in particular is that hearing acuity is poorer at the higher frequencies than at the lower ones. The acoustic characteristics of speech that allow listeners to distinguish between speech sounds occur largely in the higher frequencies. The common complaint of people with hearing loss is that they can "hear" the low frequency components of speech signals and know someone is talking, but they cannot "understand" because many of the important higher frequencies are filtered out by their hearing loss.

The sound signals which traverse acoustical space before arriving at a listener are weakened by proportion to the travel distance and distorted by background noise reverberation and other acoustical conditions before reaching the listeners. The situation will not be improved just by increasing loudness.

The approach is to take appropriate steps so that communications with people with disabilities are as effective as with the general public.

Assistive listening systems are useful for effective communication with the hearing impaired (6.10.1a). With such auxiliary aids, a hearing impaired person can enjoy equal opportunity to the benefits of an activity, a service, or a programme.

User requirements are the prime consideration in determining what type of assistive listening system would be appropriate for a venue.

6.10.1a) Provide assistive listening system

6.10.2 Types of listening systems

There are two types of listening systems, namely public address system and assistive listening system.

Public Address (PA) System:
The PA System utilizes the loudspeaker(s) to transmit sound signals to the listener. In buildings to be used by the public, the visual display boards should also display relevant information announced by the PA system. An example is the train schedule information.

Assistive Listening Systems (ALS):
ALS are devices used in venues such as theatres, auditorium, convention centres, courtrooms, museum to help people with hearing loss to improve their auditory access in difficult and large-areas. A free standing ALS can be used to back up the existing PA system but it is not a substitute for PA system. It can also be used to improve functional hearing abilities with or without the person wearing hearing aids.

ALS are intended to augment standard public address and audio systems by providing signals which can be received directly by persons with special receivers or their own hearing aids and which eliminate or filter background noise. The type of assistive listening system appropriate for a particular application depends on the characteristics of the setting, the nature of the program, and the intended audience.

Three types of ALS are listed below:-

- Magnetic Induction Loop (IL) systems use a wire around the room to transmit an electromagnetic signal that is picked up by a small telecoil in the hearing aid (6.10.2a). Users simply switch on the telecoil (the "T" setting) and adjust the volume of the hearing aid. However, telecoils (mainly used for improved telephone access) are found in about thirty percent of current hearing aids. For those people whose hearing aids contain telecoils, an IL system is very convenient as the special "receiver" is their own hearing aids.

6.10.2a) Provide magnetic induction loop equipment and amplifier at service counter

6.10.3 Installation of ALS

• FM (Radio Frequency) systems are variations on the commercial FM radio. Radio signals are broadcast by an FM transmitter backed on the sound system used in the facility. These signals are received by individual "radios" - small pocket-size receivers tuned to the specific frequency used in the transmission.

• Infrared (IR) systems operate on infrared light that is beamed from one or several IR transmitters to small, specialized receivers. There are several types of IR receivers such as stethoscope-style that dangle from the ears, a headset type that fits over the ears, and a small pocket-size type similar to the FM receiver. The receiver-to-ear connections for the first two types are straightforward as they are placed directly in or at the ear. The receiver-to-ear connections with the pocket-style are the same as FM receivers.

6.10.3 Installation of ALS

Each ALS has its advantages and disadvantages. A system that works well in a courtroom may not be appropriate for a theater. An outdoor facility needs a different system from that of an orchestra hall.

Differences in requirements such as privacy, interference, cost, installation requirements may result in installation of different type of ALS in a venue. A site analysis and operation assessment is required before deciding which system would be the most appropriate ALS for the venue. Some of the aspects that should be considered are listed below:-

• If privacy is a major consideration and the events taking place should be excluded to people outside the room, then an IR system should be employed.

• If a large number of simultaneous events are to be taking place in adjoining facilities and there are a sufficient number of potential FM carrier frequencies available to ensure non-interference between rooms, then a FM system is a possibility. Other

considerations include the provision of FM receivers that can be tuned to all the possible frequencies.

- If it is necessary to use the system alternately in a number of different activity rooms such as in a community center, then FM systems are more flexible and can be used both indoors and outdoors. However, some IR systems are also relatively easy to deploy, and portable units work well in smaller activity rooms, although they are less effective outdoors.

- If the facility is very large such as the case of a massive auditorium with balconies and overhangs, it is easier to provide an appropriate signal at all seat locations with an FM system although an IR system in such location can be considered.

- If the facility is likely to be subjected to persistent interference, then an IR system may be the best choice. It is possible to use a frequency scanner to determine the possibility of interference.

It is recommended that professional advice, preferably one with experience in installing ALS's should be obtained for major facilities, particularly the larger ones, before purchasing any system.

6.10.4 Management of ALS

Some of the common problems that are encountered with the system:-

- Staff are unfamiliar with using the system or do not know how to demonstrate it.
- The batteries in the receiver are either dead or weak.
- The receiver/ear connection is not suitable or incompatible for the user.
- The equipment is of poor quality and could not provide the acceptable standard.
- The ALS was not installed properly or maintenance is required.

Proper maintenance of the system and training of staff are important. Information regarding availability of the system and receivers should be located in a conspicuous location or can be obtained at an information counter or the box office. It is necessary to consider storage space and battery charging facilities for such devices.