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SOLIDERE

بموافقة

وزارة الشؤون الاجتماعية
لجنة الوطنية لشؤون المعوقين

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراستات القطاع العام

ACCESSIBILITY FOR THE DISABLED

A DESIGN MANUAL FOR A BARRIER FREE ENVIRONMENT

PREFACE

This manual has been prepared by The Lebanese Company for the Development and Reconstruction of Beirut Central District (SOLIDERE) in collaboration with the United Nations Economic & Social Commission for Western Asia (ESCWA).

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INTRODUCTION

We are all physically disabled ⁽¹⁾ at some time in our lives. A child, a person with a broken leg, a parent with a pram, an old person, etc. are all disabled in one way or another. Those who remain healthy and able all their lives are few. As far as the built environment is concerned, it is important that it should be barrier free and adapted to fulfill the needs of all people equally. As a matter of fact, the needs of the disabled coincide with the needs of the majority and are comfortable to all people. As such, planning for the majority would imply planning for people with varying abilities and disabilities.

Purpose

This publication is an attempt to provide for the first time in Lebanon a design manual on accessibility for the disabled. It is a design guidebook made for the purpose of providing architects and designers with basic information and data necessary for a barrier free environment. Its intent is to establish standards and recommendations that will influence the development and reconstruction not only of the BCD but on a national level as well. The manual is expected to be a stimulus leading in the long run to the establishment of the National Building and Planning Legislation regarding access for disabled people.

Application

The manual does not cover all disabled requirements in details. It is a straight forward guide expected to be the first of a series of publications with the same theme. Practically most of the recommended

measures within are tested in developed countries. Some measures have proved to be effective while the effect of some is still unknown. To determine the reliability and efficacy of those measures for Lebanon, a practical experience with all provisions has to be conducted. This will be of extreme help in determining the positive and negative aspects of each measure. Practical advice from legal, professional, academic institutions, as well as individuals with disabilities is also of utmost importance in shaping the final form of an Accessibility Code which can be applied on a national level, as an integrated part of the Lebanese building Law.

The BCD - A Case Study

Since the BCD is a pilot project in the reconstruction process of Lebanon, implementing accessibility requirements for the disabled will help in making the BCD a case study or a demonstration project on a national level. This includes the design of the traffic infrastructure, new buildings and renovation of the existing infrastructure and buildings.

Aim

The social aim of such a study is to integrate disabled people into society, in order to take an active part and carry out a normal life like any other member in society. To be active, a disabled person should be able to commute between home, work and other destinations. The technical aim of the manual is the provision of a barrier free environment for the independence, convenience and safety of all people with disabilities.

Target Group

The target group includes the following five major subgroups:

1. Wheelchair users
2. People with limited walking abilities
3. The sightless
4. The partially sighted
5. The totally and the partially hearing impaired

Other subgroups that can benefit to an extent from the same measures as those of the main subgroups include the mentally ill, people with physical fits, people with extreme physical proportions, people with functional disabilities of the arm or hand, etc.

As for the composition and size of the target group, no dependable statistics exist at present defining the extent of disability in the Lebanese society. However, taking into consideration the duration of the war, one can deduce that the disabled form a significant percentage of the population. A good data base on disability in Lebanon is essential for any future development in this field.

Content

The manual deals with the technical considerations and design provisions or measures to be taken into account in the planning of the built environment. This includes issues related to the design of several complementary domains: open spaces and recreational areas, local roads and pathways, the immediate vicinity of the building, the building entrance and the inside of the building.

For the purposes of the manual, all information is divided into five sections:

- I. Urban Design Considerations
- II. Architectural Design Considerations
- III. Building Types
- IV. Emergency and Fire Safety
- V. Implementation Checklists
- IV. Appendices

I. Urban Design Considerations

Deals with the design requirements of open spaces, recreational areas and pedestrian routes. It introduces solutions to problems of main importance in the design of an accessible outdoor environment.

It is subdivided into 7 chapters:

- 1. Obstructions
- 2. Signage
- 3. Street Furniture
- 4. Pathways
- 5. Pedestrian Crossings
- 6. Curb ramps
- 7. Parking

II. Architectural Considerations

Deals with the design requirements of vertical and horizontal accesses in both new and existing constructions.

It is subdivided into 9 chapters:

- 1. Ramps
- 2. Elevators
- 3. Lifts
- 4. Stairs
- 5. Railings and Handrails
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8. Corridors

9. Rest Rooms

III. Building Types

Deals briefly with the accessibility requirements for some selected building types. Special buildings for people with disabilities such as health and residential facilities, schools, etc. are not included within the scope of this section.

To establish building and planning legislation regarding access for disabled people, this section needs to be thoroughly developed by local authorities, based on the size of the target group, a classification of the various building types and study of the specific needs of each district.

IV. Emergency and Fire Safety

Defines briefly the emergency and fire safety requirements in a barrier free access design. These provisions should be developed according to the Fire Code (now under preparation).

V. Implementation Checklists

Can be used by both designers and inspectors to assess and identify physical barriers in the built environment, for both new and existing constructions. The checklist is done on a case by case basis whereby questions and possible solutions addressing almost all problem areas are posed.

VI. Appendices

- 1. Trouble Shooting Reference
- 2. Anthropometrics
- 3. Height of Selected Items
- 4. Comparative Tables

Chapter Organization

Each chapter is composed of 6 parts:

1) Problem Identification

Defining problems encountered by the disabled in the built environment due to absence or bad application of a certain measure or provision.

2) Planning Principle

Defines the target group, the general goal and the need behind providing a certain measure.

3) Design Considerations

Deals with the technical and architectural aspects of implementing a certain measure with regards to general and particular application characteristics, criteria, minimum dimensions and measurements, materials, etc.

4) Existing Constructions

Defines the problems encountered in existing constructions which prohibit the implementation of a certain measure. Accordingly, alternative solutions and modifications are suggested.

5) Notes

Include general remarks and explanations related to the subject. Also points out to the different interrelated measures which have to be combined and integrated in order to have a continuous accessible path of travel.

References

The information provided is based on the accessibility codes and relevant knowledge available in various countries. A comparative

study was conducted between the available sources regarding each measure. The information was later synthesized and organized in a new simple manner adapted to the needs and requirements of the target group.

(See list of references at the end of the book).

Dimensional Data

Dimensional data is given in the metric units. On the graphic illustrations only the minimum allowable dimensions are given. Where mentioned the maximum, the approximate or an allowable range is given.

Notes

⁽¹⁾ It should be noted that a handicap is not a synonym for disability. A disability refers to a physical, sensory or mental limitation that interfere with a person's ability to move, see, hear or learn. Whereas, a handicap refers to a condition or barrier imposed by the environment, society or one's self. As such, physical obstructions of the built environment constitute a handicap to a disabled person; for example a stair is a handicap to a wheelchair user. On the other hand, feeling different and inferior to other people constitute a handicap imposed by society.

URBAN DESIGN CONSIDERATIONS

OBSTRUCTIONS

Problem Identification

- Obstacles and protruding elements within the path of travel.
- Low overhanging signs.
- Lack of warning markings around obstructions

Planning Principle

- To design a barrier free path for the safety and independence of disabled people especially the sightless.

Design Considerations

General

- Obstructions include street furniture, traffic signs, direction signs, street plans, bollards, plantation, shops' awning and advertizing signs, etc.

- Obstructions should be placed outside the path of travel wherever possible.

- Obstructions within the pathway should be easy to detect, and if possible, should be placed along one continuous line.

- Protruding parts should be avoided

- The minimum clear unobstructed path width should be no less than 0.90 m.

Obstructions within the Pathway Surface

- Obstructions within the pathway surface should have either of the following design features so as to be detected by the cane of a sightless person:

(a) Straight shape rising up from the pathway surface. (fig. 1)

(b) A 0.10 m raised platform. (fig. 2)

(c) Tactile warning markings all around the obstruction. The warning marking should protrude over a width of at least 0.60 m outside the projected area below the base of the obstacle. (fig. 3)

Overhanging Obstructions

-Overhanging signs in accessible pathways should have a minimum clear height of 2.00m to allow a sightless person to pass safely. (fig. 4)

-Overhanging vegetation should be clipped or have a minimum clear height of 2.00 m. (fig. 5)

-Undetectable obstacles mounted lower than 2.00 m, are allowed to project a maximum distance of 0.10 m into the pathway, otherwise should be recessed or covered. (fig. 6)

Fixed Poles

-Fixed poles should be provided with contrasting durable colour marking strips of at least 0.30 m length, placed with the center line at a height between 1.40 m -1.60 m, to warn pedestrians with limited vision. (fig. 7)

Spaces below Ramps and Stairs

-Spaces below ramps and stairs should be blocked out completely by protective rails or raised curbs or be marked with a tactile surface. (fig. 8)

Garbage bins

-Garbage bins attached to lampposts should not face the line of pedestrian flow to minimize collisions and should be painted with a contrasting colour to be identified by people with limited vision. (fig. 7)

Bicycle Stands

-Bicycle stands should be located on a raised platform.

Wires

-Stabilizing wires and wires netting should be painted with a contrasting colour or be blocked out.

Bollards⁽¹⁾ (fig. 9)

-Bollards should be painted with a contrasting colour or stripped colour markings

-The distance between guiding posts should be around 1.20 m.

Road Works

-Excavations and road works form temporary obstructions within the route of travel, thus should be protected by easily detected continuous barriers or scaffolding, fences, for safety reasons.

-Barriers should be identified by stripped colour markings and should be lit at night, to guide the sightless.

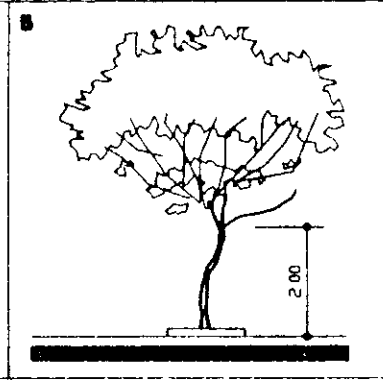
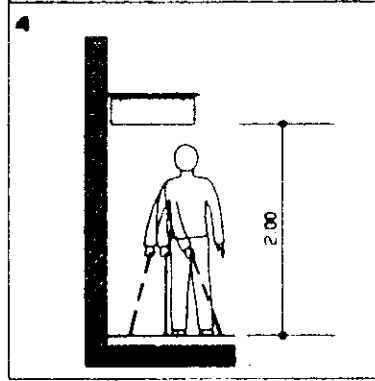
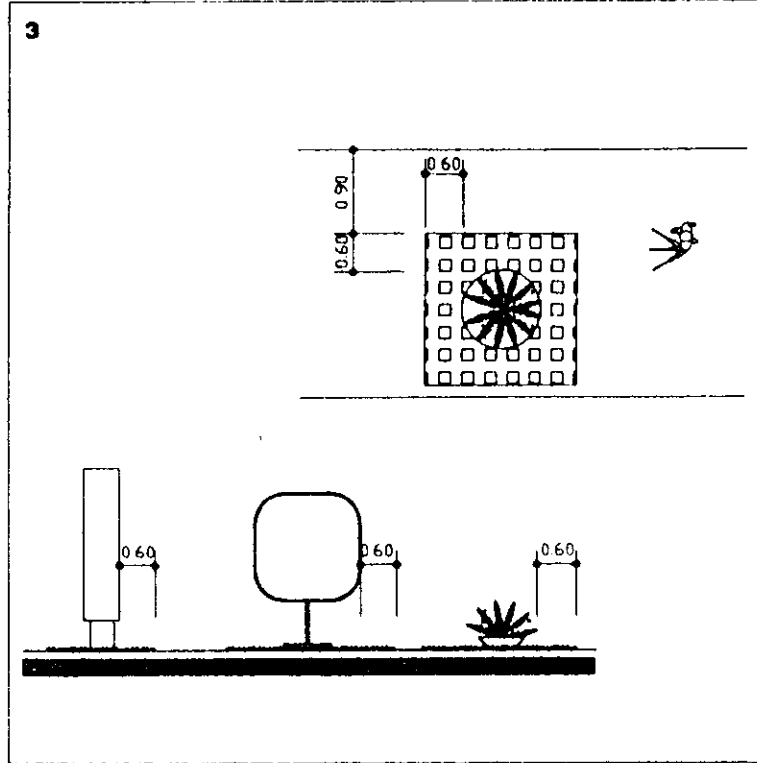
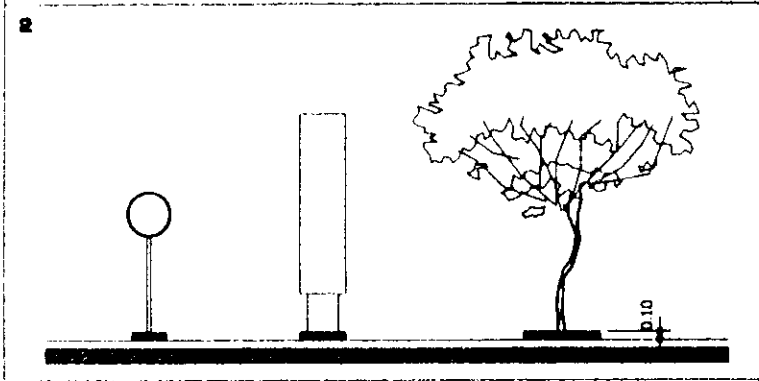
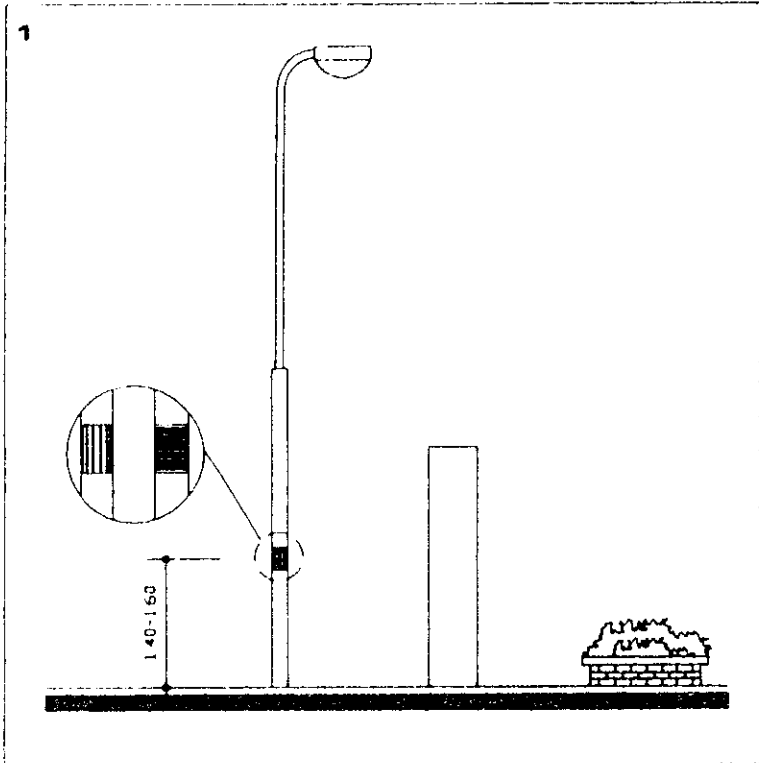
-The barrier height should be between 0.75 m - 0.95 m. The distance between the bottom of the barrier and the pathway surface should not exceed 0.10 m.

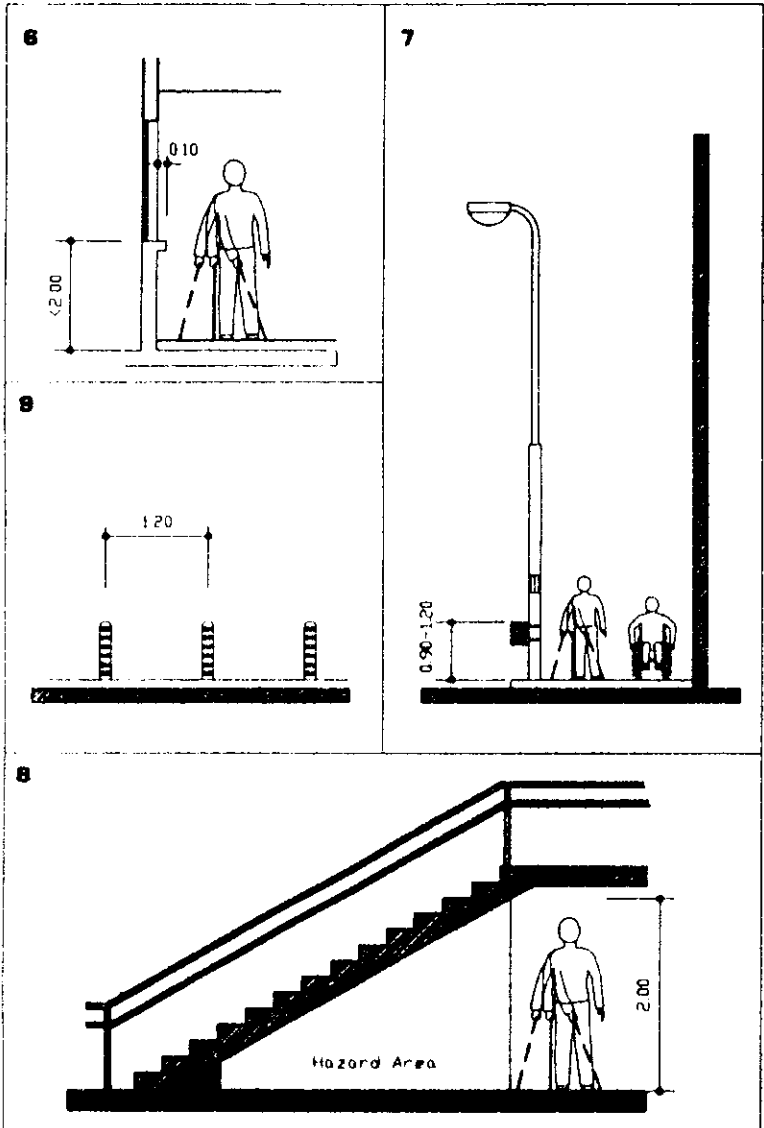
Existing Constructions

-Existing obstructions within the path of travel should be redesign in conformance with all the above requirements

Notes

(1) Bollards or guard posts are placed to keep out undesired motor traffic from pedestrian areas or to indicate a non parking area.





SIGNAGE

Problem Identification

- Orientation difficulties resulting from illegible and/or lack of directional signs, street names and numbering.
- Pedestrian accidents due to badly positioned signs.
- Hazards due to lack of warning and traffic signals.
- Non identification of access routes and accessible facilities.

Planning Principle

- To facilitate orientation mainly for the disabled, the sightless and the mentally ill.

Design Considerations

General

- Signage includes direction signs, signs of locality, street names and numbering, information signs, etc.

- All types of signs should be visible, clear, simple, easily read, understood and properly lit at night.

- In general, signs should not be placed behind glass because of possible reflection.

- Signage placed within the pedestrian path of travel are considered as obstructions, thus should be detectable. (see Obstructions)

International Symbol of Accessibility

- Accessible spaces and facilities should be identified by the international symbol of access. (fig. 1)

- The symbol is composed of a wheelchair figure and either a square background or a square border. (fig. 2)

- Contrasting colours are used to differentiate the figure from the background. The commonly employed colours are white for the figure and blue for the background.

- The wheelchair figure should always face right.

- For completely accessible buildings, it is enough to have one explanatory sign at the entrance.

Direction Signs

- Graphic or written directions should be used to indicate clearly the type and location of the available facility. (fig. 3)

- Directional indications should not be placed excessively, but only at main entrances and doors and at changes in direction or level.

Street Names

- Fixed signs bearing street names should be placed at a maximum height of 2.50m. (fig. 4)

House Numbers

- Fixed signs bearing house numbers should be placed at a maximum height of 2.00 m. (fig. 4)

Maps and Information Panels

- Maps and information panels at building entrances or along roads and public buildings, should be placed at a height between 0.90 m - 1.80 m. (fig. 5)

Fixation

- Signs can be wall mounted, suspended or pole mounted.

(a) Wall Mounted Signs:

- Wall mounted signs such as room numbers should be placed with the center line at a height between 1.40 m - 1.60 m from finished floor level.

- Colour of the wall should be light and non reflective.

(b) Overhanging Signs:

- Should allow a minimum clearance of 2.00 m (see Obstructions).

(c) Pole Mounted Signs:

- (see Obstructions)

Shape of the Signboard

- Information signboards should be rectangular.

- Warning signboards should be triangular.

- Prohibition signboards should be circular.

Colour

- Colour of signs should be contrasting to the surrounding surface to be clearly distinguishable.

- The commonly used colours are: white, black, yellow, red, blue and green.

- The colour combination red/green and yellow/blue should not be used to avoid confusing colour blind persons.

Surface

-The sign surface should be processed so as to prevent glare.

-Engraved texts should be avoided unless coloured. Relief prints are advisable.

-Key plans, orientation signs and push buttons in lifts ought to have a text in Braille or to be in relief ⁽¹⁾

Lettering

-The size of letters should be in proportion to the reading distance.(fig. 6)

-Character width to height ratio should be between 3:5 - 1:1 and the character stroke width to height ratio should be between 1:5 - 1:10. (fig. 7)

-The letters and signs should preferably be raised from the background, at least 1 mm, to enable sightless people to read the information using the tips of their fingers.

-The smallest letter type should not be less than 15 mm.

-Normal spacing between words and letters should be used.

Existing Constructions

-Add the international symbol of accessibility to mark accessible spaces and facilities.

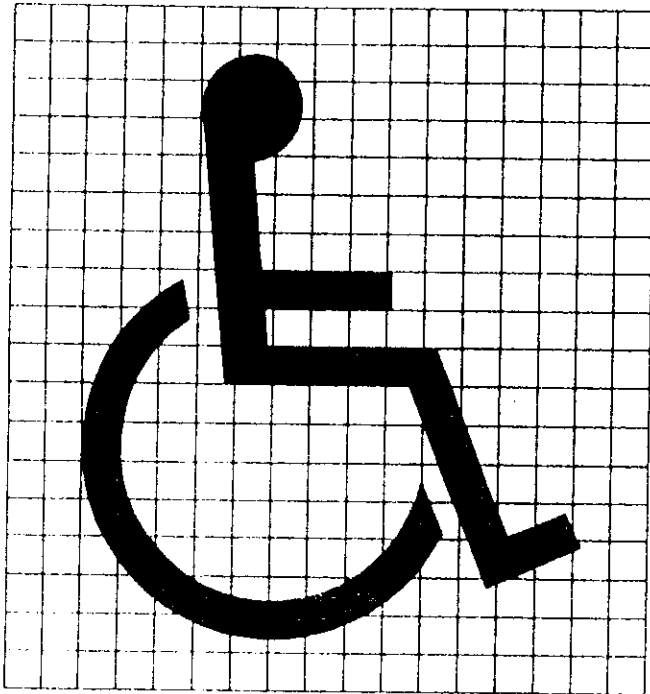
-Add directional signs to clearly indicate the location and function of accessible spaces and facilities.

-Existing signs that do not comply with the above design requirements should be modified or replaced.

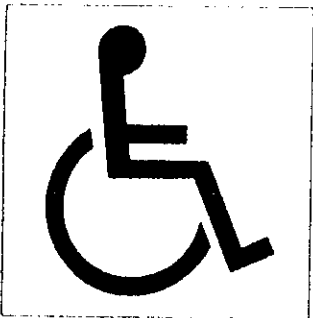
Notes

⁽¹⁾Not all sightless persons are familiar with Braille.

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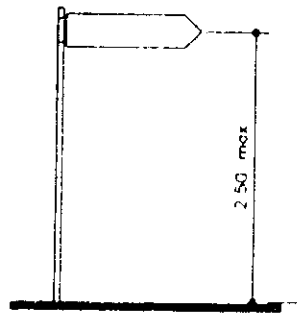


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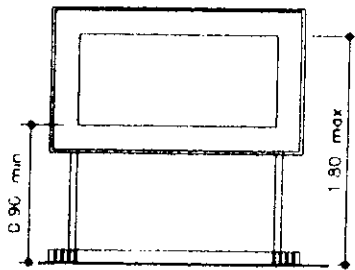
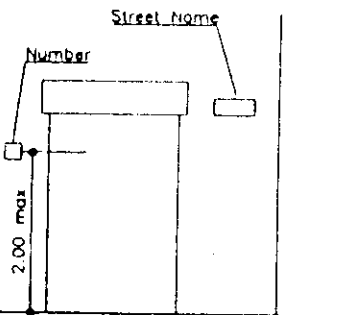
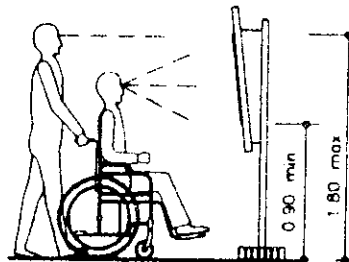


TELEPHONE

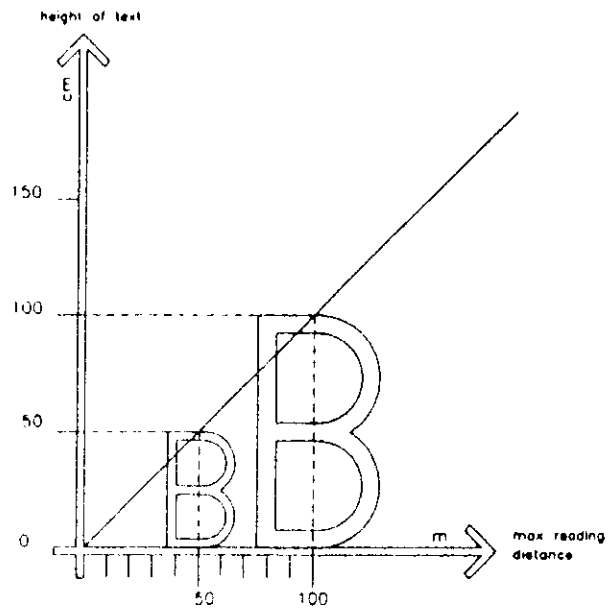
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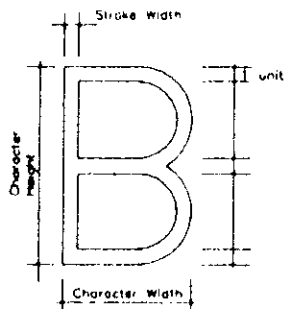
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STREET FURNITURE

Problem Identification

- Lack of and /or improper design of street furniture.
- Obstructed pathway.
- Inaccessible street facilities.

Planning Principle

- To design accessible amenities convenient to all people, without obstructing the free passage of pedestrians along travel routes.

Design Considerations

General

- Street furniture includes bus stops, benches, letter boxes, lampposts, signboards, telephone cubicles, public toilets, newspaper kiosks, planting tubs, garbage bins, etc.

Location⁽¹⁾

- Street furniture should be located so as to allow for the free passage of all people without creating hazards.

- Textural changes in the footpath surface are helpful to the sightless people to identify the location of public amenities. (see Obstructions)

Resting Facilities

- Level rest areas with seats are helpful for all pedestrians especially for those with mobility problems.

- Resting facilities should be placed off the pathway in public parks, recreational places, cross pathways, in front of accessible entrances and exits and wherever needed.

- Resting facilities should be provided at regular intervals between 100.00 m - 200.00 m⁽²⁾. (fig. 1)

- Some sitting accommodations should be placed close to public toilets, telephones, etc.

- Resting spaces with benches should allow a minimum of 1.20 m adjoining space for a wheelchair. (fig. 2)

- Public seats and benches should approximately be 0.45 m above floor level, and with backrests at approximately 0.70 m above floor level. (fig. 3)

- The height of the table should be between 0.75 m - 0.90 m and the minimum depth under the table should be 0.60 m, so to be possible to push a wheelchair under all sides. (fig. 4)

Public Telephone Booths⁽³⁾

- Per bank of public telephone, one telephone should be accessible to a wheelchair user and one to a person with hearing impairment.

- Telephones of the hearing impaired should be equipped with hearing aid devices and amplifiers. The location of telecommunication devices should be indicated by signage.

- The telephone numbering system should be push buttons expressed in relief, for the convenience of sightless users. Dial numbering system is not recommended unless the dial tension is reduced to require less force to rotate the dial.

- A folding seat should be provided in accessible telephone booths for the convenience of people with mobility problems.

- The minimum unobstructed area in front of the telephone counter should be 1.20 m x 0.85 m allowing either a parallel or a frontal approach. (fig. 5)

- The coin slot should be mounted at a comfortable height between 0.90 m - 1.20 m.

- The telephone cord length should at least be 0.75 m.

- Accessible public telephones should be marked by the signage.

Letter boxes

- The letter box slot should be mounted at a comfortable height between 0.90 m - 1.20 m. (fig. 6)

Water Fountains (fig. 7)

- Drinking fountains spouts should be located at an approximate height of 0.90 m.

- Drinking fountains can have two spouts located at different heights, one convenient for wheelchair users approximately at 0.85 m, and one approximately at 0.95 m for non disabled people.

Signs (see Signage - Pedestrian Crossings)

Garbage Bins (see Obstructions)

Public Toilets (see Rest rooms)

Ticket Vending Machines (see Height of Selected Items)

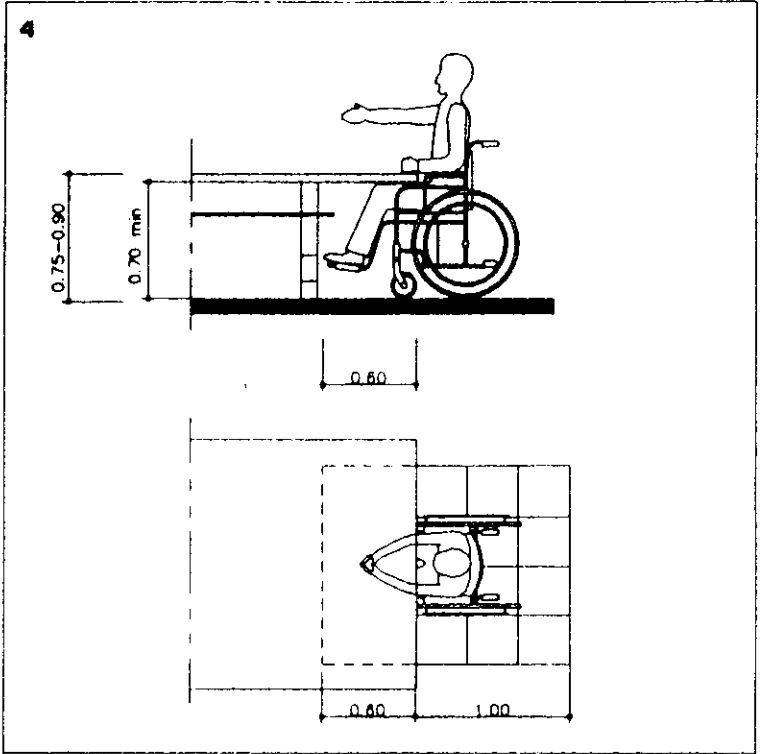
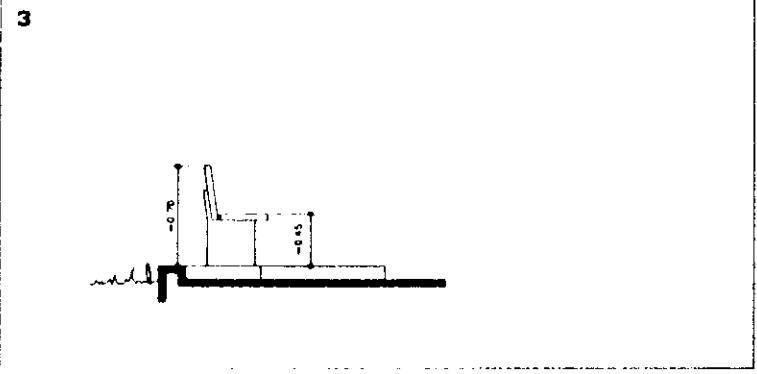
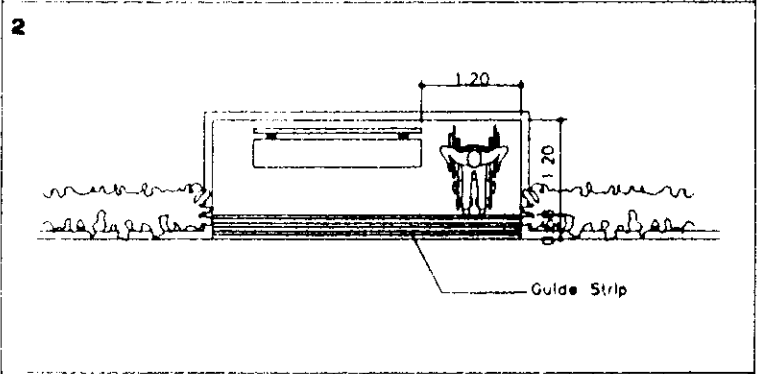
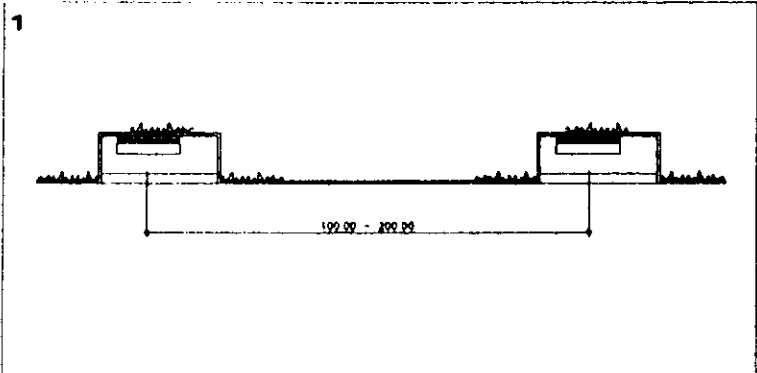
Existing Constructions

-Existing resting facilities should be re arranged where possible so as to allow an adjoining space for a wheelchair.

-Facilities mounted at a maximum height of 1.40 m are accepted. Facilities located at a higher level should be modified.

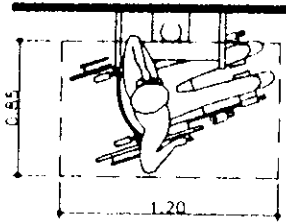
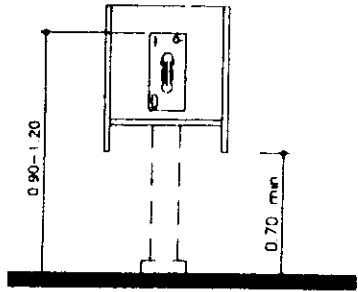
Notes

- (1) Landscape strips act as a buffer zone between pedestrian and vehicular zones, street furniture can be located within.
- (2) It might be beneficial to locate rest areas at more frequent intervals on long gradients.
- (3) Public telephones requirements also include those in hotels, information and other services.

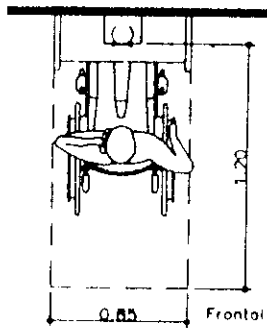


المعهد الوطني للتكنولوجيا
 مكتبة الأزياء الدولية
 مركز دراسات ودراسات أبحاث العالم

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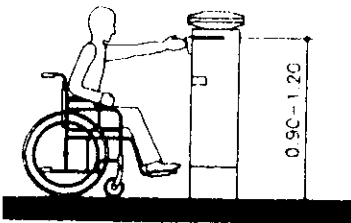


Parallel Approach

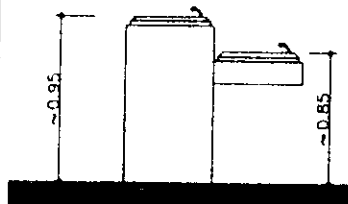


Frontal Approach

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7



PATHWAYS

Problem Identification

- Uneven curbs with obstacles and holes.
- Inconvenient and dangerous interruptions in the path of travel.
- Insufficient width.
- Changes in level.

Planning Principle

- To provide clear, obstruction free, level and wide pathways for the convenience of all users, especially the sightless and people with mobility problems.

Design Considerations

General

- Street pavements, pedestrian passages within open spaces and recreational areas, pedestrian under passes and overpasses are considered as pathways or ramps.

- Pedestrian routes within recreational areas and open spaces could be broken regularly by detectable obstructions such as plants and/or by changing the alignment so as to discourage bicycles. (see Obstructions)

Guide Strips

- The path of travel should be easy to detect by a sightless person using a long white cane. Natural guide lines⁽¹⁾ and guide strips are used to help identify travel routes.

- A guiding strip is a guiding line of artificial means constructed in or on the road surface at the following locations, to facilitate orientation for sightless pedestrians:

- (a) To replace missing natural guide lines or to fill long gaps, more than 10.00 m, in a guide line. (fig. 1)

- (b) To guide to pedestrian crossings. (fig. 2) (see Curb Ramps - Pedestrian Crossings)

- Guide strips should be laid in a simple and logical manner, and should not be located close to manholes or drains to avoid confusing sightless people.

- Guide strips are recommended to have a colour which contrasts with the surrounding surface for the benefit of people with sight problems.

- The guide strip ridge profile should be parallel to the main direction of movement, and should be flush with the top layer of the adjacent road surface so not to hinder people with mobility problems.

- At direction change of travel routes, it is recommended to have a gradual change in the direction of the guiding strip. (fig. 3)

Tactile Marking

- Tactile tiling within the pedestrian route of travel should be placed at the following locations:

- (a) In a guide strip where alternative routes exist or at a junction of guide strips. (fig. 4)

- (b) At pedestrian crossings (see Curb Ramps - Pedestrian Crossings).

- (c) Around obstruction difficult for the sightless to detect (see Obstructions).

- A tactile guiding area preferably of rubber tiles⁽²⁾ with minimum dimensions of 0.90 m x 0.90 m, should be constructed in a guide strip at cross pathways where a choice between several routes is to be made. (fig. 4)

Curbs

- The height of a curb should be between 0.07 m - 0.15m.

- Stepped curbs should be avoided, as they are hazardous to all pedestrians especially in darkness.

Curb Ramps

- Curbs should not obstruct the free passage of physically disabled people, mainly wheelchair users (see Curb Ramps).

Width (fig. 5)

- The minimum width of an unobstructed pathway should be 0.90 m.

- The minimum width of a two-way wheelchair traffic passage is 1.50 m. The preferable width is 1.80 m.

Slope

- The slope of an accessible path should not exceed 1:20. Pathways with a slope more than 1:20 should be designed as ramps. (see Ramps)

- The slope across a path should not exceed 1:50.

Surface

- The surface of an accessible pathway should be smooth, continuous, non-slip and even.

-Level and even pathways with the adjacent surfaces, should be given a different textured and coloured finish for differentiation.

-Intersecting pathways should blend into one common level.

Gratings (fig. 6)

-Grating can be hazardous to wheelchair users, cane and crutches users, parents with prams and women with high heels.

-Manholes, drains and gratings should generally be placed outside the pedestrian pathway.

-Gratings should be flush with the pathway surface and should have narrow patterns, not more than 13 mm.

-Elongated grating openings should be perpendicular to the pedestrian travel path.

Guards

-For changes in level more than 13 mm between the pathway and the surrounding surface, guards, up stands or other types of barriers should be used.

-Guards with a minimum height of 0.15 m should be used to separate pathways from planting areas, pools and landscape features. (fig. 7)

-The edges of the pathway should be beveled when changes in level between 6 mm - 13 mm exist between the pathway and the surrounding area. (fig. 8)

Landscaping

-Plants' varieties and locations within the travel route should be chosen with caution.

-Thorny and poisonous plants should not be used immediately adjacent to pedestrian paths.

-Plants that drop seeds and leaves that create hazard under the foot should be avoided.

-Trees with shallow roots should be avoided as they will heave or breakup the pathway surface.

Obstacles and Signs

(see Obstructions)

Existing Constructions

-Textured rubber stuck-on tiles can be applied to existing paving to avoid slipping and to warn sightless people.

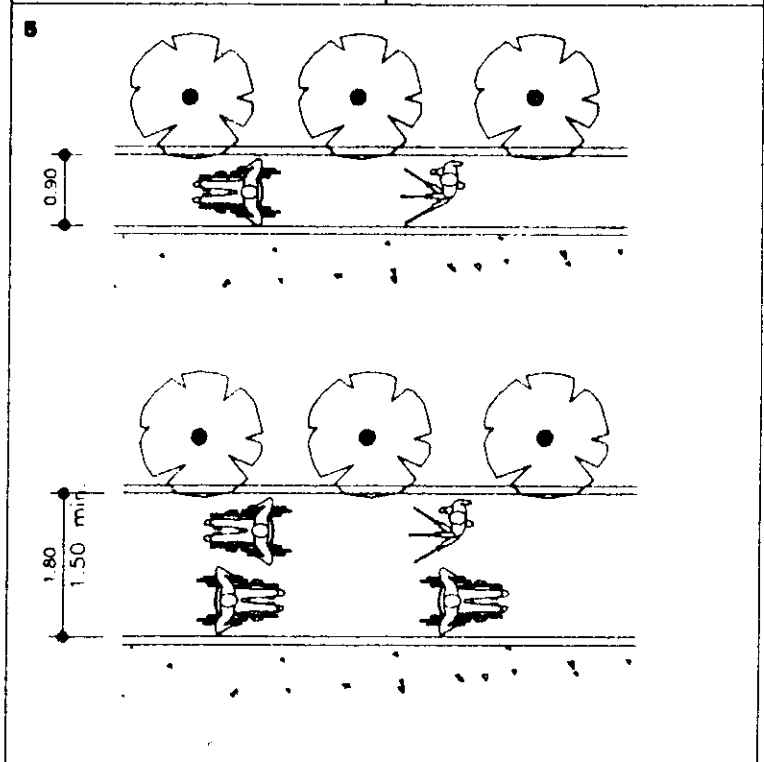
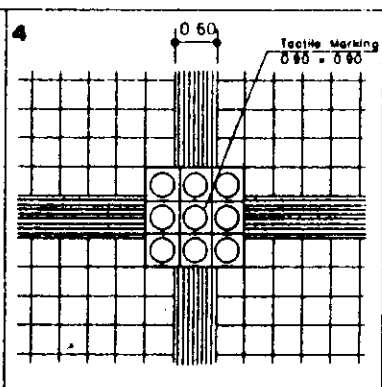
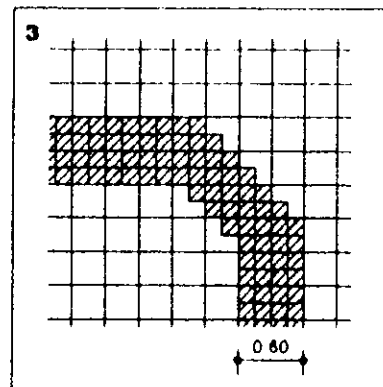
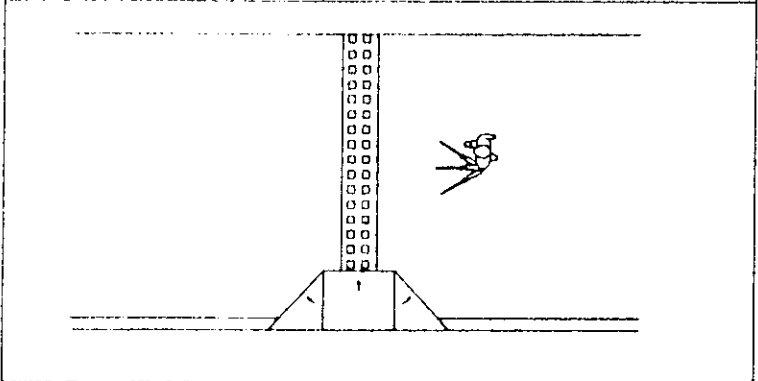
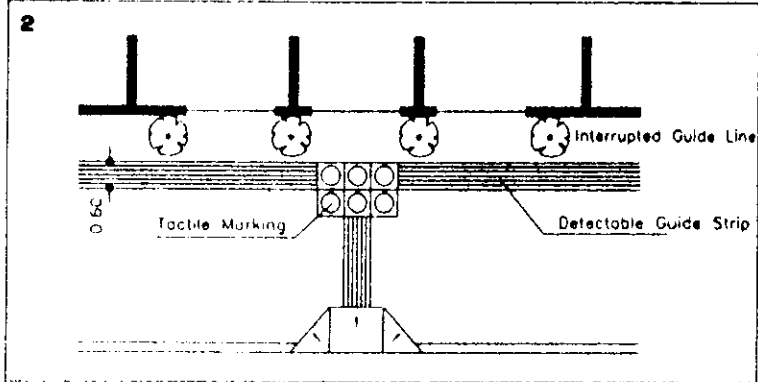
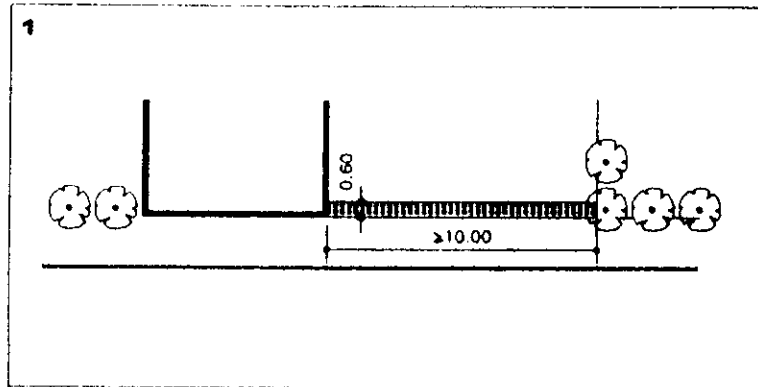
-Existing curbs that obstruct the pedestrian flow should be ramped (see Curb Ramps).

-Existing pathways with steps, stairs or steep slope need not be modified if an alternative accessible route exists.

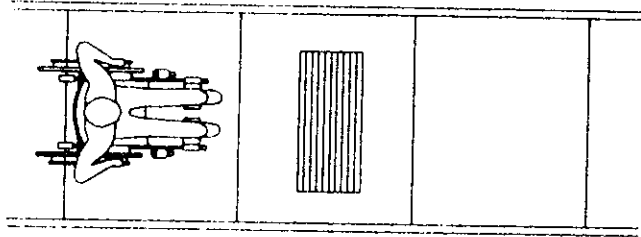
Notes

⁽¹⁾ A guiding line is a straight continuous line of detectable natural objects and defined edges (i.e. building frontages, grass verges, raised platforms, continuous railing, curbs, guards, low barriers, etc.).

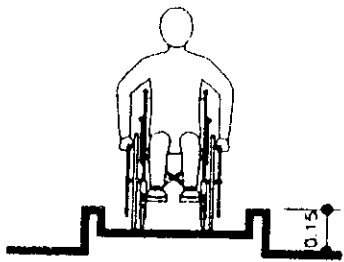
⁽²⁾ The acoustic effect of the rubber tiles as compared to the surrounding surface will provide both a tactile and audible warning of the changing direction.



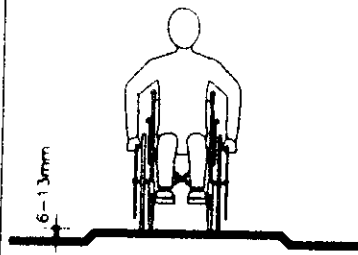
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CURB RAMPS

Problem Identification

-Lack or improper design of level transition between the curb and the street at pedestrian crossings and close to buildings' entrances.

Planning Principle

-To overcome changes in level between the pavement and the road surface and within the pavement.

Design Considerations

General

-Curb ramps are used whenever a difference in level exists in pedestrian paths or cross paths.

-To avoid confusing sightless pedestrians, curb ramps should be positioned out of the usual line of pedestrian flow. The unobstructed width of the pathway should be no less than 0.90 m. (see Pathways).

-Curb ramps should be located away from places where water accumulates.

Types

(a) Standard curb ramps:

Cut back into the pavement with flared sides providing transition in three directions. (fig. 1)

(b) Returned curb ramps:

Providing slope in one direction. This could be a dangerous measure if the sides are not protected.⁽¹⁾(fig. 2)

(c) Built up curb ramps.⁽²⁾

Usually with flared edges. (fig. 3)

Application

-At each quadrant of each street intersection. (fig. 4)

-At each pedestrian crossing, on the opposite sides of the street. (fig. 4)

-At drop-off zones, close to buildings' entrances. (fig. 5)

-Between accessible parking areas and pathways. (fig. 6)

Curb Ramps at Intersections

-At intersections curb ramps design can be either of the following:

(a) Direct or primarily located to the path of travel. (fig. 1)

(b) Diagonally located across the corner⁽³⁾. (fig. 7)

(c) Continuously wrapped around the corner. (fig. 8)

Narrow Pavements

-For narrow pavements, where the construction of curb ramps will affect the width of the travel route, the whole pavement should be dropped down, at a maximum slope of 1:12, to provide the necessary level transition. (fig. 9)

-For narrow pavements dropped at the corner, the tactile tiling indicating the location of the pedestrian crossing should be constructed as drawn. (fig. 10)

Width

-The minimum width is 0.90 m, without the sloping sides. The recommended width is 1.20 m⁽⁴⁾. (fig. 11)

Slope

-The maximum slope of a curb ramp should be 1:12.

-The maximum slope of the flares should be 1:12.

-Level transfer is recommended between the curb ramp and the surface of a pathway. A lip not exceeding 15 mm can be used. (fig. 11)

Guide Strips

-A guide strip with a contrasting colour should be constructed to guide sightless and impaired vision pedestrians to the location of the curb ramp. (fig. 4)
(see Pathways - Pedestrian Crossings).

Surface and Colour

-Curb ramps including flares should have a rough texture or ground pattern to make it detectable and slip resistant.

-The surface colour should be contrasting and distinct from the surrounding surfaces, to guide pedestrians with limited vision.

Existing Constructions

-The maximum allowed slope for a curb ramp constructed along existing high pavements should not be more than 1:10. The maximum slope of the flares should be 1:10 as well.

-If existing curb ramps do not comply with the above mentioned requirements, they should be modified.

-For existing narrow pavements more than 0.15 m high, where the construction of curb ramps obstruct the free passage of pedestrians:

(a)The pavement can be dropped to the road level to obtain the required level transition between the pavement and the road surface. (fig. 9) (fig.10)

(b)Built up curb ramps can be constructed, if they do not obstruct the required width of the road.

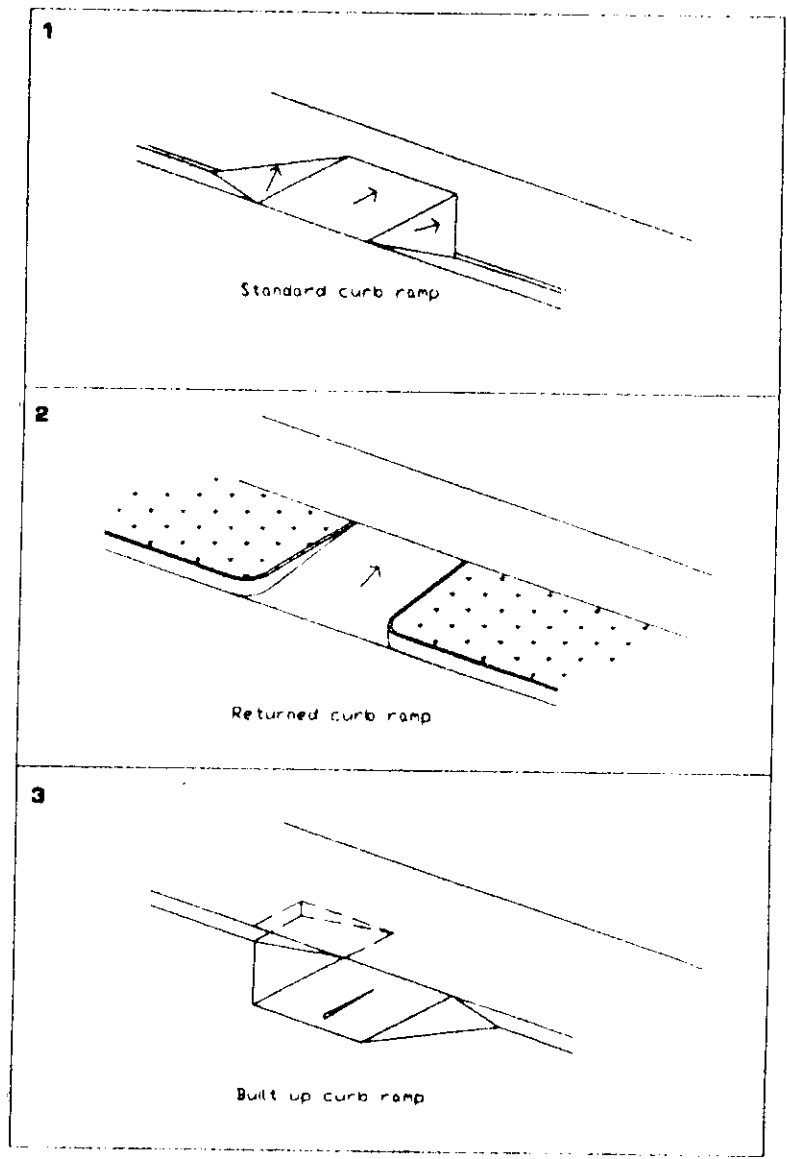
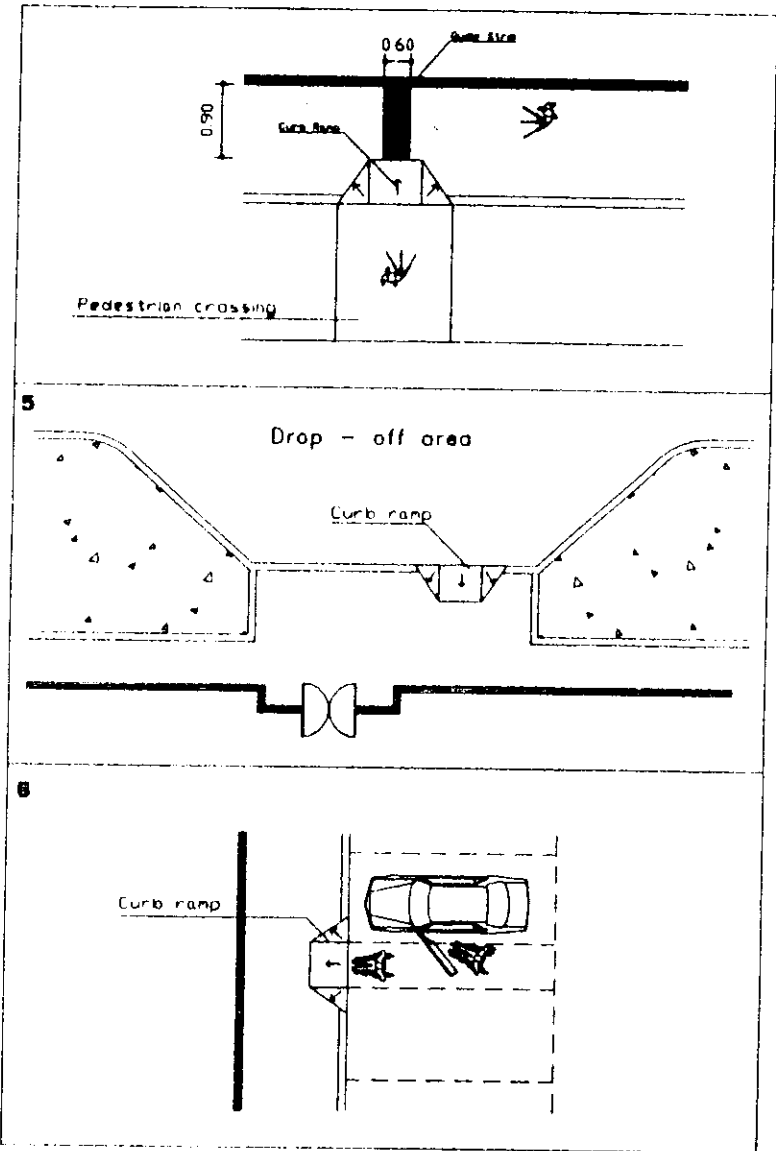
Notes

⁽¹⁾ Returned curb ramps are not accepted measures in some countries (Boston).

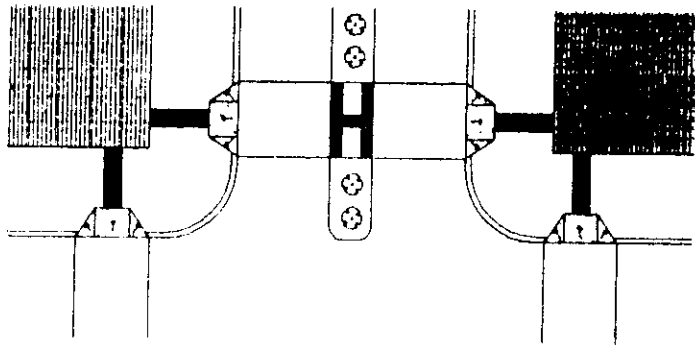
⁽²⁾ In some countries, built -up curb ramps are accepted only as remedial measures to overcome existing barriers, but not on public streets and pathways (Canada).

⁽³⁾ Corner curb ramps could be dangerous to wheelchair users, if the pedestrian crossing is not wide enough.

⁽⁴⁾ The curb ramp construction at pedestrian crossings does not need to cover the whole width of the crossing.

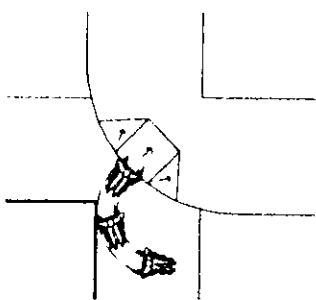


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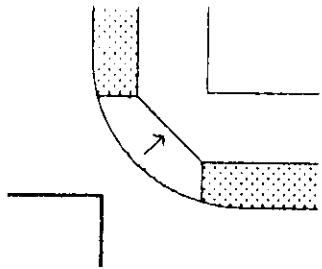
Direct to the path of travel

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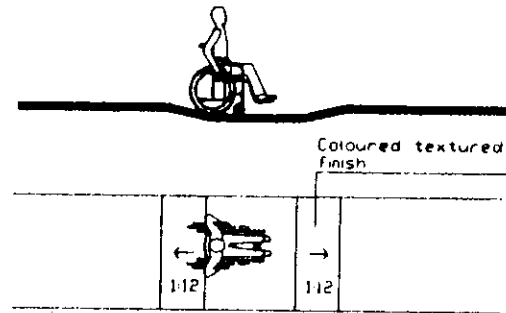
Diagonally located across the corner

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Continuously wrapped around the corner

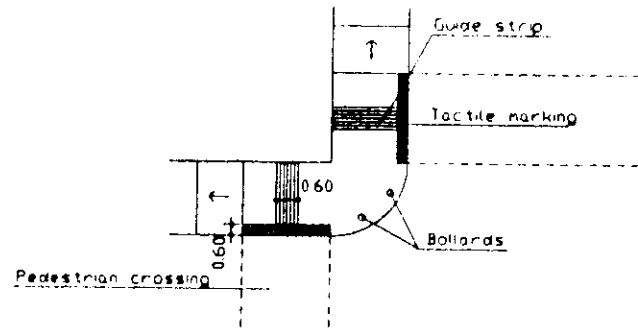
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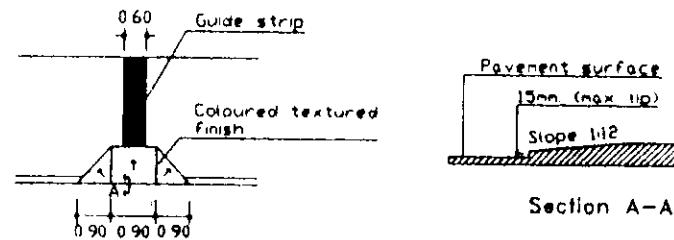
Coloured textured finish

Narrow pavement

10



11



Section A-A

PEDESTRIAN CROSSINGS

Problem Identification

- Uneven road surface.
- Lack of guide strips.
- Lack of warning marking for crossings.
- Grating in the road surface.

Planning Principle

- To facilitate the safe and independent crossing of disabled people.

Design Considerations

General

- Pedestrian crossings should be equipped by traffic control signals.

-Low traffic crossings frequently crossed by disabled people can be controlled by a pedestrian push button system.

-Reducing the length of the crossing by constructing traffic islands is a desirable measure to improve the safety of all road users.

Guide Strips (fig. 1)

-Guide strips should be constructed to indicate the position of pedestrian crossings for the benefit of the sightless pedestrians. (see Pathways - Curb Ramps)

-A guide strip should lead to pedestrian light poles with push buttons for the benefit of the visually disabled.

Traffic Signals

-Pedestrian traffic lights should be provided with clearly audible signals for the benefit of the sightless pedestrians.

-Acoustic devices⁽¹⁾ should be installed on a pole at the point of origin of crossing and not at the point of destination.

-The installation of two adjacent acoustic devices such as beepers is not recommended in order to avoid disorientation.

-The time interval allowed for crossing should be proportioned to the slowest crossing persons.

Push Buttons

-Push buttons should be easy to locate and operate and at height between 0.90 m -1.20 m for the benefit of a wheelchair user.

Traffic Islands

-The traffic island depth should not be less than 1.50 m.

-The width of a traffic island should not be less than 1.50 m to allow for mutual wheelchair passing possibilities.

-A coloured tactile marking strip of at least 0.60 m width should mark the beginning and the end of traffic islands, to guide sightless and impaired vision pedestrians to its location.

Road Hump⁽²⁾

-The road surface at pedestrian crossings can be raised to the same level as the pathway so that wheelchair users do not have to overcome differences in height.

Surface

-The road surface should be firm, well-drained, non-slip and jointless.

Drains and Gratings

(see Pathways)

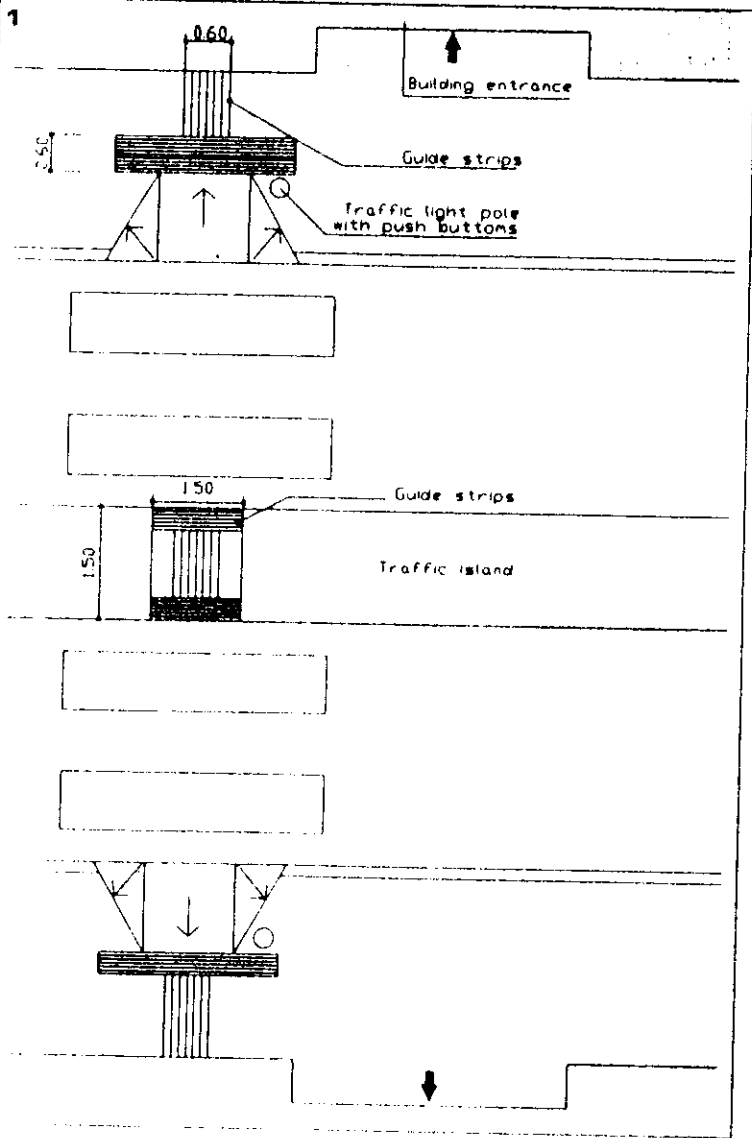
Existing Constructions

Notes

⁽¹⁾ Experience shows that acoustical signals encourage safer crossing behavior among children as well.

⁽²⁾ Road Hump is also helpful in reducing the traffic speed approaching the intersection.

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PARKING

Problem Identification

- Poor parking facilities.
- Insufficient width of the parking aisle.
- Non allocation of parking space for the disabled.

Planning Principle

- To provide accessible parking facilities as close as possible to the point of destination.

Design Considerations

General

- Accessible parking provisions apply to both outdoor and underground situations.

- For multistory indoor parking, at least one level should be served by an accessible elevator.

Number

- The number of disabled persons parking space should be provided at the rate of 1:50, but not less than one space per parking lot.

Location

- For outdoor parking, accessible parking spaces should be located at a distance not exceeding 50 m from accessible building entrance.

- For indoor parking, accessible parking spaces should be located directly next to accessible elevators, or as close as possible to exits.

- Ends of rows are preferable for wheelchair users vans with lifts.

Dimensions

- The minimum width of an accessible parking space is 3.60 m. The recommended width space is 3.90 m. (fig. 1)

- An access aisle of 1.20 m, can be shared between two ordinary parking spaces. (fig. 2)

- For indoor parking, the minimum height clearance for disabled persons vans with hydraulic lifts is 2.40 m.

- For space efficiency, the remaining space at row ends in angled parking spaces can be used for disabled persons parking aisles. (fig. 3)

Parking Curb

- If a curb exists, curb ramps should be provided to link accessible parking spaces to accessible pathways (fig. 2)

- If no curb exists, provide a minimum of 0.60 m wide textured surface to segregate the pathway from the vehicular area or use bollards (see Street Furniture). Pre-cast car stops can also be used to delineate a passage of a minimum 0.90 m width. (fig. 4) (fig. 5)

Curbside Parking

- Curbside parking is very dangerous for disabled people unless designed as accessible drop-off-area.

Drop-off Areas (fig. 6)

- Drop-off areas are beneficial for the picking up and dropping off of people with physical limitations, parents with children, people carrying loads, etc.

- Drop-off zones should be provided at public transport stops such as bus stops and at a distance not exceeding 30.00 m from accessible building entrances.

- The drop-off area should be at least 3.60 m wide, providing a 1.20m aisle for maneuvering. The length should accommodate at least two cars.

- Appropriate curb ramps should be provided to facilitate circulation over paved surfaces.

- When no curb exists to mark the separation between pedestrian and vehicles zones, the installation of a cue is necessary to guide sightless passengers:

- (a) Bollards may be used. (see Street Furniture)

- (b) A minimum 0.60 m wide tactile marking strip can be constructed at the edge of the pathway to warn of transition to a vehicular area.

- A protected shelter or canopy with seating facilities is a desirable design feature at passengers loading zones.

- Signage should be provided to clarify the identity of a drop-off zone and prevent its misuse as a parking space.

Surface

- The floor surface should be uniform and smooth.

- The slope of a parking ramp should not exceed 1:20.

Signage (fig. 7)

-Accessible parking areas should be signposted.⁽¹⁾

Existing Constructions

-If the parking is more than 50.00 m away from the building entrance, provide a vehicular drop-off area within 30.00 m distance from the entrance or construct an accessible parking space close to the entrance.

-If no accessible parking space is available, one of the following measures should be implemented:

(a) An existing parking space can be enlarged.

(b) Two existing parking spaces can be combined to make one accessible aisle (fig. 8)

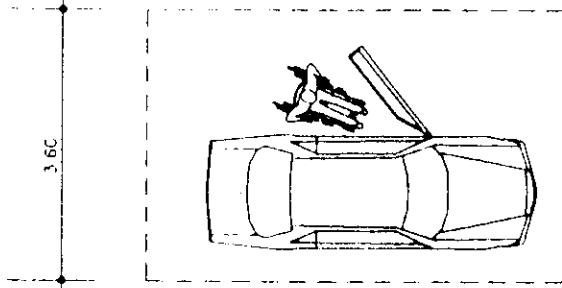
(c) Three existing parking spaces can be combined to make two accessible parking aisles. (fig. 9)

-For indoor parking spaces with a clear height less than 2.40 m, provide alternate outdoor provisions for disabled people vans.

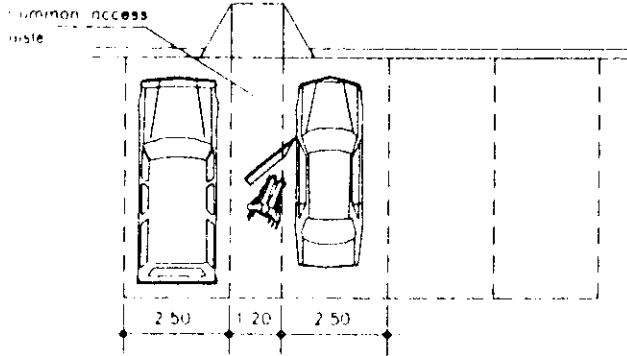
Notes

⁽¹⁾ As enforcement procedures a high fine can be imposed on non disabled drivers who park in a designated disabled parking space.

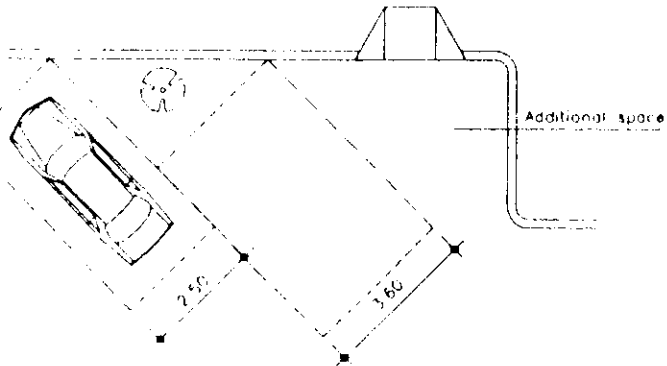
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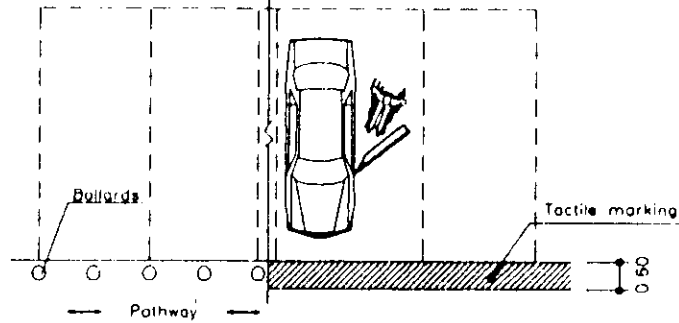
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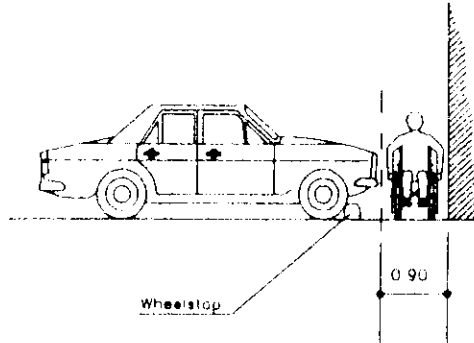
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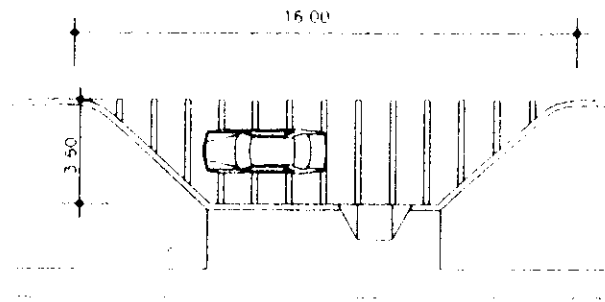
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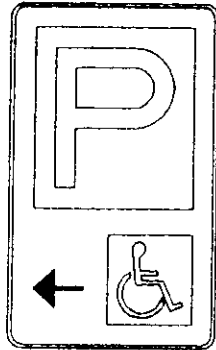
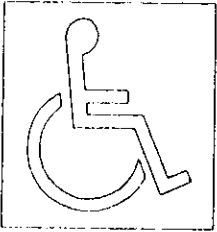
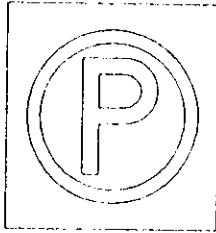
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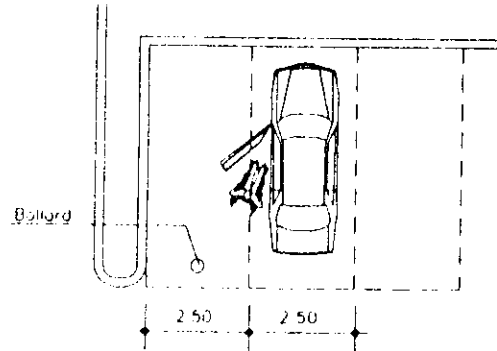
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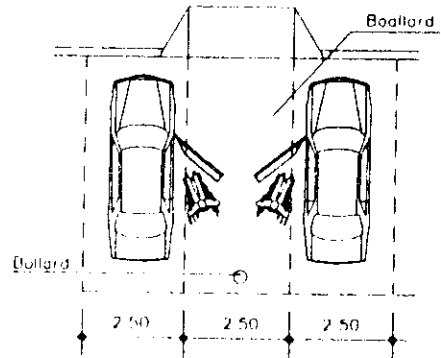
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9



ARCHITECTURAL CONSIDERATIONS

RAMPS

Problem Identification

- Inaccessible building entrances due to difference between indoor and outdoor levels.
- Inaccessible routes due to differences in level.
- Lack or improper design of ramps: very steep and long ramps with no resting landings.

Planning Principle

- To provide ramps wherever stairs obstruct the free passage of pedestrians mainly wheelchair users and people with mobility problems.

Design Considerations

General

- An exterior location is preferred for ramps. Indoor ramps are not recommended because they take so much space.

- The entrance to a ramp is preferably immediately adjacent to the stairs.

Ramp Configuration⁽¹⁾

Ramps can have either of the following configurations:

- (a) Straight run. (fig. 1)
- (b) 90° turn. (fig. 2)
- (c) Switch back or 180° turn. (fig. 3)

Width

- Width varies according to use, configuration and slope.

- The minimum width should be 0.90m.

Slope

The maximum recommended slope along ramps is 1:20. Steeper slopes are allowed in special cases depending on the length to be covered: (fig. 4)

Max. slope	Max. Ramp length
1:20	Unlimited
1:18	11m
1:16	8m
1:14	5m
1:12	2m
1:10	1.25m
1:8	0.5m

- Ramps should have no transverse slope.

- The plane of the slope of the ramp should follow the path of travel.

Landing

- Ramps should be provided with landings for resting, maneuvering and to avoid excessive speed.

- Landings should be provided every 10.00 m, at every change of direction and at top and bottom of every ramp.

- The landing should have a minimum length of 1.20m, with a width at least equal to that of the ramp.

Handrail

- A protective handrail is required to be placed along the full length of ramps with a rise of 0.40 m or more.

- For ramps more than 3.00 m wide, an intermediate handrail should be installed. (fig. 5)

- The distance between handrails when both sides are used for gripping should be between 0.90 m-1.40 m. (fig. 5)

Surface

- The ramp surface should be hard and non-slip. Carpets should be avoided.

Tactile Marking

- A coloured textural indication at top and bottom of the ramp should be placed to warn sightless people of the location of the ramp.

- The marking strip width should not be less than 0.60 m.

Drainage

- Adequate drainage should be provided to avoid accumulation of water.

Obstacles

- The same clearance considerations that apply to pathways apply to ramps. (see Obstructions).

Mechanical Ramps

- Mechanical ramps can be used in large public buildings but are not recommended for use by persons with physical impairment.

- The recommended slope is 1:12, but should not exceed 1:10 if the ramp is to be used by a wheelchair confined person.

-The maximum width should be 1.00 m to avoid slipping.

Existing Constructions

-If the topography or the structure of the existing building are restrictive, minor variations of gradient are allowed as a function of the ramp length: (fig. 6)

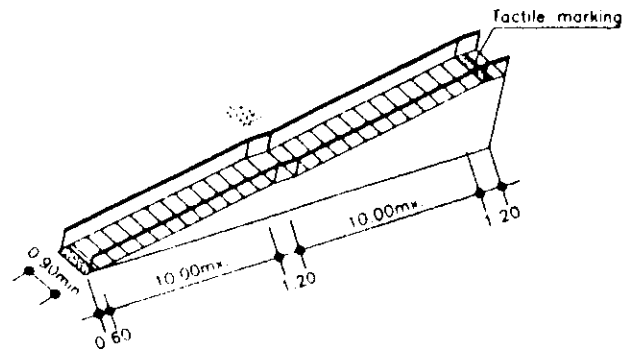
Max. slope	Max. Ramp length
1:20	Unlimited
1:18	12m
1:16	10m
1:14	8m
1:12	6m
1:10	4m
1:8	2m

-A non slip surface finish should be added to slippery ramps.

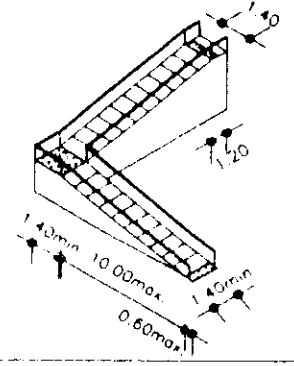
Notes

⁽¹⁾ Circular or curved ramps are not recommended.

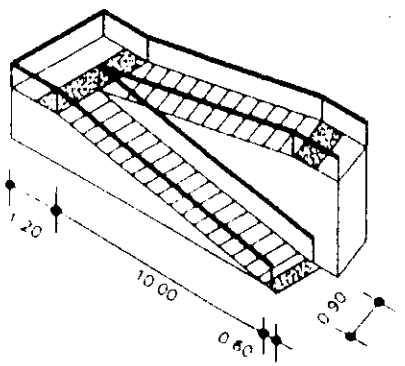
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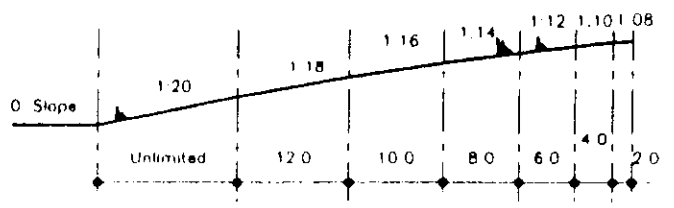
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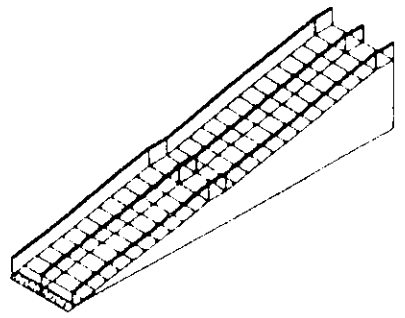
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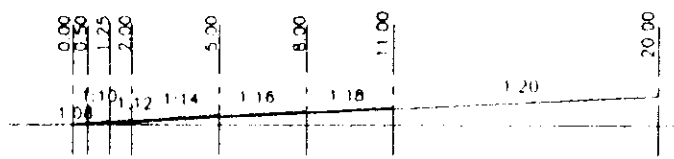
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4



ELEVATORS

Problem Identification

- Inadequate space inside the elevator cab.
- High position of switch buttons and control panel.
- Narrow entry doors.
- Insufficient opening time interval.

Planning Principle

- To provide well dimensioned elevators, convenient for the independent use of disabled people.

Design Considerations

General

- The accessible elevator should serve all floors normally reached by the public.
- Key operated elevators should be avoided or be used only in private facilities or when accompanied by an elevator operator.
- Wide elevator cabs are preferable to long ones.

Elevator Cab

- The minimum internal elevator dimensions, allowing for one wheelchair passenger alone, are 1.00 m x 1.30 m. (fig. 1)
- The clear door opening should not be less than 0.80 m.
- A handrail at a height between 0.80 m -0.85 m from the elevator floor should be provided on the three sides of the elevator cab for gripping. (fig. 2)

- The maximum tolerance for stop precision should be 20 mm.

Control Panel

- The control panel can be located at either of the alternative locations shown in the figure. (fig. 3)
- The elevator cab control panel should be located at a comfortable height between 0.90m - 1.20 m from the elevator floor. (fig. 2)
- Control buttons should be accessible, lit, and with a diameter no less than 20 mm.
- The floor registration numerals should be expressed in relief.

Call Buttons

- Lobby call buttons should be placed at a comfortable height between 0.90 m -1.20 m from finished floor level. (fig. 4)

Floor Designation

- Tactile floor designation numerals should be placed on both sides of the door jambs at an approximate height of 1.50 m, to help a sightless passenger, taking the elevator alone, to identify the floor reached. (fig. 4)

Hall Signal

- The elevator hall signal should be placed at an approximate height of 1.80 m.(fig. 4)

Door Re-Opening Activators

- The door opening interval should be no less than 5 seconds. Re-opening activators should be provided.

Alarms

- A warning should be given by a bell and a light, to alert sightless and hearing impaired passengers simultaneously, prior to arrival at a floor.

Floor Surface

- The elevator and the elevator lobby should have a non -skid resilient flooring or a low pile fixed carpet.

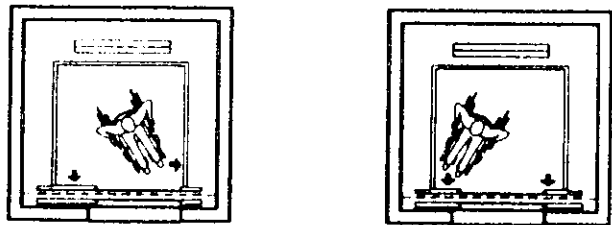
Colour

- The elevator door should be in a contrasting colour to the surrounding surface to be visible and easily distinguishable

Existing Constructions

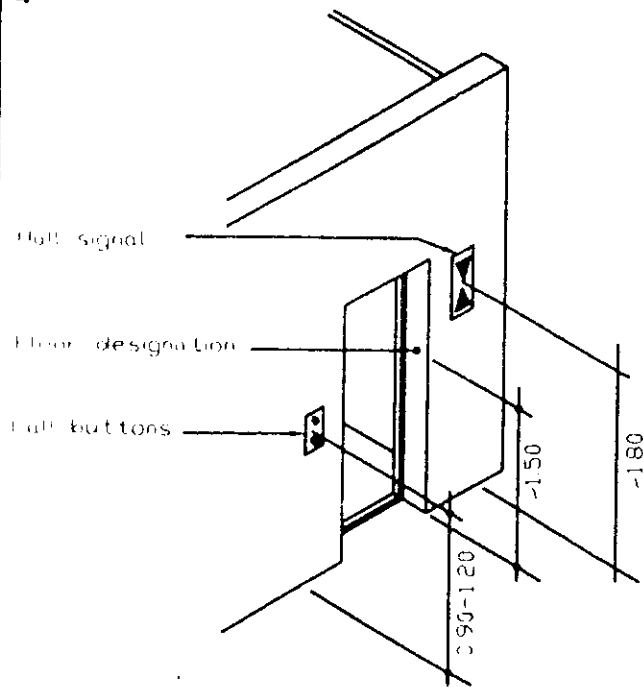
- The minimum acceptable size of an existing elevator cab, allowing for a wheelchair passenger alone, is 0.95 m x 1.25 m. Smaller cabs should be replaced.
- The minimum acceptable size of an existing elevator door opening is 0.75 m.
- Lobby call buttons and control panels mounted higher than the recommended comfortable height can be left in place if they are within 1.40 m from floor, being the maximum wheelchair user reach. Higher controls should be replaced.
- When two identical control panels exist, only one needs to be replaced.

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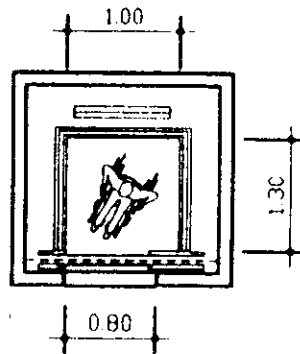


Alternate locations of control panel

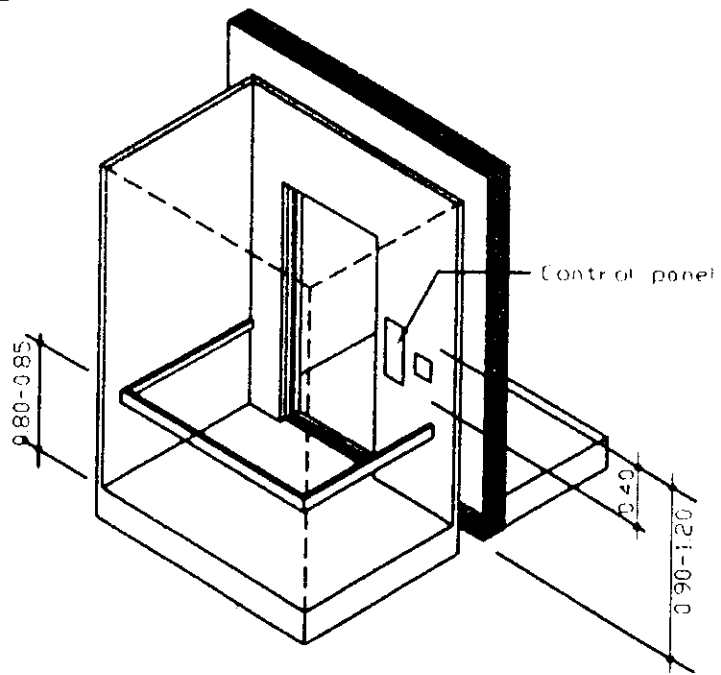
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LIFTS

Problem Identification

- Changes in level between indoor and outdoor areas.
- Changes in level inside the building.
- Insufficient space for ramps.

Planning Principle

- To allow people with mobility problems to have free vertical access between different levels.

Design Considerations

General

- Lifts are special passengers elevating devices for the disabled.

- Lifts could have either a vertical or an inclined movement.

Vertical Movement Lifts⁽¹⁾

- For maximum level changes of 2.50 m, vertical movement lifts may be installed adjacent to the stairs. (fig. 1)

- For level changes of more than 1.20 m, the lift should be placed in a closed structure with doors at the different accessible levels. (fig. 2)

- Vertical lifts can have a variety of entrance and exit openings. (fig. 3)

Inclined Movement Lifts⁽²⁾

- Inclined movement lifts consist of three elements: a railing, an electrical generator and a moving platform or seat.

- The operation system of the lift can be either lateral or suspended. (fig. 4) (fig. 5)

- Inclined movement lifts can be installed along the stairs wall, provided they do not obstruct the required width of egress. The seat or the platform can be folded when not in use.

- The minimum width of the stairs should not be less than 0.90 m to allow the installation of a lift. (fig. 6)

- Stairway lifts can be installed at all types of stairs including a switch back stairs i.e. with a rotation angle of 180° and spiral staircases. (fig. 5) (fig. 7)

Lift Size

- The minimum width of the lift platform is 0.90 m and the minimum length is 1.20 m. (fig. 3)

Existing Constructions

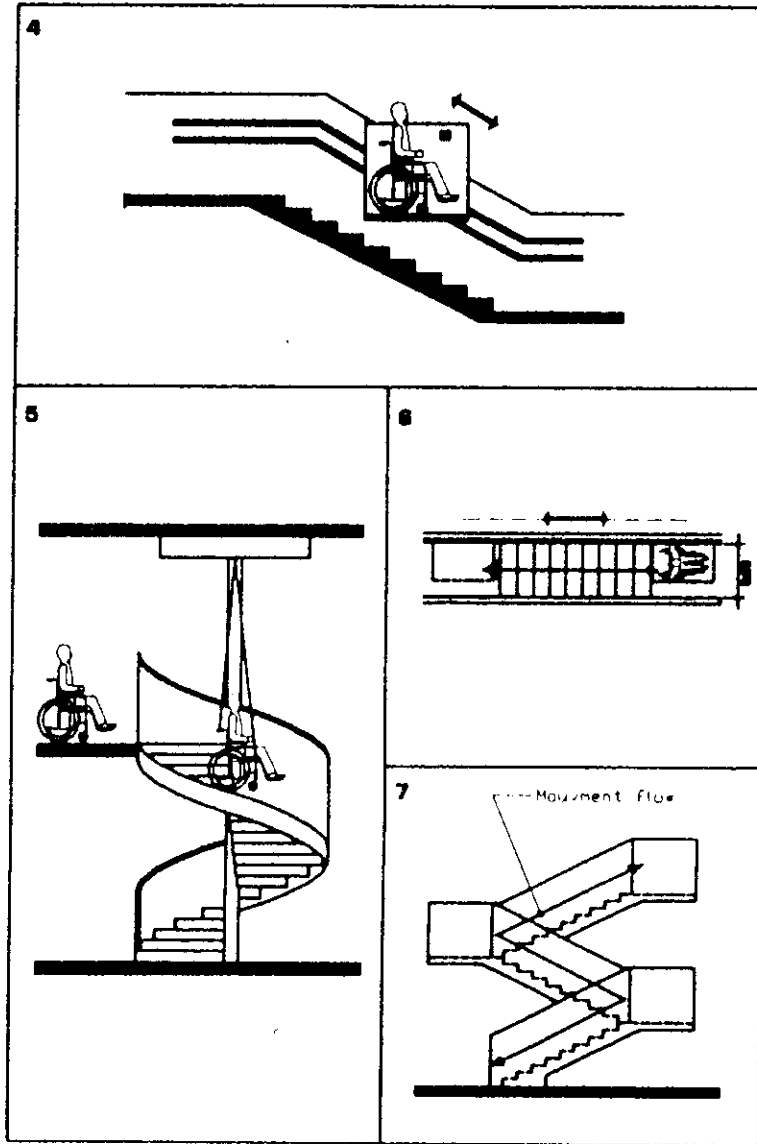
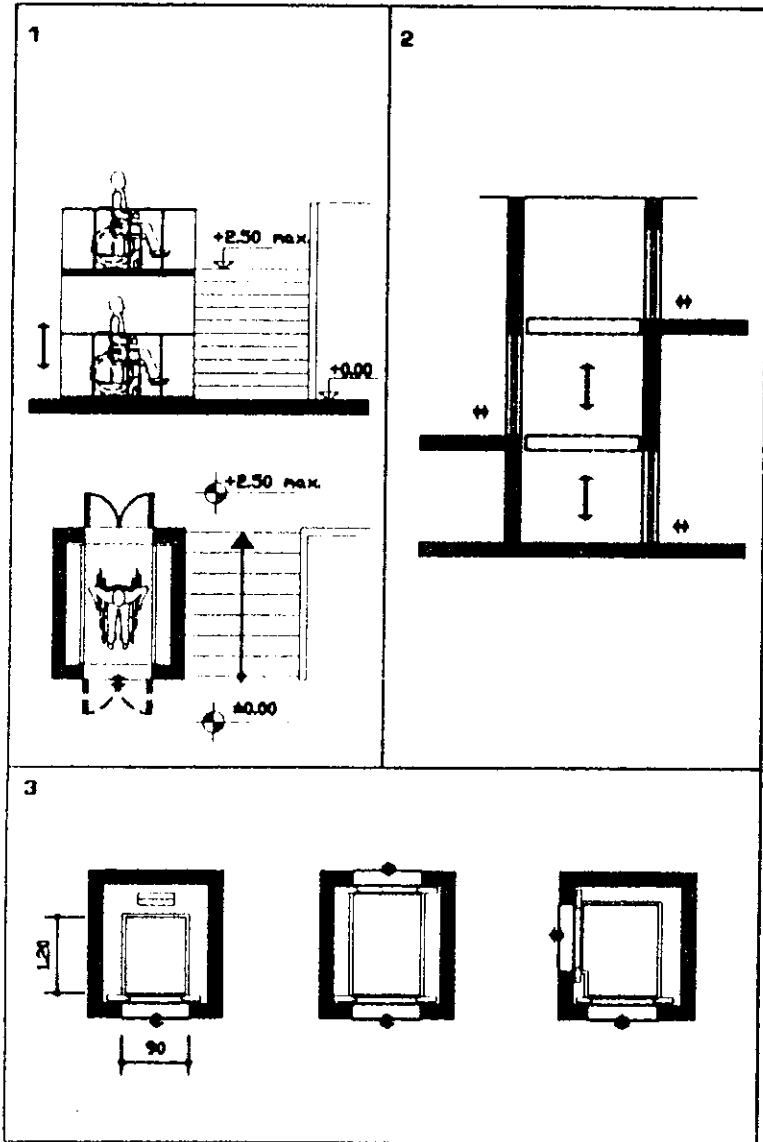
- Wheelchair lifts can provide access into existing buildings where the installation of a ramp or an elevator are difficult or not feasible.

- Inclined movement lifts are usually used to connect one or more floors or to overcome split levels in existing buildings, provided that the building is not heavily used by people with mobility problems.

Notes

⁽¹⁾ Known as vertical platform lifts.

⁽²⁾ Known as inclined platform lifts.



STAIRS

Problem Identification

- Steep staircases.
- Poor design of steps that hinder the foot.

Planning Principle

- To provide safe and well dimensioned staircases for the comfort of all people, especially people with mobility problems.

Design Considerations

General

- Differences in level should be illuminated or be minimized as much as possible for the comfort of disabled people.

- A complementary ramped route, elevator or lift should be provided where steps exist in an otherwise accessible path.

- All steps should be uniform.

- Circular stairs and stepped landings should be avoided. (fig. 1)

- Open risers are not recommended.

Width

- The minimum width of the stairway should be 0.90 m for one way traffic and 1.50 m for two way traffic stairs.

- For indoor stairs, the riser should be between 0.12 m - 0.18 m, and the tread between 0.28 m - 0.35 m.

- For outdoor stairs, the maximum riser should be 0.15 m and the minimum tread should be 0.30 m.

- An angle of 10° - 15° should be maintained for risers.

Landing (fig. 2) (fig. 3)

- An intermediate landing should be provided when the stairs covers a difference in level more than 2.50 m.

- The length of the landing should at least be 1.20 m extending along the full width of the stairs.

Nosing (fig. 4)

- Sharp edges and overhanging nosing should not be used for treads.

- Flush or rounded nosing not projecting more than 40 mm should be used.

Handrail

- Handrail must be installed on both sides of a stair and around the landing for gripping. (fig. 3)

- For stairs more than 3.00 m wide, 1 or more intermediate handrails should be provided. (fig. 5)

- The distance between handrail when both sides are used for gripping should be between 0.90 m - 1.40 m. (fig. 5)

- Handrails must extend a distance between 0.30 m - 0.45 m, at top and bottom of the stairs (see Railings and Handrails). (fig. 3)

Tactile Marking (fig. 2) (fig. 3)

- A textural indication at top and bottom of the stairs and at intermediate landings

- should be placed to warn sightless people of the location of the stairs.

- The tactile marking strip should be at least 0.60 m wide and placed over the full width of the stairs.

- To guide users with poor vision the strip should have a contrasting colour to the surrounding surface.

Surface

- Landings, treads and nosing should be slip resistant and free of projections.

- Exterior stairs should be pitched forward at 10 mm per meter to drain surface water.

- Slip-resistant stair nosing should be used to install carpets on stairs.

Emergency Stairs

- Emergency stairs should be identified by tactile marking (see Emergency and Fire Safety).

Mechanical Stairs (Escalators)

- Mechanical stairs can be provided with an adaptable tread at least 1.20 m long, if to be used by wheelchair confined persons. (fig. 6)

- The edges escalators should be marked with a contrasting colour, for the benefit of poor sighted users.

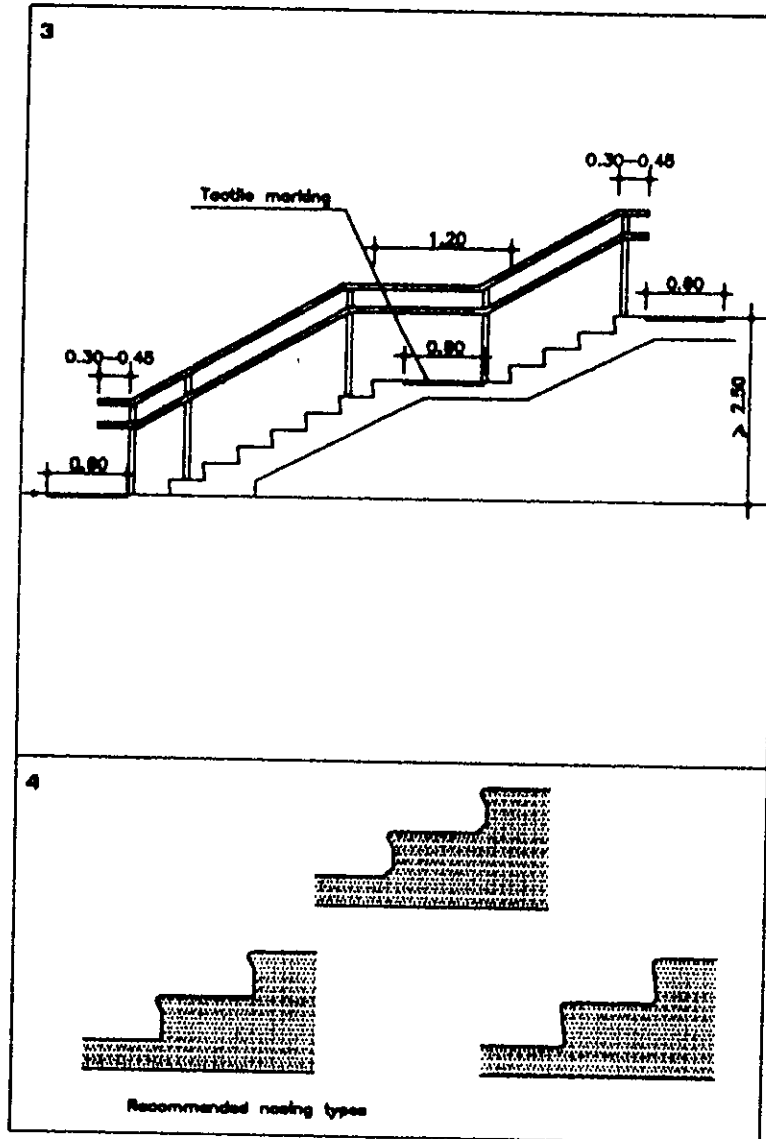
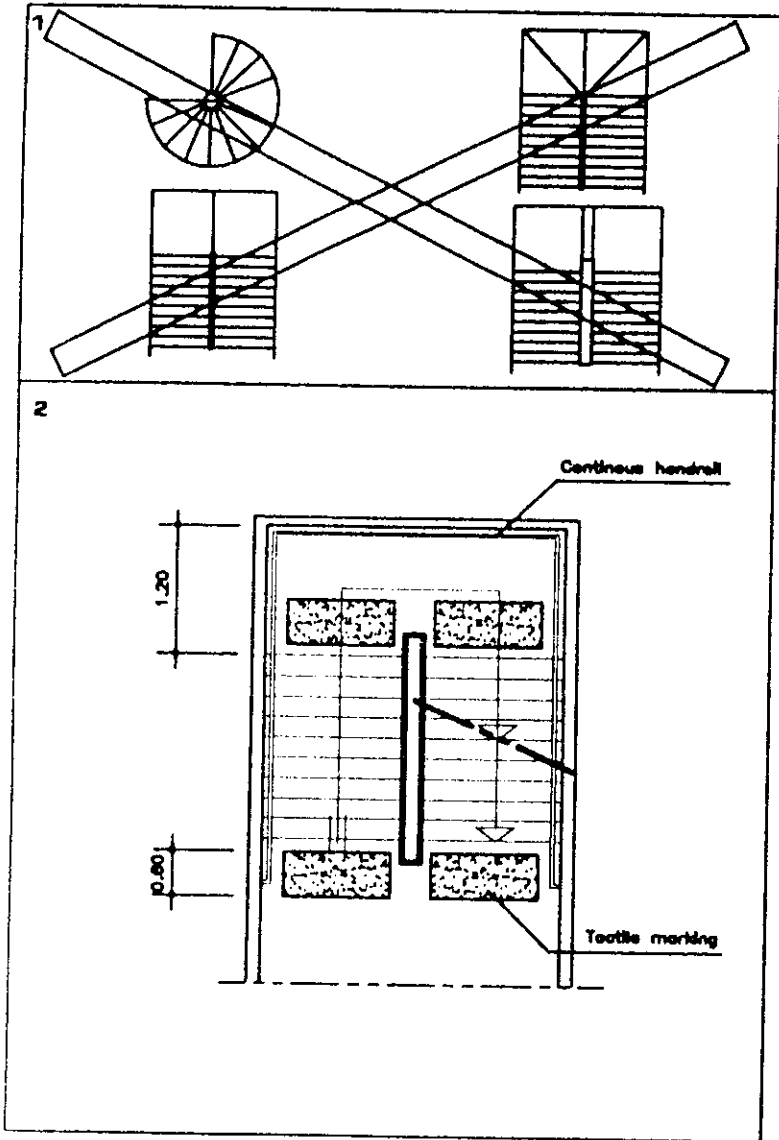
Existing Constructions

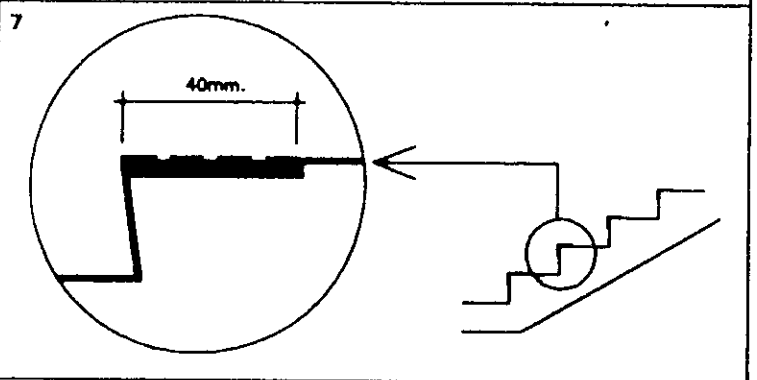
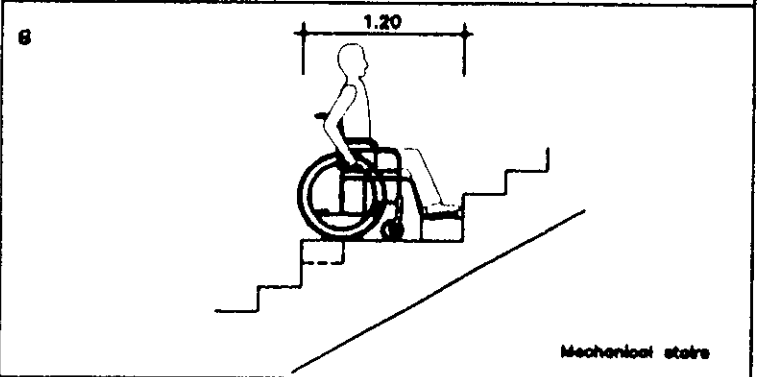
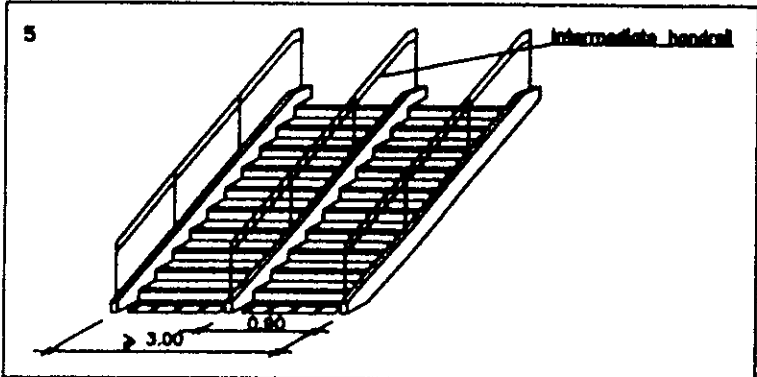
Slip Resistant Strips (fig. 7)

- When the configuration of the nosing can not be modified, an alternative solution is to apply slip resistant strips to the nosing.

-Slip resistant strips should be 40 mm wide and extending not more than 1 mm above the tread surface

-To guide people with sight problems, the strips should have a contrasting colour to that of the stairs.





RAILINGS AND HANDRAILS

Problem Identification

- Unsafe railings.
- Hard to grip handrails.
- No railing or handrails installed.

Planning Principle

- To install adequate railings wherever needed, for the comfort and safety of all people especially people with mobility problems.

Design Considerations

General

- Safety guards or a railings should be installed around hazardous areas, stairs, ramps, accessible roofs, mezzanines, galleries, balconies and raised platforms more than 0.40 m high.

- Windows in exit stairways with a height less than 1.00 m above the landing should be protected by railings.

- Handrails should be used to assist disabled persons in bathrooms and toilets (see Rest Rooms).

- For hazardous situations, spacing between vertical and horizontal members of a railing should be narrow for the safety of children.

- Handrails should not obstruct the path of travel.

Height⁽¹⁾ (fig. 1)

- To facilitate use by ambulant disabled and old people, handrails should be mounted at a

height between 0.85 m - 0.95 m above finished floor level.

- For the benefit of wheelchair user, a second handrail can be mounted at a height between 0.70 m - 0.75 m.

- To facilitate use by children and short people, a third handrail can be mounted at 0.60 m height.

- To guide sightless people using a long cane, and to act as wheel stops:

(a) A rail should be mounted at a height between 0.10 m - 0.15 m. (fig. 1)

(b) A low curb should be installed at a height between 50 mm - 75 mm. (fig. 2)

Fixing

- Railing should be securely attached to the wall or supporting structure so as to withstand heavy loads

- Railings should not end abruptly but extend to the floor or be connected to the wall, so not to create hazard to sightless people.

Form (fig. 3)

- Handrails should allow a firm and easy grip.

- Circular cross sections with a diameter of 40 mm are preferable.

- Sharp edges should be avoided

Handrails for Ramps and Stairs

- Handrails should be continuously provided on both sides and around the landing, except where interrupted by doorways.

- Handrails should extend horizontally for a distance between 0.30 m - 0.45m at top and bottom of stairs and ramps, except in places where extensions could obstruct the pedestrian flow. (fig. 4)

- For stairs or ramps more than 3.00 m wide, a continuous intermediate handrail should be provided. (see Ramps - Stairs)

Wall Mounted Handrails

- The space between the handrail and the wall should be between 40 mm - 50 mm for smooth walls and 60 mm for rough textured walls. (fig. 5)

- Where handrails are fully recessed into walls, a space of at least 0.15 m should be allowed between the top of the rail and the top of the recess. (fig. 6)

Tactile Marking

- For emergency exit stairs or ramps, a contrasting colour tactile strip, with a length of at least 0.90 m, should be applied to the top and bottom edges of the handrail to alert sightless people.

Colour

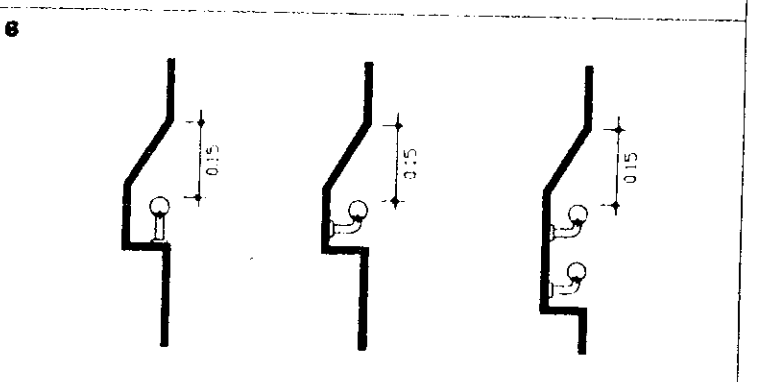
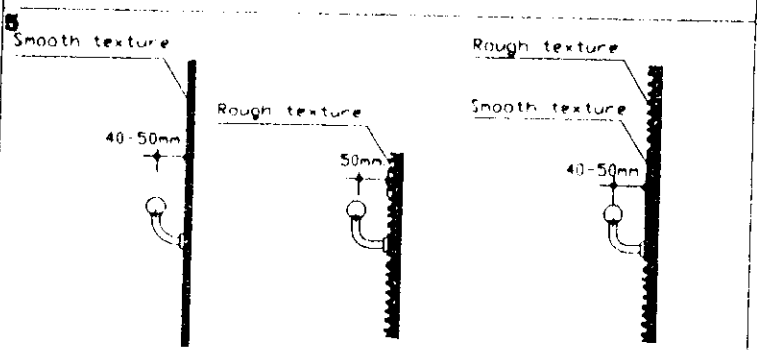
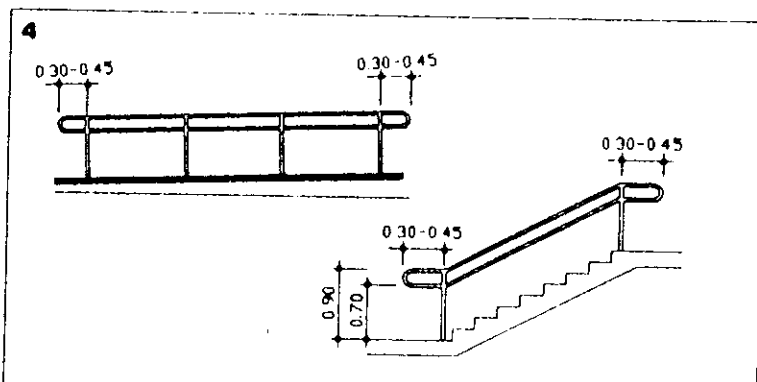
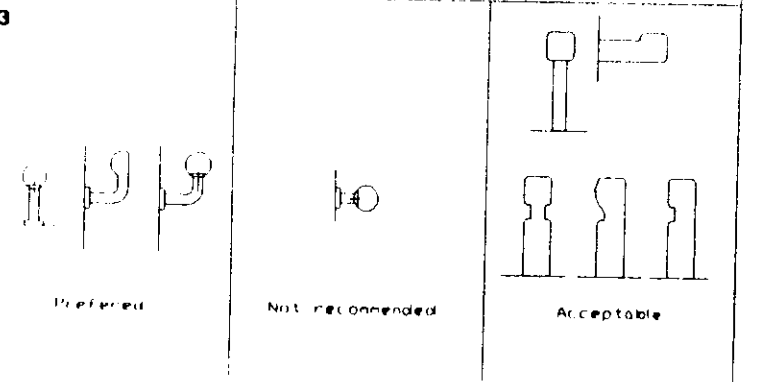
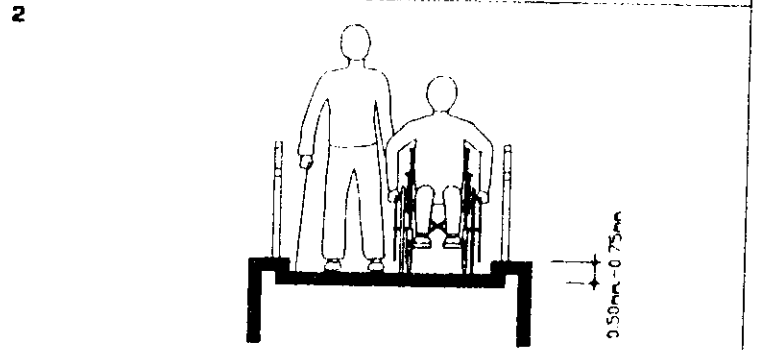
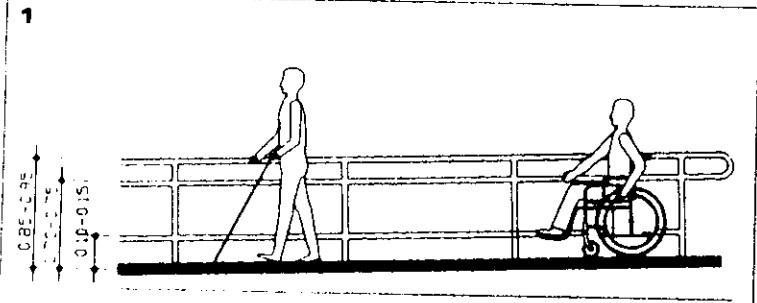
- A contrasting colour is recommended for the handrail to alert people with sight problems.

Existing Constructions

-If existing railings and handrails do not comply by the above requirements, they should be replaced or modified.

Notes:

⁽¹⁾ Measurements are taken from the front of the tread.



ENTRANCES

Problem Identification

- No distinct accessible entrance.
- Inadequate space in front of the entrance.

Planning Principle

- To provide accessible and easy to find building entrances.

Design Considerations

General

- For new accessible constructions all main public entrances should be accessible to an ambulant disabled person.

- At least one entrance per facility should be accessible to a wheelchair confined person. In case of new buildings the accessible entrance(s) should be the main entrance(s) intended for use by the general public.

- Each accessible entrance should be connected by accessible pathways to indoor or outdoor accessible parking areas, local public transit stops and drop-off areas. (fig. 1)

- In multistory buildings, the accessible entrance should permit access to a conveniently located accessible elevator or a lift.

Signage

- Accessible entrances should be clearly identified using the International symbol of accessibility including alternate locations of accessible entrances. (fig. 2)

- No signage is needed if the whole building is accessible.

Entrance Landing

- Where the entrance door opens outward, the minimum landing dimensions should comply with the figure. (fig. 3)

- Where the entrance door opens inward, the minimum landing dimensions should comply with the figure. (fig. 4)

- The surface of the landing should be level, a slope of 2% is required for drainage.

- The finish material should be non-slippery.

- Jute door mats should be avoided, the upper surface of the mat should be level with the floor. (fig. 5)

- Sheltered landings are preferable.

Threshold

- Thresholds should be removed where possible. (see Doors)

Colour

- The colour of the entrance door should contrast with its surrounding surface to be distinguished by people with sight problems.

Entrance Vestibules

(see Vestibules).

Entrance Doors

(see Doors).

Existing Constructions

- Public buildings should have at least one accessible entrance, this should be wherever possible the main entrance intended for use by the general public. ⁽¹⁾ (see BUILDING TYPES)

- If the main entrance can not be made accessible, either for architectural or technical reasons, an alternative accessible entrance should be provided. The location of the alternative entrance should be clearly indicated by signs.

- To allow for an accessible entrance one of the following solutions can be adapted:

(a) Ramps, bridges or mechanical lifts might be used. ⁽²⁾

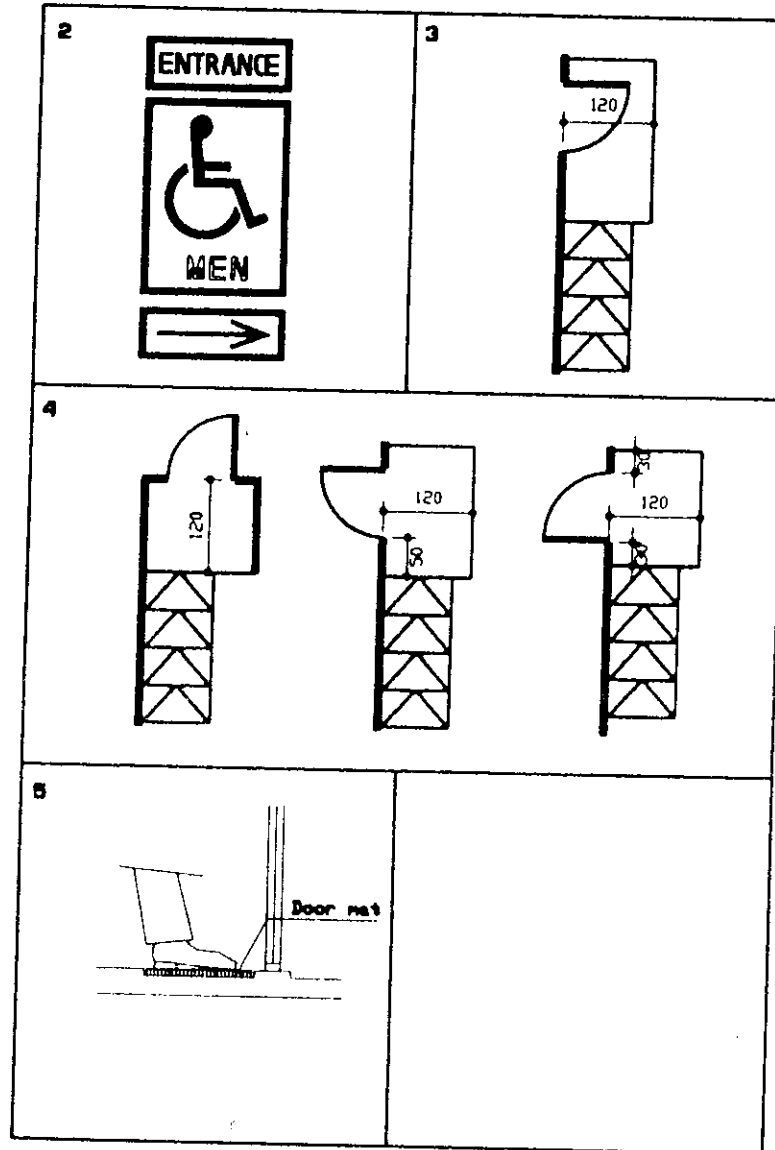
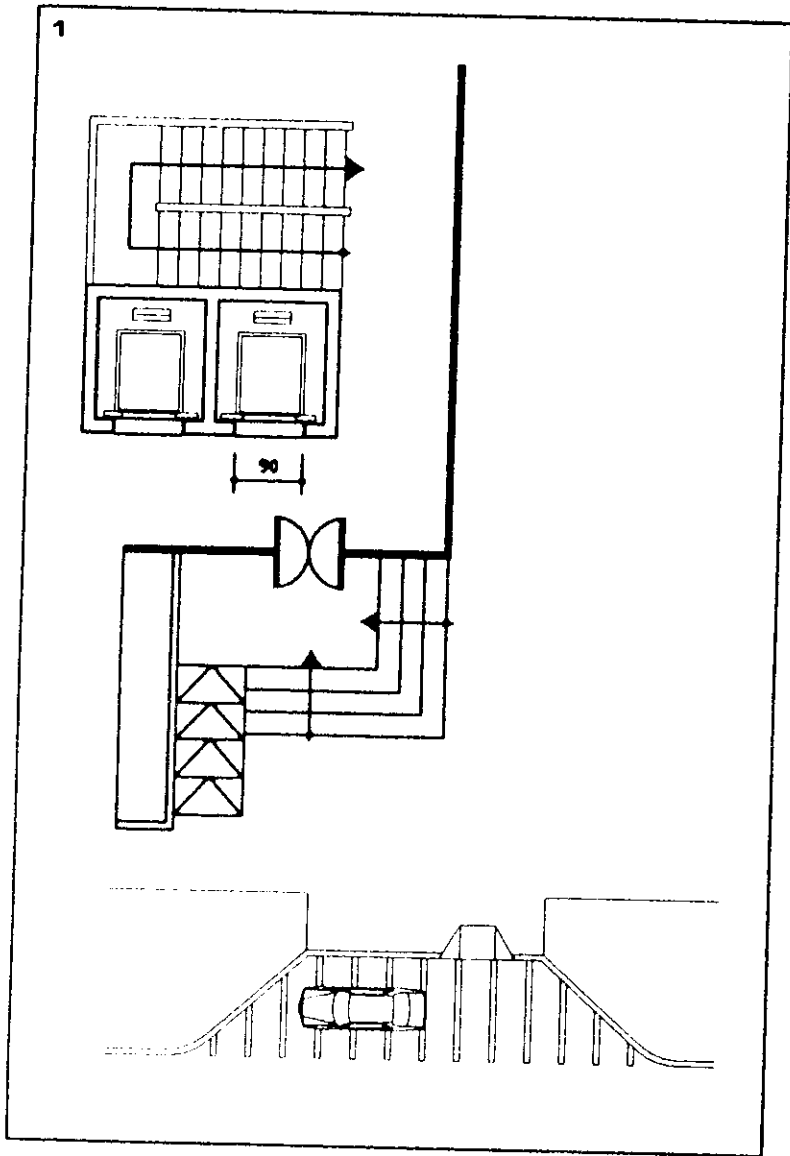
(b) The entrance level might be modified by earth fill, changes in the grade or landscaping of the surrounding site.

(c) A window or other door at ground level might be converted to an accessible entrance.

Notes

⁽¹⁾ For existing constructions, a service entrance can be used temporarily as an accessible entrance, but should not be the only accessible entrance.

⁽²⁾ Mechanical lifts are recommended for conserved buildings where modifications are impossible or unacceptable.



VESTIBULES

Problem Identification

-Narrow entrance doorways and narrow entrance vestibules.

Planning Principle

-To provide sufficient space to maneuver a wheelchair between two sets of doors.

Design Considerations

General

-Entrance vestibule doors can either be sliding or swinging.

-For swinging doors, the door mechanism should allow the maximum opening swing.

Layout

The layout of two swinging doors in a series can be either of the following:

(a) Outward swinging. (fig. 1)

(b) Double swinging. (fig. 2)

(c) Swinging in same direction⁽¹⁾ (fig. 3)

(d) Inward swinging. (fig. 4)

Existing Constructions

-For narrow vestibules either of the following solutions can be adapted:

(a) Replace swinging doors by sliding doors.

(b) Change the direction of the door swing, so that both doors can be made to swing outwards, if possible. (fig. 5)

(c) Install double swinging doors for small egress vestibules with a minimum width of 1.20 m.

(d) Remove the inside or second door.

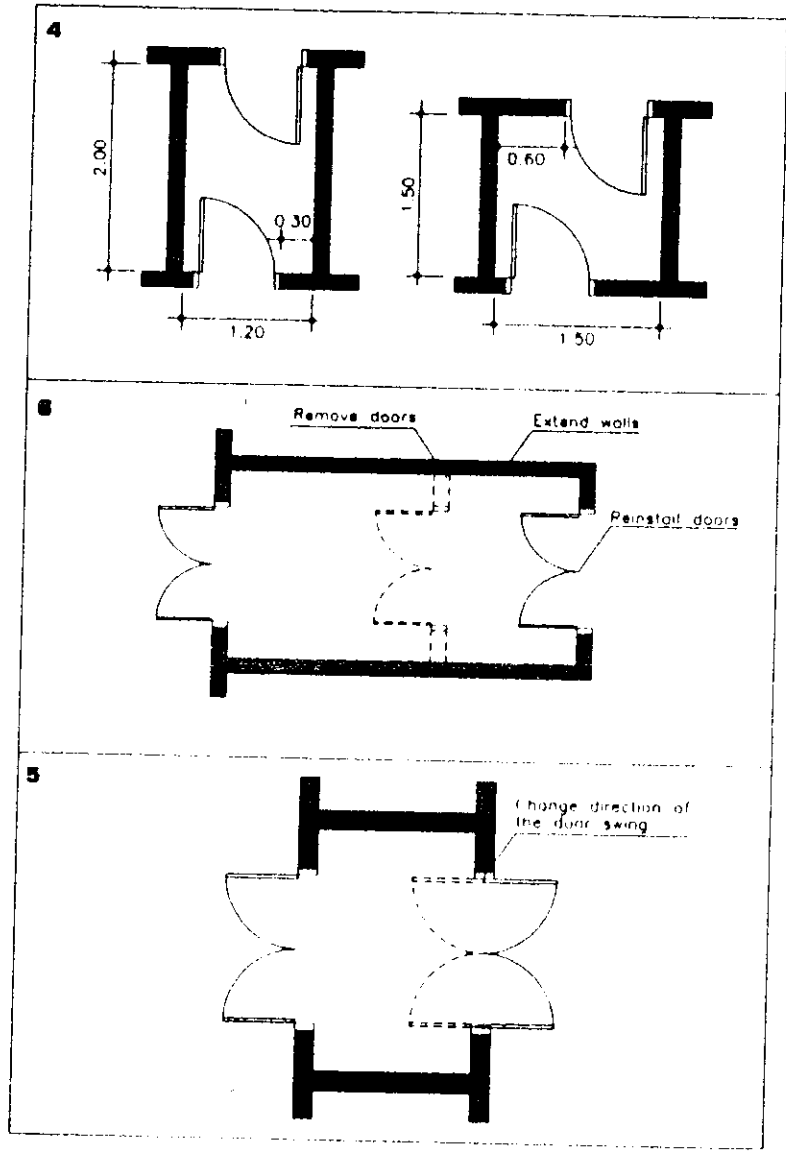
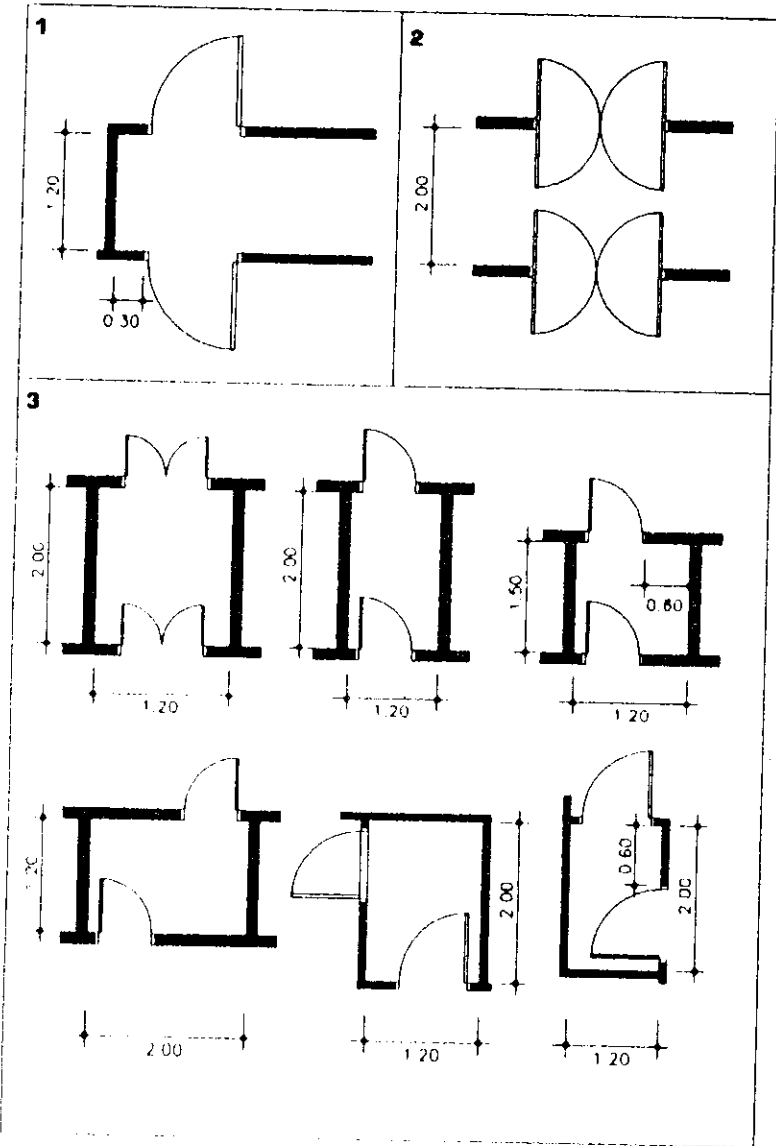
(e) Enlarge the existing vestibule if possible⁽²⁾. (fig. 6)

Notes

⁽¹⁾ Doors swinging in the same direction can be aligned, offset on opposite walls or offset on adjacent walls.

⁽²⁾ Recommended for existing vestibules serving also as emergency exits because other solutions such as changing the direction of the door swing might not solve the problem.

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DOORS

Problem Identification

- Narrow doorways.
- Doors hinged on the wrong side thus hindering accessibility.
- Doorways with high thresholds.
- Heavy and hard to operate door leafs.

Planning Principle

- To facilitate the passage of a wheelchair confined person through doors.

Design Considerations

General

- Accessible doors should be independently operated with a single effort.

- Power-operated doors are the best for people with disabilities. The activator system should be automatic or placed within easy reach.

- An accessible door is preferred to have the following features: Signage, door handle, extra pull handle, glazing and kick plate.

Door Types

(a) Automatic Doors:

- Can be sliding or swinging. Sideways sliding doors are preferable to swinging ones. (fig. 1) (fig. 2)
- Automatic doors are beneficial when there is a lot of traffic.

- Automatic doors should have a sufficiently long opening interval.

- Guard rails can be installed for double swinging doors to indicate a door opening

area and prevent people from being hit by the door.

(b) Revolving Doors:

- Revolving doors are not suitable for the use of disabled people or people with prams.

- Wherever revolving doors exit, an adjacent accessible swinging or sliding door should be provided. (fig. 3)

- Auxiliary gates should be provided at turnstiles. (fig. 4)

(c) Pivoted Doors:⁽¹⁾

- Pivoted doors should swing away from the direction of travel wherever possible.

- Pivoted doors in series are considered as vestibules (see Vestibules)

(d) Sliding and Folding Doors:

- Manual sliding and folding doors are recommended for narrow spaces not heavily used by the public. (fig. 4)

Door Opening

- For exterior doors the minimum opening is 0.90 m when the door is open.

- For interior doors, the minimum opening is 0.80 m when the door is open.

- The minimum door opening can be 0.75 m if the access is straight or if the door can stay open by itself. (fig. 5)

- The minimum door width of rest rooms should at least be 0.75 m.

- For doors installed in an opening more than 0.60 m in depth, the clear door opening should at least be 0.90 m. (fig. 6)

- For double leaf doors, at least one leaf should have a minimum clear width of 0.80 m. (fig. 7)

Manual Door Hardware

- Operational devices on doors like handles, pulls, latches and locks should have a shape that is easy to grasp with one hand (fig. 8)

(a) Handles:

- Lever-type handles, push plates or pull handles are recommended for swinging doors because they are easy to open⁽²⁾.
- Round knobs are not recommended.

- Door handles should be located at a comfortable height between 0.90 m - 1.20 m from the floor surface.

(b) Locks:

- Locks on entrance doors should be mounted at a comfortable height between 0.90m - 1.20 m above floor level.

(c) Extra pull Handle:

- To facilitate closing, a door fitted with spring closers should be equipped with an extra pull handle, with an approximate length of 0.30 m, located at a distance between 0.20 m - 0.30 m from the hinged side of the door and mounted at a height between 0.90 m -1.20 m above floor surface.

Automatic Doors Hardware

- Automatic doors can be activated by:

(a) Push buttons located at a comfortable height between 0.90 m - 1.20m.

(b) Activating mats. The mat also serves as a location cue. (fig. 2)

(c) Card insert switch.

(d) Remote control.

Threshold (fig. 8)

-Thresholds should be omitted wherever possible. Weather stripping at the door bottom is preferred to thresholds.

-The threshold should not be more than 20 mm higher than the finished floor level.

-Thresholds higher than 6 mm should be beveled or have sloped edges to facilitate the passage of a wheelchair.

Exit Doors Landing

-The exit landing should not be lower than the finished floor level by more than 20 mm maximum.

Glazing and Glazed Doors

-Outward swinging doors and doors in public corridors should have low windows to enable users to see oncoming traffic. The bottom edge of the window should not be higher than 1.00 m above the finished floor level. (fig. 8)

-Completely glazed doors should be avoided in buildings frequented by people with visual impairment.

-Glazed doors should be clearly marked with a coloured band or mark placed for the benefit of all users at a height between 1.40 m - 1.60 m. (fig. 2)

Kick plates

-Kick plates are useful in protecting the finish on the lower part of the door. Kick plates should be between 0.30 m - 0.40 m in height. (fig. 8)

Signage

-In public buildings, the function or room number, incorporating international symbols should be identified at eye level, i.e. between 1.40m - 1.60 m. (fig. 8)

-Room numbering should be placed on doors frames and not on door, as they may be left open.

Colour

-The doors or the door frame can have a contrasting colour to the adjoining wall to facilitate its identification by people with visual impairment.

Existing Constructions

-Automatic doors are recommended to replace heavy hard to open swinging doors.

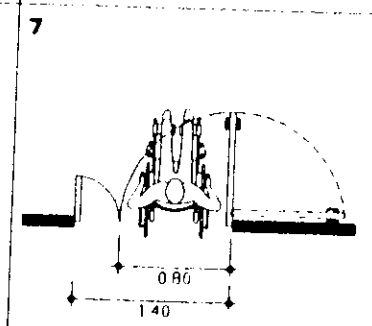
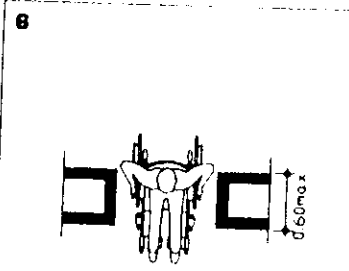
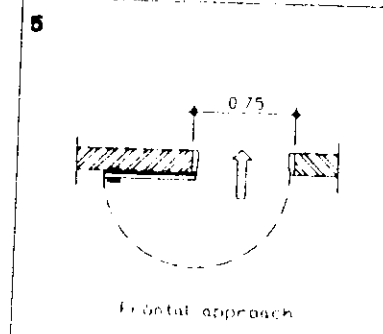
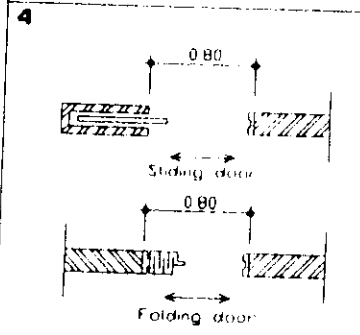
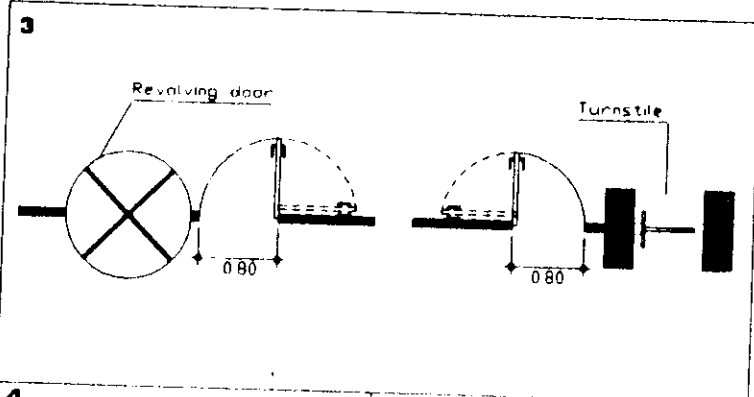
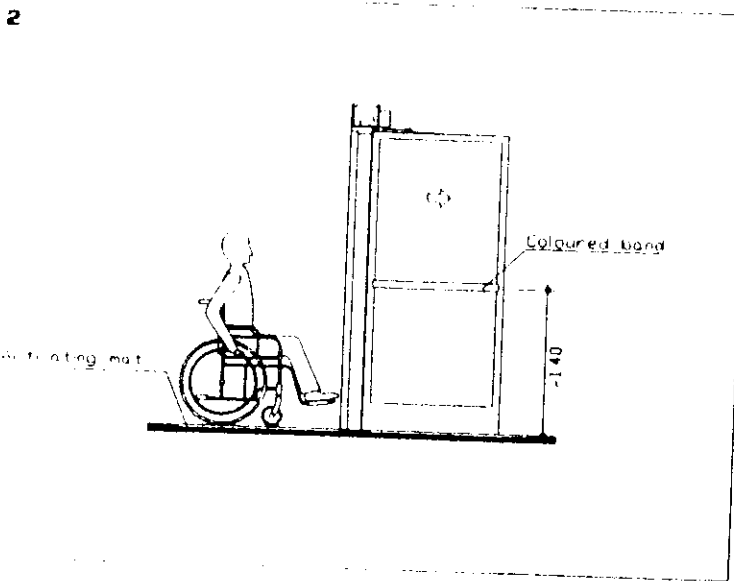
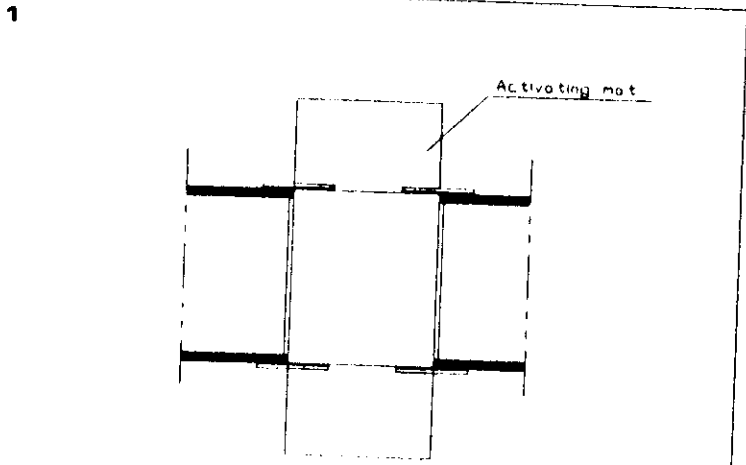
-Door openings narrower than 0.75 m, should be widened. A swing-clear hinged door may be used to slightly enlarge an existing opening.

Notes

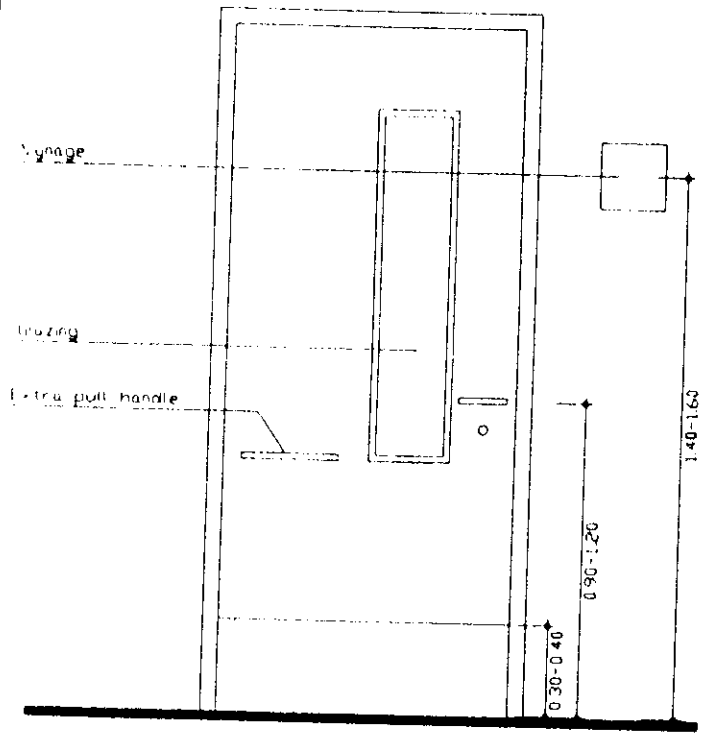
⁽¹⁾ If the door width is more or equal to 1.10 m, swinging doors are exempted from the

requirement for space at the latch side of the door.

⁽²⁾ Lever type handles can be activated by the hand, elbow or other means.



8



CORRIDORS

Problem Identification

-Long and narrow corridors creating orientation difficulties.

Planning Principle

-Provision of well dimensioned corridors to facilitate the passage and maneuvering of a wheelchair.

Design Considerations

General

-Wide corridors are useful for wheelchair users, service equipment, high traffic areas, etc.

Width

-The minimum unobstructed width of a low traffic corridor should not be less than 0.90 m. This also allows maneuverability at 90°. (fig. 1)

-The minimum unobstructed width of a public corridor should not be less than 1.50 m. The recommended width is 1.80 m⁽¹⁾. (fig. 2)

-To allow maneuverability at 180°, the minimum circulation space should be as shown in the figure. (fig. 3)

-The corridor width should allow maneuverability through doors located along its length (fig. 2) (fig. 4)

Obstructions

-Obstacles protruding into the corridor such as drinking fountains or public telephones

should be placed outside the circulation path, in alcoves or cul-de-sac. (fig. 5)

-Overhanging signs and obstacles should be mounted at least 2.00 m high. (fig. 6)

Surface

-Changes in surface level more than 13 mm should be ramped.

-Floor surface should be non-slip and even. Carpets should be securely fastened.

Existing Constructions

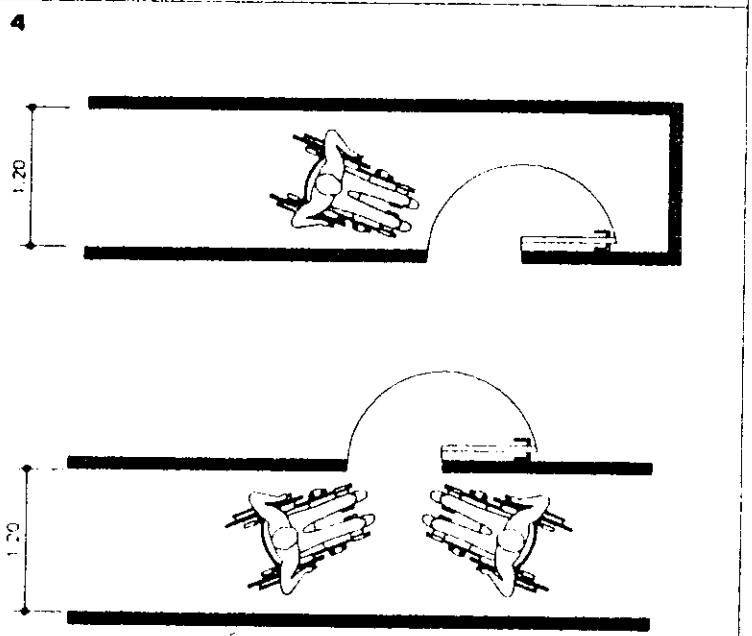
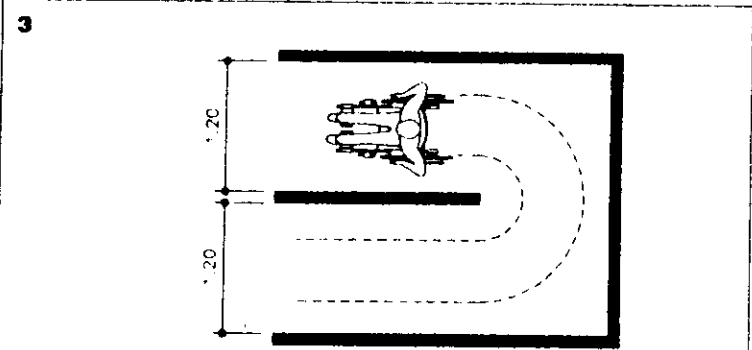
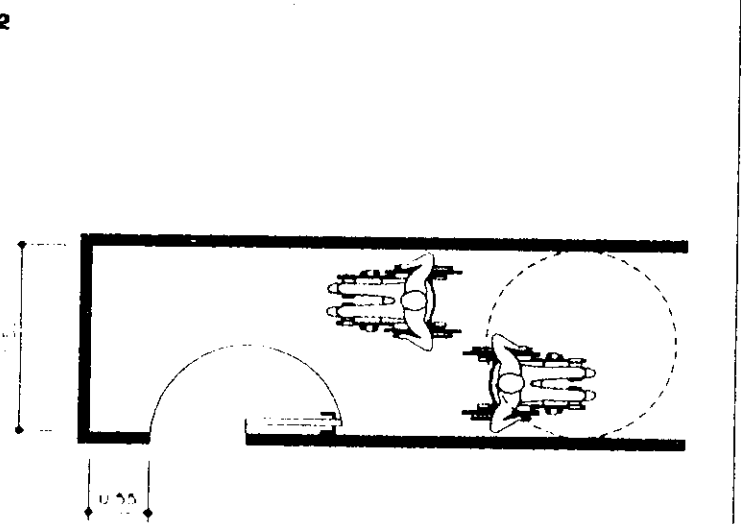
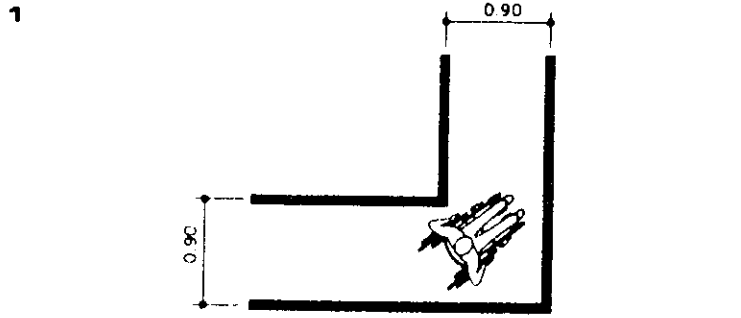
-Narrow corridors should be widened along their full length if feasible; otherwise, passing areas should be located at appropriate intervals along the corridor length.

-The minimum width of the passing area should be 1.50 m and the minimum length should be 2.40 m.

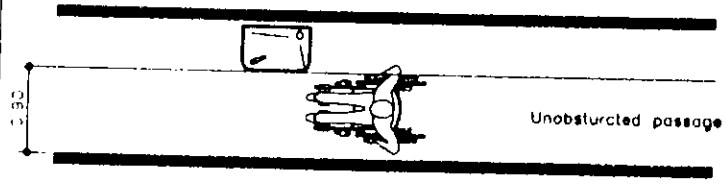
-In highly restricted spaces, the height for an obstacle or sign can be dropped to 1.95 m.

Notes:

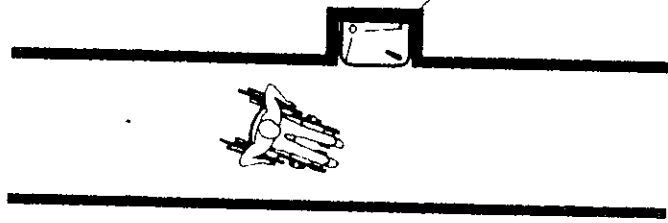
⁽¹⁾1.50m is the minimum width for two wheelchairs to pass each other or for one wheelchair to make a full turn.



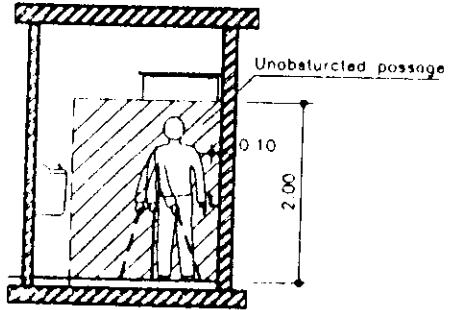
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Water fountain



6



REST ROOMS

Problem Identification

- Insufficient space inside the rest room.
- Bad design and positioning of fixtures and fittings.
- Difficult to grip taps.

Planning Principle

- To provide sufficient accessible space inside the rest room, with all fixtures and fittings being within easy reach.

Design Considerations

General

- 1.5 m diameter turning circles are recommended inside the rest room, to allow for full turn maneuvering of a wheelchair.

-The ease of transferring from a wheelchair to the toilet seat or the bidet depends on the approach. In general there are four different approaches:

- (a)The parallel approach which is the easiest. (fig. 1)
- (b)The diagonal approach which is difficult. (fig. 2)
- (c)The perpendicular approach which is also difficult. (fig. 3)
- (d)The frontal approach which is the most difficult and needs particular care. (fig. 4)

Public Rest Room

-In any public rest room, at least one compartment for each sex should be accessible to an ambulant disabled person.

-In any public rest room at least one uni sex compartment should be accessible to a wheelchair confined person.

-Accessible rest rooms should be marked with the international symbol of accessibility. No indication is needed if all rest rooms are accessible.

-Pivoted doors should be outward opening, unless sufficient space is provided within the toilet stall.

Special Public Rest Rooms

-Installation of a separate unisex unit is always desirable in public buildings, even when all rest rooms are accessible, so as to allow a disabled person to be assisted by an attendant of the opposite sex.

-Special rest rooms should be marked with the international sign of accessibility but should not be the only accessible rest rooms.

-A water closet and a lavatory should be provided within special rest rooms.

-The size and arrangement of special rest room should comply with the minimum requirements. (fig. 5)

Residential Rest Rooms

-Residential rest rooms include private residences, health facilities, dormitories and other residential institutional settings.

-Residential bathrooms are usually equipped with a toilet, a bidet, a wash hand basin, a bathtub or a shower.

-In assembly occupancies:

(a)Only one wash hand basin per rest room needs to be accessible.

(b)At least one shower stall and one toilet stall should be designed to be used by a wheelchair disabled person.

-For space saving in private occupancies:

(a)The tiled floor area adjacent to the tub can be used as a shower space.

(b)The wash hand basin seat might be used as a seat during the use of the wash basin or the hand shower.

-The size and arrangement of residential rest rooms should comply with the minimum requirements. (fig. 6)

Rest Room Fixtures

1) Water Closets:

-The size and arrangement of water closets and toilet stalls should comply with the minimum requirements. (fig. 7) (fig. 8)

-The height of the toilet seat should be between 0.45m and 0.50m above finished floor level. (1)

-The distance between the center line of the toilet seat and the adjacent wall, if provided

with a grip bar, should be between 0.45 m - 0.50 m.

-Grab bars should be mounted on the wall behind the water closet if it is of the tankless type and on the side wall closest to the water closet, or ground mounted at the edges of the seat.⁽²⁾

-Grab bars should be mounted at a height between 0.85 - 0.95 m from the floor.⁽²⁾

-Flushing arrangements and toilet paper should be placed within reach at a height between 0.50 m - 1.20m.

-Accessible hand-operated flushing controls, located on the open side of the water closet, are recommended.

-Wall mounted water closets are recommended for providing the least amount of obstructions.⁽³⁾

2) Lavatories:

-The dimensions of lavatories should comply with the minimum requirements. (fig. 9)

-The height of a wash hand basin should be between 0.80 m - 0.85 m above finished floor level.

-The distance between the center line of the wash hand basin and the adjacent side wall should at least be 0.45m.

-The wash hand basin may be drawn forward from the wall a distance between 0.15 m and 0.20 m.

-No shelves must be located above the wash hand basin.

3) Bath Tubs:

-The dimensions of bathtubs should comply with the minimum requirements. (fig. 10)

-Bath tubs are difficult to use by a wheelchair confined person without the help of an attendant.

-The minimum dimension of the bath tub should be no less than 1.60 m x 0.70 m.

-The height of the tub should be between 0.45m - 0.50 m from finished floor level.

-An in-tub seat or a seat at the same height of the tub should be provided at the head side of the tub.⁽¹⁾

-A grab handle should be fixed on the wall at a height between 0.85 m - 0.95 m from finished floor level.⁽²⁾

-Tubs with a toe recess are recommended.

4) Showers:

-The dimensions of showers should comply with the minimum requirements. (fig. 11)

-The shower should have seating facilities positioned under the shower head at a height of 0.45 m - 0.50 m.⁽¹⁾

-The seat of the shower space should be of the hinged pull-down or removable type, not spring loaded.

-A grab bar should be placed on the wall opposite the seat and around the back wall, mounted at a height of between 0.85 m - 0.95 m.

-Outlets should be placed at the corner of the tub so that slip-resistant rubber mats can be used.

-The floor of the shower tub should not be more than 20 mm below the surrounding floor area.

-The shower stall should have a beveled threshold not exceeding 13 mm in height above the finished floor.

5) Bidets:

-The dimensions of bidets should comply with the minimum requirements. (fig. 12)

-The upper edge of the bidet should be between 0.45 m - 0.50 m from finished floor level.⁽¹⁾

-The distance between the center line of the bidet and the adjacent wall should at least be 0.45 m.

-Wall mounted bidets are recommended.⁽³⁾

6) Urinals: (fig. 13)

-At least one accessible urinal should be provided in a public rest room

-Urinals should be mounted with clear space on both sides.

-A full length urinal is the most accessible.

-Urinals with a protruding lip should be mounted at a height of 0.45 m above finished floor level.

Rest Room Door

-The clear door opening should be at least 0.75 m with the door in the open position.

-Doors should be lockable from inside and releasable from outside under emergency situations.

-A handle should be placed at the door from the inside to facilitate closing. Another handle should be provided from the outside. (see Doors)

Accessories

-All accessories such as, soap, towel and toilet paper dispensers, should be placed at a height between 0.50 m and 1.20 m above finished floor level.

Grab Bars

-Grab bars should be installed in water closets, bathtubs and showers to assist disabled persons to have a safe and easy transfer from a standing or sitting position to the facility.⁽²⁾

-Grab bars should have a diameter between 30 mm and 40 mm.

-Wall mounted grab bars should have a clearance between 35 mm - 45 mm from the wall.

-Grab bars should be firmly fixed to stand loads and should have non slip surfaces; knurled surfaces usually prevent slipping.

Mirrors

-Mirrors should be suitable for use by both standing and seated persons. Low mirrors or downwards tilted mirrors can be used.

-The bottom edge of mirrors should be located at a maximum height of 1.00 m above finished floor level. (fig. 9)

Faucets

-Single lever mixing type faucets, which could be operable by one hand are recommended. Faucets with push buttons are also convenient.

-The clearance of the grip of the tap and any adjacent vertical surface should not be less than 35 mm.

-The clear space between two taps should not be less than 0.20 m.

-The left tap should be connected to the hot water supply.

-Telephone fixtures with at least 1.50 m long hose are recommended to be used in showers and bathtubs. These can be hand held or fixed at an adjustable height between 1.20 m - 1.80 m above the floor, to suit all users.

Flooring

-Rest rooms must not have doorsteps. Gradient of floor should be as little as possible.

-Thresholds should be avoided when inevitable the maximum threshold height should be 20 mm. (see Doors)

-Flooring materials should be skid-proof and easy to clean.

-The floor should be well drained and provided with adequate waterproofing.

Alarms

-Rest rooms should be equipped with an alarm system.

Pipes

-All exposed hot water pipes should be insulated or covered.

-Pipes are preferably fitted in the wall.

Existing Constructions

Public Rest Rooms

-For accessible buildings, at least one unisex accessible rest room should be provided per facility. (See BUILDING TYPES)

Water Closets

-To obtain an accessible toilet combine two adjacent stalls by removing one water closet and the mutual partition, provided that the number of the remaining fixtures is sufficient for the floor population.

Urinals

-Existing high urinals need not be replaced if accessible toilet fixtures are available.

a wheelchair user, and for restricting the clear floor area.

-One urinal per rest room can be lowered.

Rest Room Vestibules

-For narrow vestibules, replace doors by automatic door openers or use swing clear hinges.

-Remove doors if they restrict the maneuvering space, provided that privacy is not inhibited.

Grab Bars

-If grab bars are not provided in the initial construction, walls should be reinforced to take loads.

Accessories

-Rest room accessories located at a maximum height of 1.40 m, need not be modified if they are accessible.

Mirrors

-If existing mirrors are too high, they can be tilted or a full-length mirror can be installed on another wall.

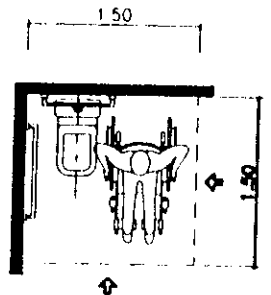
Notes

(1) Toilet seats, bidets, shower seats and bathtub seats are required to be mounted at the same height of the wheelchair seat, i.e. between 0.45m - 0.50 m above floor level.

(2) Grab bars are manufactured in various dimensions and shapes. They can either be wall mounted or floor mounted. Retractable bars are also available.

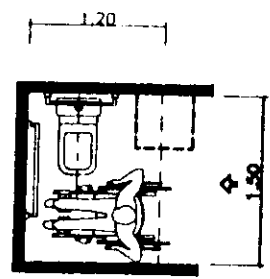
(3) Floor mounted toilet seats and bidets are not recommended as they can be too low for

1



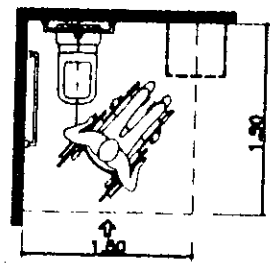
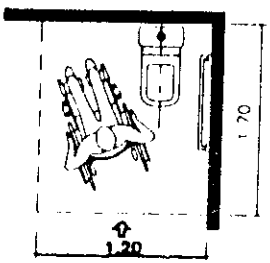
Parallel approach (Easy)

3



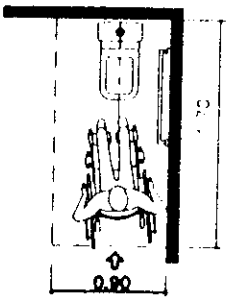
Perpendicular approach (Difficult)

2



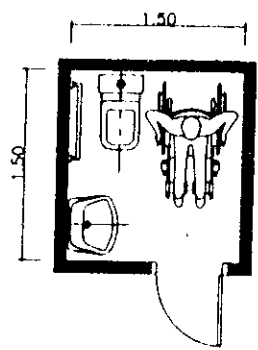
Diagonal approach (Difficult)

4

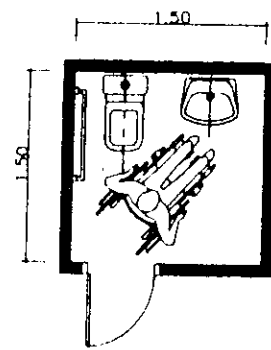


(Very difficult)

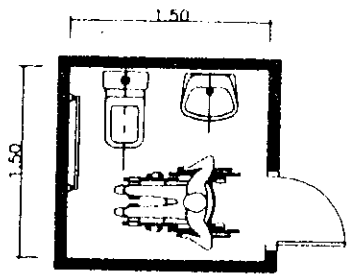
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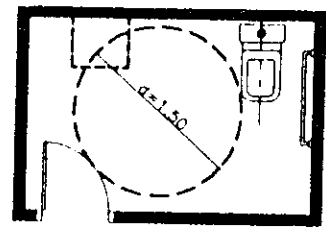
Parallel approach



Diagonal approach

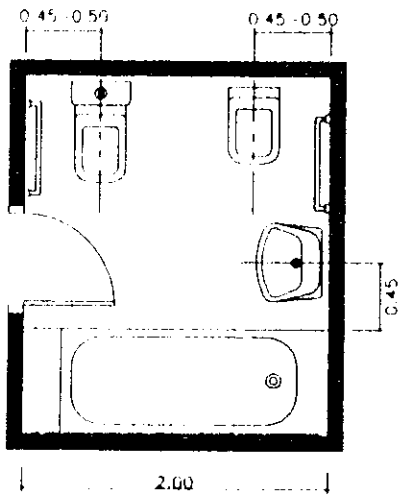
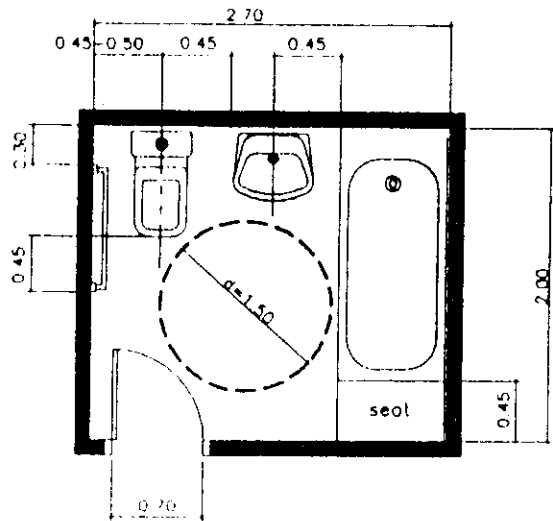


Perpendicular approach



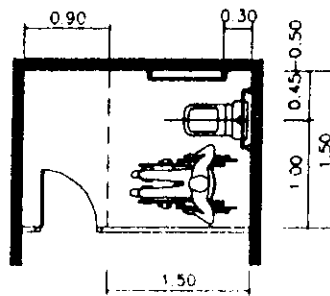
Full maneuvering space

6

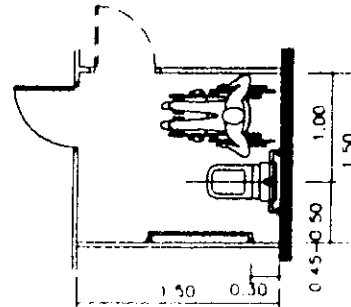


Residential washrooms

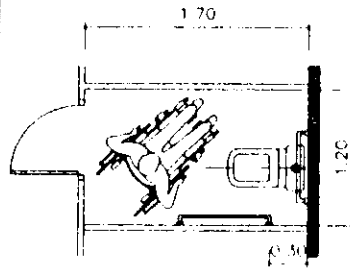
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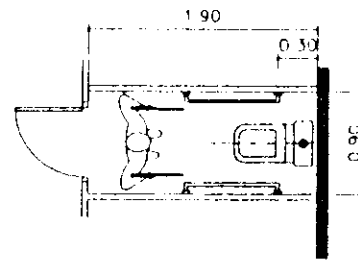
End of Row
(Parallel approach)



Middle of Row
(Parallel approach)

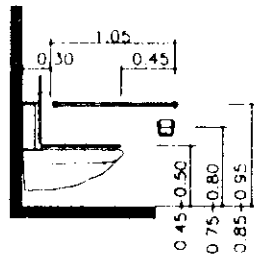
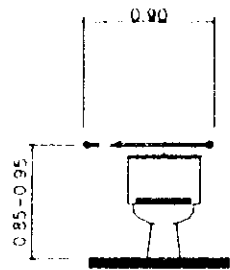
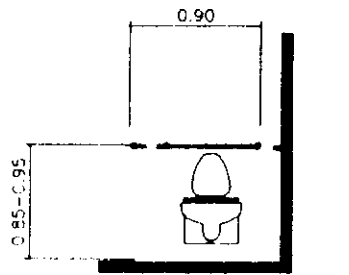


Alternate stall
(Diagonal approach)



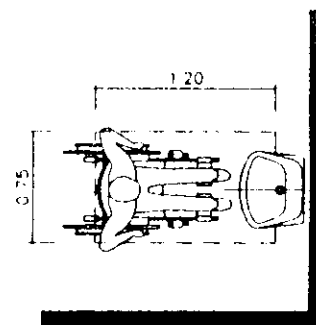
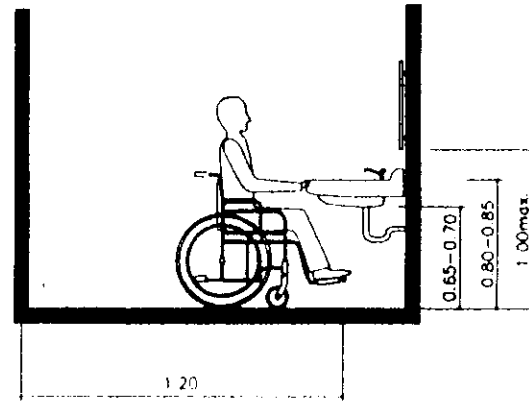
Alternate stall
(Frontal approach)

8



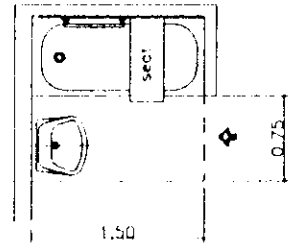
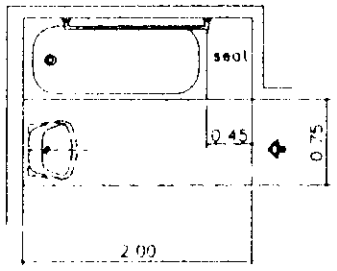
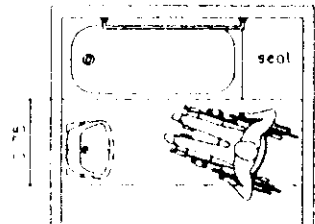
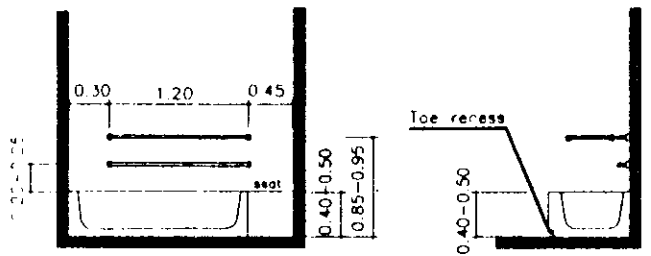
We grab bars

9



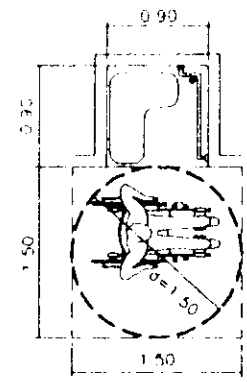
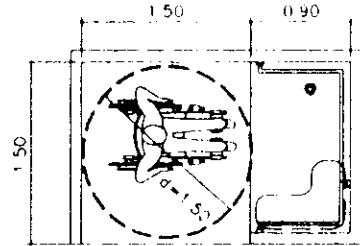
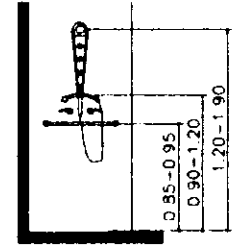
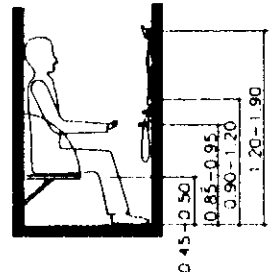
Wash hand basin

10



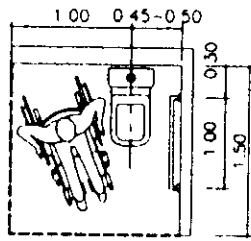
Diagram

11



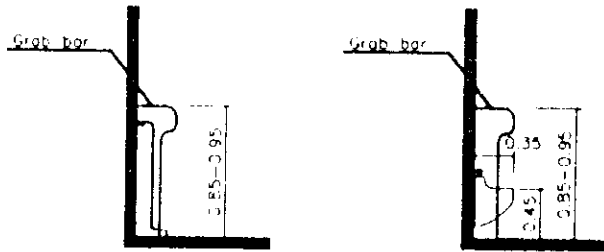
Diagram

12



Bidet

13



Urinalis

BUILDING TYPES

BUILDING TYPES

Problem Identification

-Lack of special provisions for the disabled regarding accessible buildings and facilities.

Planning Principle

-To design, as much as possible, public buildings accessible to everybody.

Design Considerations

General

-Buildings that have to comply with accessibility requirements for the disabled include all public buildings, governmental facilities and institutions, office buildings, residential buildings, commercial uses, health facilities, educational institutions, restaurants, recreational places, sports facilities, religious buildings and all other building types normally used by the general public.

-Except as otherwise specified below, only buildings for private use like private residences, clubs, offices or studios, etc. need not comply by requirements for the disabled accessibility.

-For accessible buildings, at least one entrance per facility should be accessible to a wheelchair confined person. For new buildings the accessible entrance(s) should be the main entrance(s) intended for use by the general public.

-Wherever waiting areas, coffee shops, display areas, merchandising departments, service areas, ticket counters, refreshment stands, etc. are provided for public use, these

facilities should be accessible to disabled people, mainly to wheelchair confined persons.

-All work areas which may result in employment of physically disabled persons should be accessible.

-In any public rest room at least one uni sex compartment should be accessible to a wheelchair confined person.

Residential Buildings

-Private residences may not be accessible to a wheelchair user, however it is desirable to consider a minimum of accessibility requirements so as to accommodate for disabled guests.

-In new apartment buildings constructed for rent or sale, provisions for disabled persons should be considered. The number of wheelchair housing units should be provided at a rate of 1 unit for a typical population of 1000⁽¹⁾.

Office Buildings

-New office buildings should be accessible as much as possible, so as to facilitate equal opportunity of use and employment of disabled persons.

-New low rise office blocks with no elevators need not be accessible by a wheelchair user. Office space at ground level, if any, should be accessible.

-For small office buildings where the floor area limits the provision of accessible rest rooms on each floor, disabled rest rooms

should be located adjacent to accessible elevators.

-Where an office building is subdivided among various tenants, wheelchair rest rooms should be provided on each floor.

Commercial Uses

-Accessibility requirements for wheelchair users should be applied to all new large specialist shops having a selling area of 100 m² or more.⁽²⁾ For small shops provisions for wheelchair users should be applied wherever possible.

-In large multistory department stores and supermarkets, accessible elevators should be installed to provide access to lower and/or upper levels for the benefit of wheelchair users and people with mobility problems.

-Merchandise display areas in accessible shops should be conveniently located to a wheelchair user as much as possible. Angled mirrors can be placed above high shelves for visibility.

-At least one changing room in accessible clothes shops should allow for a full turn maneuvering of a wheelchair.

Assembly Halls

-Requirements of this section apply to movie-theaters, lecture halls, spectators seating in sports centers, and other assembly halls with fixed seating.

-The number of spaces designated for wheelchair users in a seating area can be estimated according to the following table:

Number of seats in a seating area	# of required spaces for wheelchair users
up to 600	6 i.e. 1/100
up to 1000	6+2
over 1000	8+1 for each additional increment of 1000 seats

-Some seats with removable or flip-up armrests should be provided at row ends to accommodate a wheelchair confined person or a person with limited ambulatory mobility. (fig. 1)

-A level floor area for wheelchair users should be placed at row ends and should be scattered on different levels so as to have a variety of seating and viewing locations.

Cafeterias and Restaurants

-New restaurants or parts of new restaurants and eating spaces should be accessible to a wheelchair user, as much as possible.

-In self-service restaurants tray slides and counters should be mounted at an approximate height of 0.90 m from the floor. Food shelves should be mounted at a maximum height of 1.20 m. (fig. 2)

-Cantilevered tables or tables with straight legs at each corner are preferable to central pedestals that might restrict access of wheelchairs.

-Stools and high tables are not suitable for wheelchair users. Low tables should be provided as well.

Hotels

-At least one room per each new hotel or motel should be accessible to a wheelchair user. Bathrooms associated with these rooms have to be fully equipped. The layout inside the rest room should allow a lateral transfer to the toilet seat.

-Rooms specified for wheelchair users should preferably be placed at ground level to have a direct means of escape in case of fire.

Hospitals and Health Facilities

-All entrances should be accessible to a wheelchair confined person.

-Accessibility should be provided to all rooms for the benefit of both patients, disabled visitors and disabled staff members.

-All clinics on all floors should be accessible.

-All patients rest rooms should be accessible to a wheelchair confined person.

-All administrative departments should be accessible to wheelchair confined staff members.

Educational Buildings

-All teaching, administrative and common areas should be accessible to a wheelchair confined person

-Suitable arrangements should be provided for stepped lecture halls or auditoriums. (see table above)

-At least one accessible unisex rest room should be provided per each building other

than students dormitories and residential accommodations.

-All recreational facilities should be usable by disabled people, as much as possible.

-Colleges for physical education, police, military training and other activities requiring full physical abilities need not be accessible to disabled people. Provisions should be made for disabled administrative staff members.

Libraries

-All open book stacks should be accessible

-All library facilities and equipment should be accessible.

-A special room should be provided for sightless and for hearing impaired people that need assistance while reading.

Sports Buildings

-Sports halls should be accessible to a wheelchair confined person, as much as possible.

-At least one shower room, one rest room and one changing room per facility should be accessible to a wheelchair user.

-Spectators seating areas should be provided for wheelchair users as specified (see table above).

Public Transit Buildings

-All public areas used by passengers such as banks, shops, waiting areas, customs area, baggage halls, booking halls, waiting areas,

inquiry offices, etc. should be accessible to a wheelchair confined person, wherever possible.

-In bus, air and sea terminals, adjoining spaces next to seating facilities should be provided for disable people using a wheelchair.

Industrial Buildings

-Provisions for disabled employees are directly related to the production work. Provisions for disabled people need not be considered in heavy manufacturing factories.

-Provisions for all disabled people should be incorporated in the design of new light manufacturing factories where disabled people may be employed.

Existing Constructions

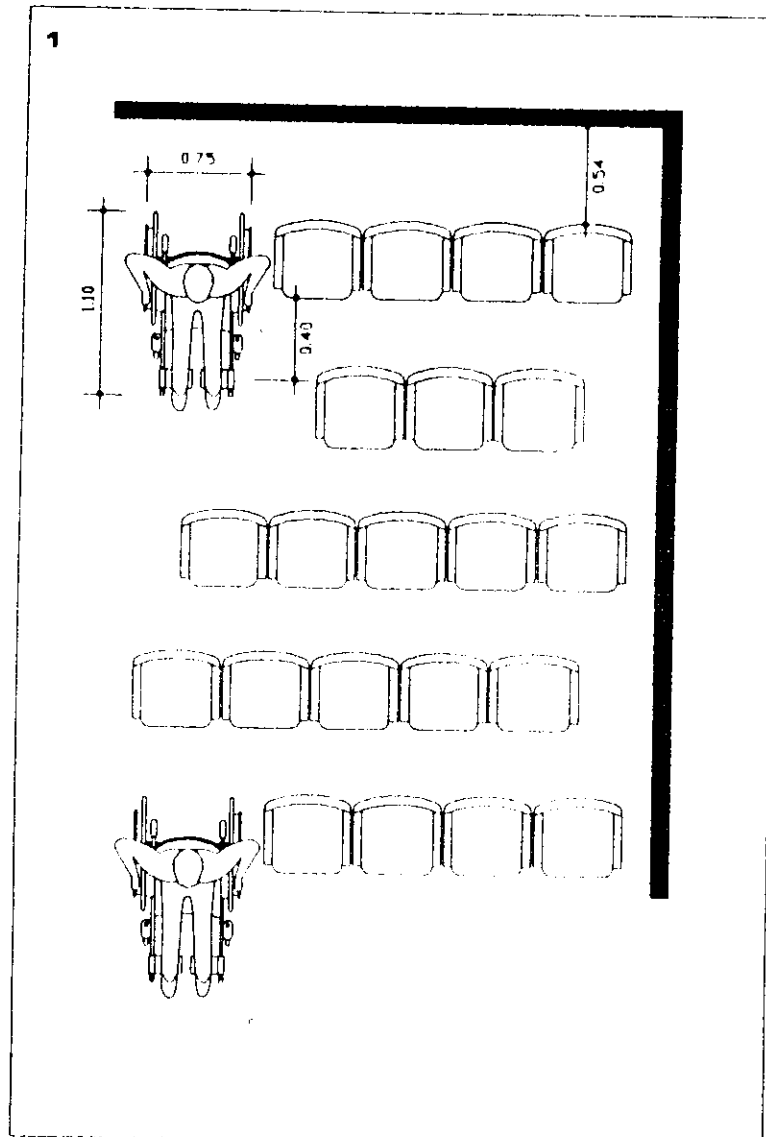
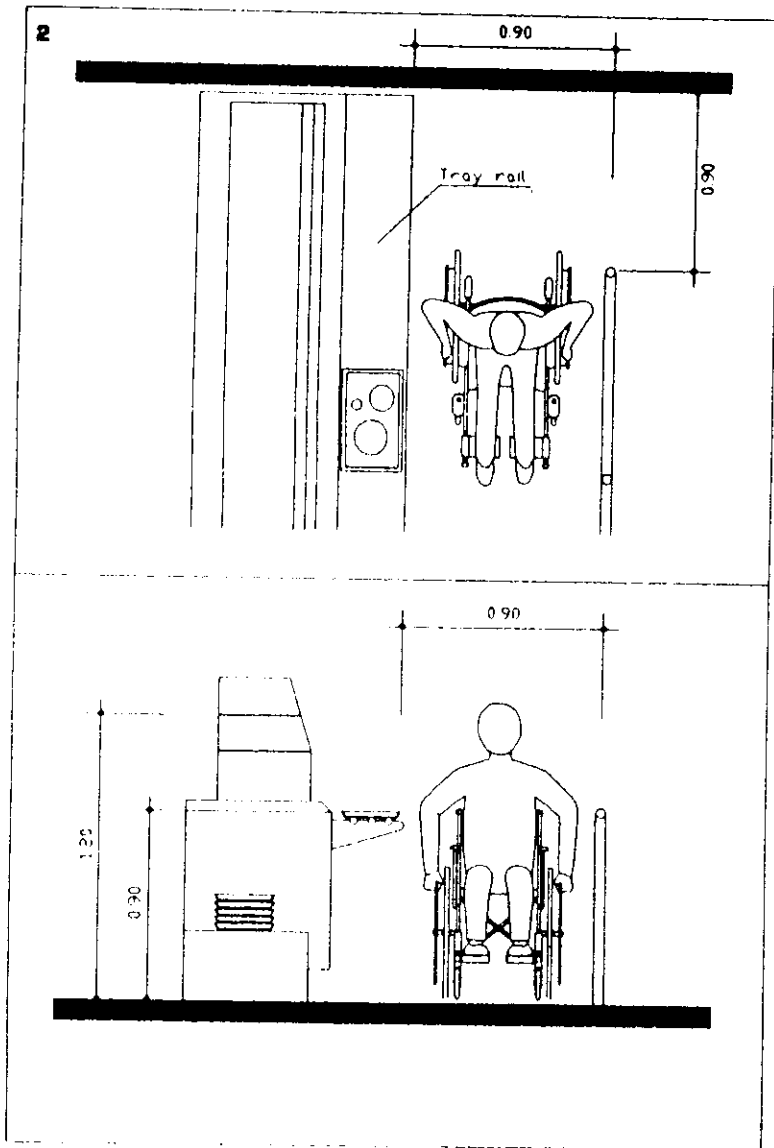
-The highest degree of accessibility to all people should be provided as much as possible where conceivable (see above requirements).

-For historic monuments, impossible to adapt to suite the requirements of disabled people without affecting the historical character, the challenge is to find alternative solutions or other innovative methods that do not conflict with preservation requirements. However, under all circumstances the character of a classified historical building should be preserved. Any modification that seriously harm its character, material, features or spaces is prohibited.

Notes

⁽¹⁾This figure is just a preliminary estimation based on a summary of suggested housing provisions, by Selwyn Goldsmith, Designing for the Disabled (p 418). It is up to every local authority to determine the exact number and the distribution of housing accommodations for disabled people, mainly wheelchair confined persons, based on the needs of individual districts.

⁽²⁾This figure is also a preliminary estimation based on the same source.



EMERGENCY AND FIRE SAFETY

EMERGENCY AND FIRE SAFETY

Problem Identification

- Lack of safety precautions.
- Inaccessible and undesigned escape routes.

Planning Principle

- To incorporate disabled accessibility requirements in all provisions for safety and emergency exit.

Design Considerations

General

-For non sprinklered buildings, every storey required by the Fire Code to have more than one egress, should have at least two separate accessible paths with different travel directions, leading to one or more of the following egress provisions: (1)

- (a) To an exterior open space or to a ramp leading to ground level.
- (b) To a fire protected zone⁽²⁾ within the floor area or to a refuge area within the elevator or stairwell space, served by an elevator intended for the use of fire fighters as means of evacuating disabled people. (fig. 1) (fig. 2) (fig. 3)
- (c) To a balcony in case of residential occupancies.

Refuge Area

-Refuge area is where disabled people can wait in case of emergency evacuation until they can exit.

-Refuge areas should be isolated by automatic closing fire doors. (fig. 2)

-Access to at least two separate exits should be provided from each area. (fig. 1).

-Refuge area should be identified by signage.

Emergency Exit Doors

-Should be clearly identified as exit doors.

-For two leafs exit doors, the width of the leaf should not be less than 0.80 m.

-The door opening should be in the direction of exit travel except where allowed by the Fire Code.

-Doors should be easy to open without effort for the convenience of people with limited use of arms. Power assisted doors are not recommended for emergency because of possible power failure. (see Doors)

-Emergency doors should be opened without keys or special mechanisms, except for places where people are under legal restraint.

-Knurled door handles are recommended for fire escapes and doors leading to dangerous and hazardous areas.

-Panic bars and manual release doorware should be located at a height between 0.90 m - 1.20 m from finished floor level.

Alarms

-Simultaneously operating audible and visual emergency alarms are required to alert both visually and hearing impaired persons.

-Alarm signals should be continuous and directional.

-Alarm devices should be installed in corridors and hallways as well as in rest rooms and other isolated areas.

Fire fighting equipment:

-Fire fighting equipment should be accessible and mounted with its center at a comfortable height between 0.90 m - 1.20m.

Exit Stairs and Ramps

(see Ramps - Stairs)

Exit Vestibules and Corridors

(see Vestibule - Corridors)

-An increase in the emergency exit corridor width enables wheelchair users to turn around faster.

-No stairs, steps and obstructions should be used in an exit passage. (see Obstructions)

Balconies

-The balcony floor should be flush with the interior finished floor, or lower by a maximum of 20 mm.

-Thresholds should be avoided. (see Doors)

-Outward swinging doors are recommended.

Information Display

-It is essential to display the floor plan showing all emergency exits.

-The escape route should be expressed in Braille.

Existing Constructions

Notes:

⁽¹⁾ These measures can not provide absolute safety but are intended as temporary refuge for disabled persons. Special safety measures should be designed in accordance with the Fire Code (now under preparation).

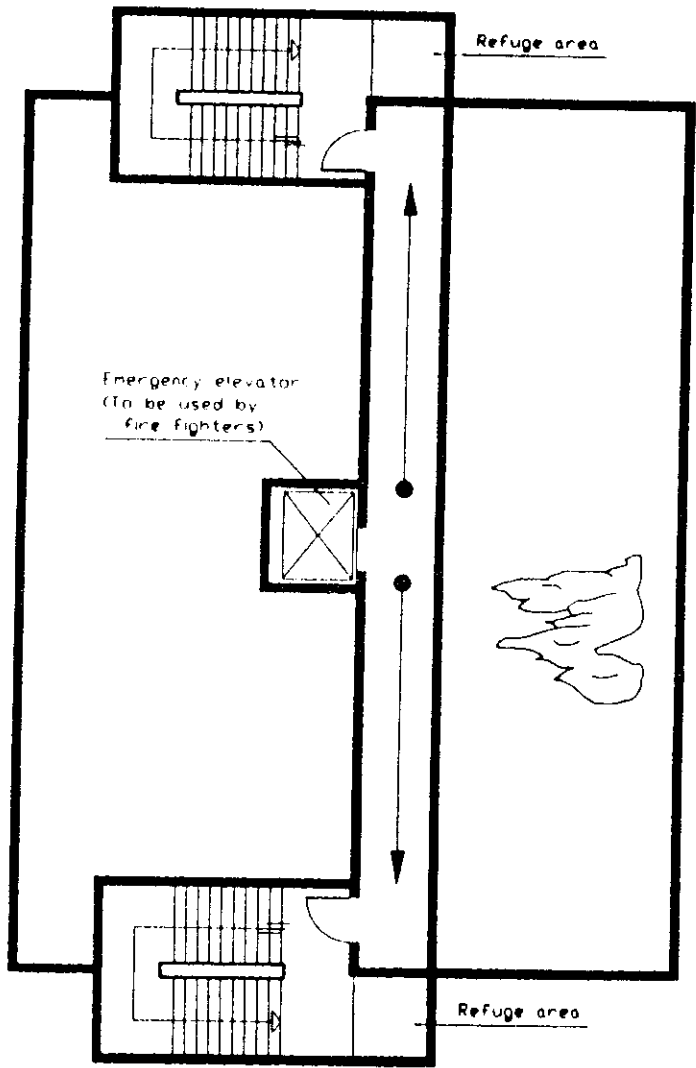
⁽²⁾ Every floor is required to be subdivided into at least two fire protected zones with each zone providing a refuge area sufficient to accommodate the occupants of the whole floor:

-The floor area needed by a non disabled person is 0.5 m².

-The floor area needed by a wheelchair confined person is 1.5 m².

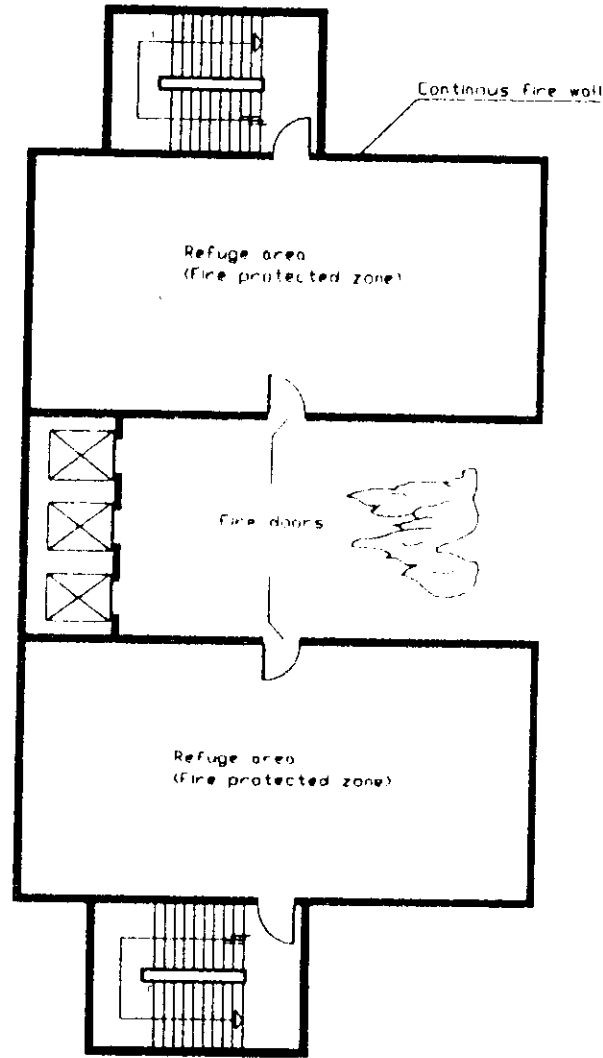
The floor area needed by a bedridden patient is 2.5 m².

2



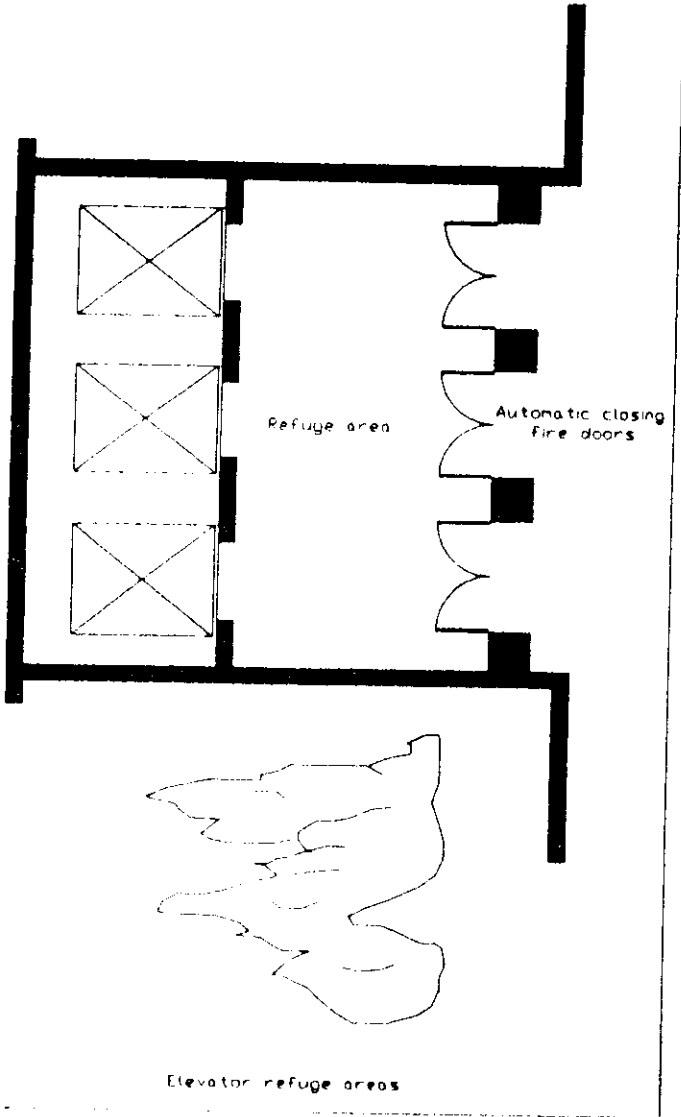
Stair well refuge area

1



Refuge areas within floor areas

3



IMPLEMENTATION CHECKLIST

IMPLEMENTATION CHECKLIST

Solutions in italics apply to existing constructions only

Obstructions

Yes	No	Questions	Possible Solutions
<input type="checkbox"/>	<input type="checkbox"/>	-Can all protruding objects within the path of travel be detected by the cane of a sightless person?	-Remove or block out protruding parts.
<input type="checkbox"/>	<input type="checkbox"/>	-Are all overhanging obstructions mounted at a minimum height of 2.00 m (1.95 m)?	-Place tactile marking extending at least 0.60 m beyond the projection area of the obstruction. -Construct a 0.10 m raised platform around the obstacle.
<input type="checkbox"/>	<input type="checkbox"/>	-Can all obstacles within the path of travel be easily identified by a partially sighted person?	-Place a cane detectable object on the ground underneath low mounted overhanging obstructions. -Add a cane detectable base that has a straight shape extending to the ground. -Mark obstructions at eye level with contrasting colour marking strips of at least 0.30 m length.

Signage

<input type="checkbox"/>	<input type="checkbox"/>	-Are accessible spaces identified by the international symbol of accessibility?	-Mark accessible spaces with the international sign of accessibility.
<input type="checkbox"/>	<input type="checkbox"/>	-Are there directional signs indicating the location of accessible facilities?	-Provide directional signs.
<input type="checkbox"/>	<input type="checkbox"/>	-Are maps, information panels and wall mounted signs placed at a height between 0.90 m - 1.80 m.?	-Adjust the height of too high or too low mounted information signs.
<input type="checkbox"/>	<input type="checkbox"/>	-Are signs clear, simple and easy to read?	-Colour engraved texts. -Replace sign.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the colour of signs clearly distinguishable?	-Use contrasting colours.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the surface of the sign processed so as to prevent glare?	-Provide a non gloss surface.
<input type="checkbox"/>	<input type="checkbox"/>	-Is a relief text or a text in Braille available next to information signs?	-Add a text in relief or in Braille.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the lettering size proportional to the reading distance?	-Change the lettering size.

Street Furniture

<input type="checkbox"/>	<input type="checkbox"/>	-Does street furniture location obstruct the free passage of pedestrians?	-Change street furniture location -Mark the location of street furniture with tactile marking.
		Resting Facilities	
<input type="checkbox"/>	<input type="checkbox"/>	-Are resting facilities provided at regular intervals?	-Provide seating facilities at regular intervals between 100.00 m -200.00m.
<input type="checkbox"/>	<input type="checkbox"/>	-Is there an adjoining space for a wheelchair next to benches and public seats?	-Rearrange the layout of seats to allow an adjoining space of at least 1.20 m.
<input type="checkbox"/>	<input type="checkbox"/>	-Are public seats between 0.45 m - 0.50 m high?	-Modify or replace too low and too high seats and tables.
<input type="checkbox"/>	<input type="checkbox"/>	-Are the tops of tables between 0.75 m -0.90 m high?	
<input type="checkbox"/>	<input type="checkbox"/>	-Are knee spaces at accessible tables at least 0.70 m high, 0.85 m wide and 0.60 m deep?	
		Public Telephones	
<input type="checkbox"/>	<input type="checkbox"/>	-Is there at least one telephone accessible to a wheelchair user?	-Enlarge or adjust one telephone booth.
<input type="checkbox"/>	<input type="checkbox"/>	-Is there at least one telephone equipped with hearing aids?	-Install volume controls and induction loops.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the telephone numbering system expressed in relief?	-Replace the dial numbering system by push buttons expressed in relief -Reduce the dial tension.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the coin slot mounted at a maximum height of 1.20 m (1.40 m)?	-Reduce the mounting height.
<input type="checkbox"/>	<input type="checkbox"/>	-Are accessible facilities identified?	-Add signage.
		Letter boxes	
<input type="checkbox"/>	<input type="checkbox"/>	-Are letter boxes slots mounted at a maximum height of 1.20 m (1.40 m)?	-Modify the height of the letter slot.
		Water Fountains	
<input type="checkbox"/>	<input type="checkbox"/>	-Are water fountains spouts mounted at an approximate height of 0.90m?	-Modify the height of high drinking fountains. -Install a double tier fountain.
<input type="checkbox"/>	<input type="checkbox"/>	-Are controls easy to operate with one closed fist?	-Replace controls.

Pathways

<input type="checkbox"/>	<input type="checkbox"/>	-Is the pathway clear of obstructions?	-Remove or relocate obstructions. -Mark obstructions with tactile marking.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the path of travel free of steps or stairs?	-Provide an alternative accessible pathway. -Construct a ramp.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the path of travel easy to detect?	-Continue natural guide lines. -Construct guide strips. -Provide a tactile marking area of at least 0.90 m x 0.90 m at changes in the pathway direction. -Construct tactile marking to indicate the location of curb ramps, stairs, ramps and obstructions.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the pathway at least 0.90 m wide?	-Widen the pathway. -Remove obstructions and landscape features than limit the pathway width.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the surface, level, smooth and non-slip?	-Replace gravel paths with uniform texture.
<input type="checkbox"/>	<input type="checkbox"/>	-Does the pathway have a different colour and texture than the adjacent surfaces?	-Repair holes and uneven paving -Apply textured rubber stuck - on tiles to slippery existing paving.
<input type="checkbox"/>	<input type="checkbox"/>	-Are manholes placed outside the pedestrian path of travel?	-Relocate grating outside the path of travel.
<input type="checkbox"/>	<input type="checkbox"/>	-Is grating flush with the surface of the pathway?	-Make grating even with the pathway surface.
<input type="checkbox"/>	<input type="checkbox"/>	-Are the grating openings narrow, not more than 13 mm?	-Replace wide opening pattern gratings.
<input type="checkbox"/>	<input type="checkbox"/>	-Are the edges of raised pathways protected?	-Construct guards with a minimum height of 0.15 m.
<input type="checkbox"/>	<input type="checkbox"/>	-Are there barriers separating the pathway from planting areas, pools and other landscape features?	
<input type="checkbox"/>	<input type="checkbox"/>	-Are plants varieties used unobtrusive to the pathway ?	-Replace plants varieties.
<input type="checkbox"/>	<input type="checkbox"/>	-Are plants varieties used not harmful?	-Relocate plants varieties.
<input type="checkbox"/>	<input type="checkbox"/>	-Are plants varieties used not harmful to the surface of the pathway?	-Clean pathway surface constantly. -Put warning signs.

Curb Ramps

	<p>-Are curb ramps provided to overcome differences in level between the road surface and pathways level at:</p> <ul style="list-style-type: none"> * Pedestrian crossings? * Drop-off zones? * Accessible parking spaces? * Close to building entrances? <p>-Are curb ramps located at each corner of each street intersection?</p> <p>-Is every curb ramp faced by another curb ramp on the opposite side of the street?</p> <p>-Are curb ramps clear to identify?</p> <p>-Are curb ramps placed outside the usual line of pedestrian flow?</p> <p>-Is the maximum slope of a curb ramp 1:12, (1:10)?</p>	<p>-Install curb ramps.</p> <p>-Slope narrow pavements to street level.</p> <p>-Install curb ramps.</p> <p>-Apply a coloured texture to the surface of the curb ramp.</p> <p>-Construct guide lines to direct pedestrians to the location of curb ramps</p> <p>-Widen pathway.</p> <p>-Add a small built up curb ramp.</p> <p>-Redesign or replace steep unsafe curb ramps.</p>
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Pedestrian Crossings

	<ul style="list-style-type: none"> -Is the road surface even and slip resistant, at pedestrian crossings? -Is the road surface at pedestrian crossings clear to identify? -Are pedestrian traffic lights installed? -Are traffic lights provided with both audible and visual signals? -Is the minimum time interval for crossing adapted to the slowest person? -Are push buttons located at a maximum height of 1.20 m? -Do traffic islands have street level pathways cut through them? -Is the minimum depth of the cut within the traffic island is 1.20 m and the minimum width 1.50 m? 	<ul style="list-style-type: none"> -Add a slip resistant surface. -Construct zebra coloured markings to identify the pedestrian crossing area within the road surface. -Install traffic lights. -Provide both audible and visual traffic lights signals. -Delay the crossing time interval. -Install push buttons at a maximum height of 1.20 m. -Cut a level area, at least 1.50 m wide and 1.20 m long, through traffic islands.
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Parking

<p>-Are there accessible parking facilities? -Is the number of accessible parking spaces enough? -Are the designated spaces wide enough?</p> <p>-Are indoor accessible parking spaces located closest to accessible elevators or lifts?</p> <p>-Are accessible parking spaces within a maximum distance of 50.00 m from building entrances?</p> <p>-Is the minimum height clearance in indoor parking 2.40 m?</p> <p>-Do curb ramps exist to connect accessible parking spaces with side curbs?</p> <p>-If no curb exists, can the parking space be differentiated from the pedestrian path?</p> <p>-Are accessible parking spaces marked by the international sign of accessibility? -Are there enforcement procedures to ensure that accessible parking space are not misused or used by non disabled people?</p> <p>-Is there a 3.60 m wide drop-off area within 30.00 m of the accessible entrance?</p> <p>-If the drop-off area has a curb, is there a curb ramp leading to the pathway?</p> <p>-If the drop-off has no curb, is there a warning to sightless people?</p>	<p>-Re-strip to obtain the required number of spaces. -Combine two parking spaces to obtain one accessible space. -Combine three parking spaces to obtain two accessible spaces.</p> <p>-Locate accessible parking spaces close to accessible elevators.</p> <p>-Construct accessible parking spaces close to the accessible entrance. -Provide a drop-off zone near the accessible entrance.</p> <p>-Modify the parking slab height. -Provide alternate outdoor provisions for disabled people vans.</p> <p>-Construct curb ramps.</p> <p>-Provide a minimum 0.60 m wide tactile marking to separate the pathway from the vehicular area. -Use pre-cast car stops -Use bollards.</p> <p>-Add signage.</p> <p>-Provide a drop-off area.</p> <p>-Provide a curb-ramp.</p> <p>-Provide a minimum 0.60 m wide tactile marking to separate pathway from vehicular area. -Use pre-cast car stops -Use bollards</p>
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Ramps

<input type="checkbox"/>	<input type="checkbox"/>	-Is there a complementary ramped route next to stairs or steps?	-Construct a ramp.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the ramp slope no greater than 1:20? -Do steeper ramps correspond to the requirements?	-Redesign or relocate ramp. -Lengthen ramp to reduce slope.
<input type="checkbox"/>	<input type="checkbox"/>	-Is there a landing of at least 1.20 m length, at 10.00 m intervals, at every change in direction and at top and bottom of every ramp?	-Remodel or relocate the ramp.
<input type="checkbox"/>	<input type="checkbox"/>	-Are ramps with a rise of 0.45 m or more protected on both sides?	-Add railings.
<input type="checkbox"/>	<input type="checkbox"/>	-Are wide ramps, more than 3.00 m, provided with an intermediate handrail?	-Add an intermediate handrail.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the width of the ramp no less than 0.90 m?	-Widen the ramp.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the surface of ramps non-slip?	-Add non slip surface material.
<input type="checkbox"/>	<input type="checkbox"/>	-Is the ramp surface clear from obstructions?	-Remove obstructions.
		Is the location of the ramp clearly identified?	-Construct coloured tactile marking strips of minimum 0.60 m width at top, bottom of the landing and at every change of direction.

Elevators

	<ul style="list-style-type: none"> -Is there an accessible path leading to the elevator? -Are all levels generally used by the public accessible? -Are the minimum internal dimensions of a residential elevator cab no less than 1.00 m x 1.30 m. (0.95 m x 1.25 m)? - Is the clear door opening no less than 0.80 m (0.75 m)? -Is the elevator cab provided with handrails on three sides? -Are the handrails mounted at a height between 0.80m - 0.85 m? -Is the maximum tolerance for stop precision 20 mm? -Is the control panel mounted at a height between 0.90 m - 1.20 m (not exceeding 1.40 m)? -Are control buttons large and in relief? -Are lobby call buttons placed at a height between 0.90 m - 1.20 m (not exceeding 1.40 m)? -Is the elevator provided with audible and visual warning signals indicating arrival at a floor? -Is the finishing of the elevator cab non-skid resilient? -Is the elevator door easy to identify? -Is the emergency intercom usable without voice communication? -Are there relief or Braille instructions for the communication system? -Is there a sign on the jamb of the elevator door identifying the floor number in relief or Braille letters? 	<ul style="list-style-type: none"> -Add a ramp or a lift if stairs exist. -Enlarge the elevator dimensions. -Install a new cab. -Enlarge the doors opening -Install new doors. -Install handrails. -Modify height of handrails. -Adjust the stop precision. -Modify the height of control panels. -Change control panel. -Install relief or Braille lettering next to buttons. -Adjust the position of call buttons. -Add bells and flash light alarm signals. -Change finish. -Change the colour of the elevator door frame. -Replace the communication system. -Add simple tactile instructions. -Install tactile signs at an approximate height of 1.40 m from floor to identify the floor number
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Lifts

	<p>-Can the lift be used without assistance?</p> <p>-When vertical movement lifts are installed, is the maximum level change no more than 2.50 m?</p> <p>-Is the lift placed within a closed structure for level changes of 1.20 m or more?</p> <p>-Where inclined movement lifts are installed, is the minimum width of the stairs no less than 0.90 m?</p> <p>-Is the minimum lift size no less than 0.90 m x 1.20 m?</p> <p>-Are controls placed at a height not exceeding 1.20 m (1.40 m)?</p>	<p>-Post clear instructions for use of the lift at each stopping level.</p> <p>-Provide a call button.</p> <p>-Replace the lift by an elevator.</p> <p>-Place the lift within an enclosed structure.</p> <p>-Widen stairs.</p> <p>-Replace lift.</p> <p>-Lower controls.</p>
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Stairs

	<p>-Is the minimum width of the stairs no less than 0.90 m?</p> <p>-Is an intermediate landing installed for stairs 3.00 m wide or more?</p> <p>-Is there an intermediate landing with a length no less than 1.20 m, when the stairs cover a difference in level more than 2.50 m?</p> <p>-Is the landing length at top and at bottom of the stairs no less than 1.20 m?</p> <p>-Do stairs have flush or rounded nosing?</p> <p>-Do treads have a non slip surface?</p> <p>-Is the location of the stairs clearly identified?</p>	<p>-Widen stairs.</p> <p>-Install an intermediate landing.</p> <p>-Remodel stairs.</p> <p>-Enlarge landing space.</p> <p>-Remodel nosing. -Add slip resistance strips to nosing.</p> <p>-Change finish material.</p> <p>-Construct coloured tactile marking strips of minimum 0.60 m width, at top, bottom and at the intermediate landings of each stairs.</p> <p>-Identify emergency stairs by signage.</p>
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Railing and Handrails

	<ul style="list-style-type: none"> -Are safety guards or railing installed around all hazardous areas and raised platforms of more than 0.40 m high? -Is the spacing between the vertical and horizontal elements of railing around dangerous areas narrow? -Are handrails mounted at a height between 0.85 m - 0.90 m? -Are handrails easy to grip? -Are railings securely attached? -Do handrails extend horizontally for a distance between 0.30 m -0.45 m at top and bottom of every stair or ramp? -Are handrails continuous throughout the full length of ramps and stairs? -Are handrails continuous throughout the landing of ramps and stairs except when interrupted by doorways? -Are low positioned windows at landings protected by railings? -Is the space between the handrail and the wall no less than 40 mm for smooth walls, and 60 mm for rough textured walls? -For fully recessed handrails, is the distance between the top of the rail and the top of the recess no less than 0.15 m? -Are handrails easy to identify? 	<ul style="list-style-type: none"> -Install safety guards or railings. -Change railings. -Change handrails. -Reinforce fixation. -Add or replace railings. -Continue or replace handrails. -Install railings. -Adjust the location of the handrail. -Paint the handrail with a contrasting colour. -Provide a tactile strip indication for emergency stairs.
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Entrances

	<ul style="list-style-type: none"> -Are the primary entrances to buildings accessible? -Is the approach to the entrance free of stairs and steps? -In multistory buildings, does the accessible entrance permit access to a conveniently located elevator? -Is the accessible entrance clear to identify? -Are the entrance landing dimensions sufficient? -Is the landing surface level and non slippery? -Can entrance doors operate independently? -Is the clear door width no less than 0.90 m? 	<ul style="list-style-type: none"> -Redesign the entrance so as to be accessible. -Construct a ramp. -Provide an accessible route. -Add the international sign of accessibility. -Paint the entrance door with a contrasting colour to the surrounding surface -Enlarge the landing area. -Add a slip resistant finish. -Install a lighter door. -Change the door opening mechanism. -Enlarge the door opening -Install automatic sliding doors. -Use swing clear hinge doors.
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Vestibules

	<ul style="list-style-type: none"> -Is there enough space to maneuver between two sets of doors? 	<ul style="list-style-type: none"> -Enlarge vestibule space. -Install automatic sliding doors. -Install double swinging doors. -Remove the inside or second set of doors. -Change the direction of the swing of the door.
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Doors

	<p>-Can doors be opened without too much force?</p> <p>-Do automatic doors have a sufficiently long opening interval?</p> <p>-Are automatic doors push buttons located at a maximum height of 1.20 m (<i>not exceeding 1.40 m</i>)?</p> <p>-Is the space beside the latch side of the door enough?</p> <p>-Are accessible doors placed adjacent to revolving doors and turnstiles?</p> <p>-Are glazed doors marked with a coloured band at eye level?</p> <p>-Is the clear width of straight access interior doors no less than 0.75 m?</p> <p>-Is the minimum clear width of interior doors no less than 0.80 m?</p> <p>-For double leaf doors, is the width of one of the leaves no less than 0.80 m?</p> <p>-Do door handles have a shape that is easy to grasp with one hand?</p> <p>-Do bathrooms doors and doors fitted with spring closers have an extra pull handle?</p> <p>-Is manual door hardware (handles, locks, pulls, etc.) located no higher than 1.20 m (<i>not exceeding 1.40 m</i>)?</p> <p>-Are door mats flush with the floor surface and secured to the floor at all edges?</p> <p>-Is the threshold no more than 20 mm high and beveled?</p>	<p>-Install lighter doors. -Install power assisted door openers.</p> <p>-Adjust the opening interval.</p> <p>-Lower the height of buttons.</p> <p>-Move door. -Move or remove obstructing partitioning.</p> <p>-Install adjacent sliding or pivoting doors.</p> <p>-Add a coloured band.</p> <p>-Enlarge door opening. -Install offset or swing clear hinges.</p> <p>-Install lever type handle easy to operate with a closed fist. -Install power assisted door openers.</p> <p>-Install an extra pull handle.</p> <p>-Adjust the height of the door hardware.</p> <p>-Replace or remove mats. -Secure mats at edges.</p> <p>-Remove high thresholds. -Add bevel to both sides.</p>
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Corridors

	<p>-Is the minimum unobstructed width of low traffic corridors no less than 0.90 m?</p> <p>-Is the unobstructed width of a public corridor no less than 1.50 m?</p> <p>-Does the corridor width allow maneuvering through doors located along its length?</p> <p>-Are differences in level connected by ramps or lifts?</p>	<p>-Widen the corridor.</p> <p><i>-Locate passing areas at frequent intervals.</i></p> <p>-Change the direction of the door swing.</p> <p>-Widen Corridor.</p> <p><i>-Remove door if possible.</i></p> <p>-Install a lift.</p> <p>-Construct a ramp.</p>
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Rest Rooms

	<p><u>Public Rest Rooms</u></p> <p>-Is there at least one accessible uni sex rest room to a wheelchair user?</p> <p>-Is the accessible rest room identified by signage?</p>	<p>-Re configure rest rooms.</p> <p><i>-Combine two water closet stalls to create one unisex accessible rest room.</i></p> <p><i>-Widen toilet stalls by moving one of the side partions and/or installing outdoor swinging door.</i></p> <p>-Identify accessible rest room by the international symbol of accessibility.</p>
	<p><u>Residential Rest Rooms</u></p> <p>-Is there sufficient space inside the rest room to maneuver a wheelchair?</p> <p>-Is there at least one accessible shower and/or bathtub?</p>	<p>-Enlarge rest room space.</p> <p>-Re configure shower stalls.</p> <p>-Enlarge rest room.</p> <p><i>-Use the tiled floor area inside the rest room as a shower space.</i></p>

	<p>Fixtures</p> <p>-Are water closets and bidets mounted at a height between 0.45 m -0.50 m?</p> <p>-Is the distance between the toilet seat and the closest adjacent wall, fitted with a grab bar, between 0.45-0.50 m?</p> <p>-Is the accessible wash hand basin mounted at a height between 0.80 m -0.85 m?</p> <p>-Is the accessible shower and the bathtub provided with folding seats ?</p> <p>-Is the floor of the tub slip resistant?</p> <p>-Does the shower tub have a beveled threshold not exceeding 13 mm above the finished floor?</p> <p>-Is the shower tub floor no lower than 20 mm below the surrounding floor area?</p>	<p>-Adjust the height of wall mounted fixtures.</p> <p>-Replace low floor mounted fixtures.</p> <p>-Adjust the location of fixtures.</p> <p>-Install floor mounted grab bars.</p> <p>-Adjust the height of wall mounted fixtures.</p> <p>-Replace floor mounted fixtures.</p> <p>-Install a shower seat at a height between 0.45 m -0.50 m.</p> <p>-Adjust the height of seats.</p> <p>-Change finish material.</p> <p>-Place a slip resistance rubber mat.</p> <p>-Modify the shower tub.</p>
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<p>Grab Bars - Are grab bars installed in water closets, bathtubs and showers at a height between 0.85m -0.95 m?</p> <p>- Do grab bars have a diameter between 30 mm - 40 mm? - Do wall mounted grab bars have a clearance between 35 mm - 40 mm?</p> <p>- Are grab bars non slip? - Can grab bars withstand loads?</p> <p>Faucets - Are faucets easy to grip and operate with one hand? - Are telephone shower fixtures with at least 1.50 m long hose used in showers and bathtubs?</p> <p>Pipes - Are hot water pipes insulated or covered?</p> <p>Accessories and controls - Is the lower edge of mirrors positioned at a height not exceeding 1.00 m? - Is the rest room equipped with an alarm system?</p> <p>- Are flushing arrangements, dispensers and toilet paper mounted between 0.50 m-1.20 m? - Are flushing mechanisms easy to operate?</p> <p>Flooring - Is the flooring material skid-proof, well drained and waterproofed?</p> <p>Doors - Is the door opening no less than 0.75 m? - Can doors be lockable from inside under emergency situations?</p>	<p>- Install grab bars. - Adjust mounting height.</p> <p>- Replace grab bars. - Add a knurled slip resistance surface. - Reinforce walls on which grab bars are installed.</p> <p>- Replace faucets with single lever or push-button type.</p> <p>- Insulate or cover hot water pipes.</p> <p>- Lower or tilt high mirrors. - Install another mirror at another wall.</p> <p>- Install an alarm system operable by a push button located at a maximum height of 1.20 m.</p> <p>- Adjust the height of high too high and too low fixtures.</p> <p>- Change flushing mechanism.</p> <p>- Change flooring material.</p> <p>- Enlarge door opening. - Change the direction of the swing of the door. - Change the direction of the door swing.</p>
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APPENDICES

TROUBLE SHOOTING REFERENCE

Wheelchair Users

Problem	Measure	Reference Chapter
Tackling differences in level between road and pavement	Installation of curb ramps	Curb Ramps
Bridging great differences in height usually tackled by providing stairs	Provision of ramps, wide elevator cabs or lifts	Ramps, Elevators, Lifts
Maneuvering in tight spaces	Provision of wide routes and spaces	Street Furniture, Pathways, Parking, Vestibules, Corridors, Rest Rooms
Passing through narrow door openings and tackling high thresholds	Provision of sufficiently wide door openings with no or low beveled thresholds	Doors
Reaching high controls and objects	Provision of low controls	Heights of Selected Items
Manipulating in rest rooms	Installation of grab bars, bathtub and shower seats	Rest Rooms

People with Limited Walking Abilities

Problem	Measure	Reference Chapter
Tackling level differences	Provision of curb ramps, ramps, elevator and lifts	Curb Ramps, Ramps, Elevators, Lifts
Manipulating in situations requiring speed	Increase of the pedestrian crossing time interval Increase of the opening interval of elevators and automatic doors	Pedestrian Crossing, Elevators, Doors
Climbing stairs and ramps	Provision of handrails to grip	Railings and Handrails
Manipulating in rest rooms	Installation of grab bars, bathtub and shower seats	Rest Rooms
Passing through narrow door openings and tackling high thresholds	Provision of sufficiently wide door openings with no or low beveled thresholds	Doors

The Sightless

Problem	Measure	Reference Chapter
Orientation	Provision of guide strips within the pathway surface Provision of raised curbs and other detectable guiding elements Provision of tactile marking strips to indicate changes in direction, the location of stairs and ramps	Obstructions, Pathways, Curb Ramps, Stairs
Identifying obstructions within the path of travel	Provision of textured paving or tactile marking strips around obstructions	Obstructions, Pathways
Crossing roads	Provision of acoustic traffic signals	Pedestrian Crossing
Manipulating in elevators	Provision of acoustic signals and relief call buttons.	Elevators
Recognizing emergency situations	Provision of acoustic alarm signals	Emergency and Fire Safety
Identifying exit doors and stairs	Provision of tactile marking around knobs of exit doors and handrails of exit stairs	Doors, Railing and Handrails

The Partially Sighted

Problem	Measure	Reference Chapter
Identifying obstructions within the path of travel	Provision of bright coloured markings or signals to identify obstructions	Obstructions
Orientation	Provision of clearly legible lettering and sufficiently large dimensions for direction signs	Signage
Crossing roads	Provision of acoustic traffic signals	Pedestrian Crossings
Manipulating in elevators and in emergency situations	Provision of acoustic alarm signals	Elevators, Emergency and Fire Safety
Locating facilities	Use of contrasting colour for entrance doors, doors, handrails, tactile signage, etc.	Entrances, Elevators, Pedestrian Crossing, Rails and Handrails

The Hearing Impaired

Problem	Measure	Reference Chapter
Crossing roads	Provision of clearly visible coloured signs and traffic signals	Signage, Pedestrian Crossing
Managing in situations involving the use of speech messages, verbal transmission and interaction	Use of clearly written messages especially in emergency situations Installation of induction loops in assembly halls and in public telephones	Street Furniture, Signage, Building Types, Emergency and Fire Safety
Hearing door, elevator and emergency bells	Provision of flash light signals	Elevators, Emergency and Fire Safety

People with Limited Use of Hands or Arms

Opening heavy doors	Use of automatic, or easy to open doors.	Doors
Gripping door knobs	Use of lever type door handles	
Gripping faucets	Use of lever type or push buttons faucets	Rest Rooms

ANTHROPOMETRICS

Dimensional data varies from one person to another and the average dimensions vary from one country to another. The dimensions of the individual human being are not constant as well but change with time. Tables below provide a range of dimensions derived from various studies (see comparative tables). The given measurements take into consideration size variation between males and females as well as between different size persons of the same sex.

Wheelchair Dimensions (fig. 1)

-Dimensions shown in the figure are of a conventional manual wheelchair. Larger dimensions (placed in circles) refer to electric wheelchairs.

Dimensional Data of a Non-Disabled Person. (fig. 2)

Height	1.50 m - 1.90 m
Eye	1.40 m - 1.75 m
Shoulder	1.20 m - 1.55 m

Reaching Zones of a Non-Disabled Person. (fig. 3)

Maximum Reach Up	1.85 m - 2.10 m
Oblique Reach Up	1.65 m - 2.00 m
Forward Reach	1.30 m - 1.45 m

Dimensional Data of a Wheelchair Confined Person (fig. 4)

Head	1.25 m - 1.45 m
Eye	1.16 m - 1.33 m
Shoulder	0.99 m - 1.14 m
Elbow	0.66 m - 0.69 m
Knee/Lap	0.60 m - 0.64 m
Foot	0.18 m - 0.22 m

Vertical Reaching Zones of a Wheelchair Confined Person (fig. 5)

Maximum Reach Up	1.58 m - 1.90 m
Oblique Reach Up	1.47 m - 1.79 m
Forward Reach Up	1.28 m - 1.49 m
Forward Reach	0.99 m - 1.08 m
Forward Reach Down	0.67 m - 0.72 m
Oblique Reach Down	0.37 m - 0.51 m
Maximum Reach Down	0.26 m - 0.45 m

Horizontal Forward Reach of a Wheelchair Confined Person (fig. 6)

Easy Reach	0.50 m - 0.68 m
Maximum Reach	0.71 m - 0.92 m

Common Reaching Zone (fig. 7)

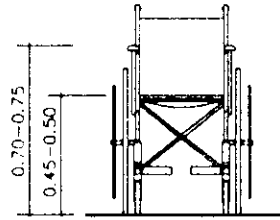
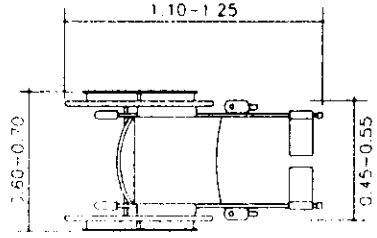
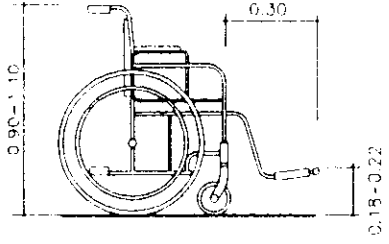
Field of Vision (fig. 8)

Pathway Dimensions (fig. 9)

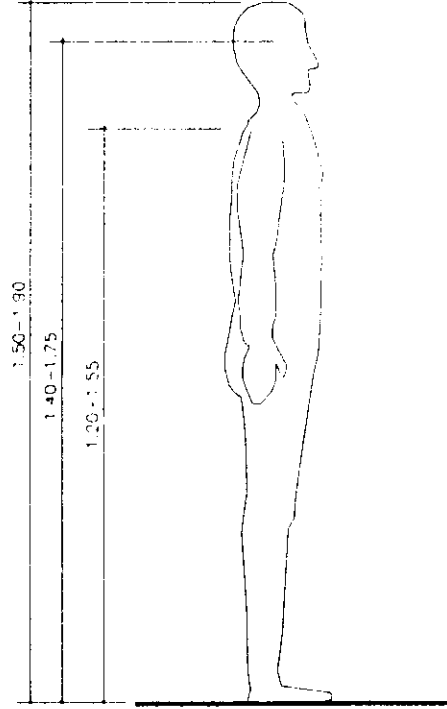
Wheelchair Maneuvering Space (fig. 10)

Maneuvering Clearances at Doors (fig. 11)

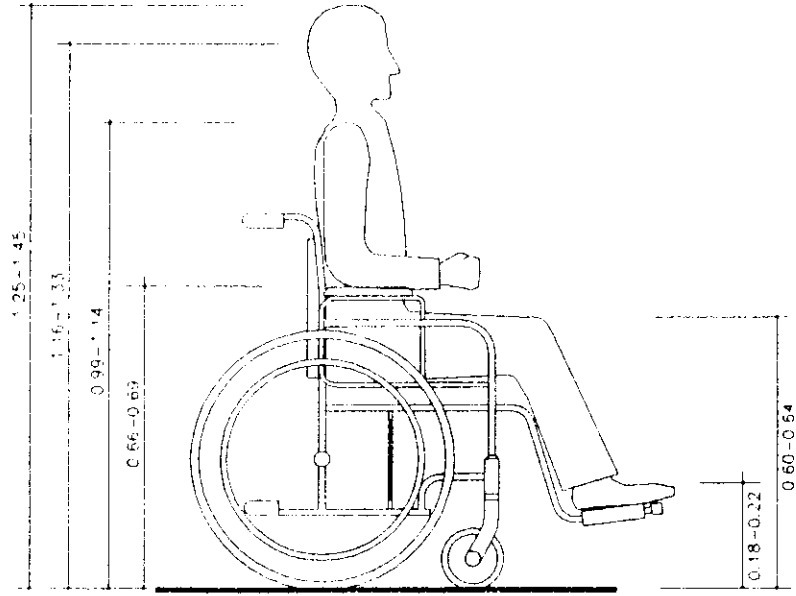
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2

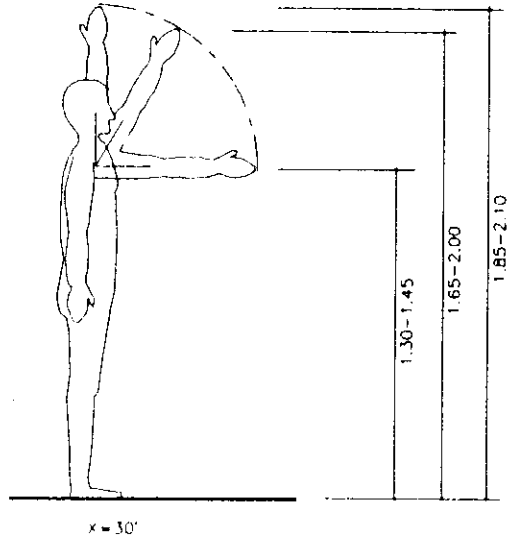


3



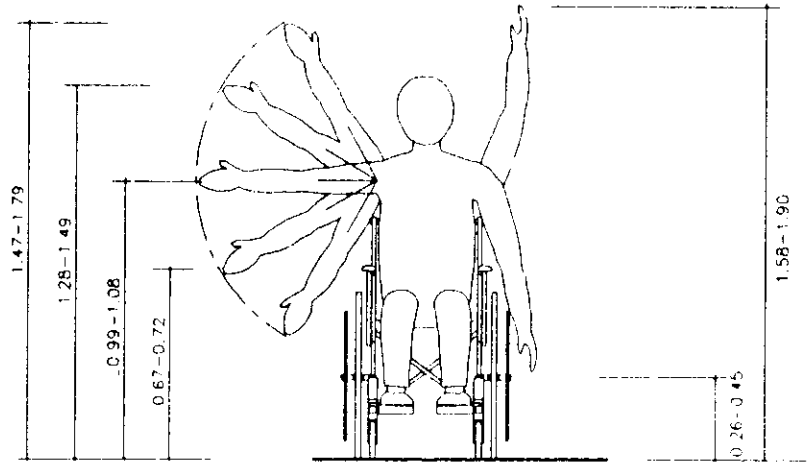
4

Vertical reaching zones of a non-disabled person



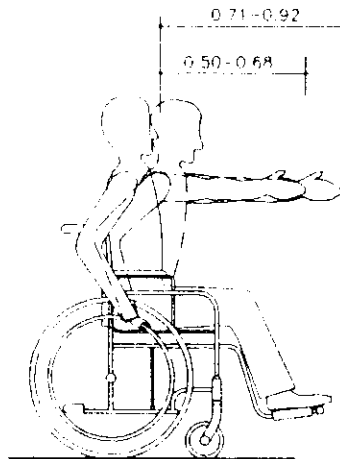
5

Vertical reaching zones of a wheelchair confined person

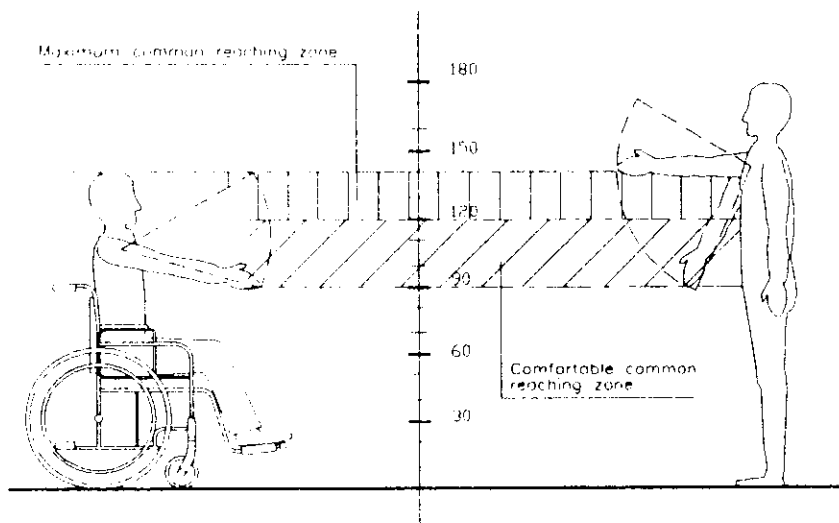


6

Horizontal forward reach of a wheelchair confined person

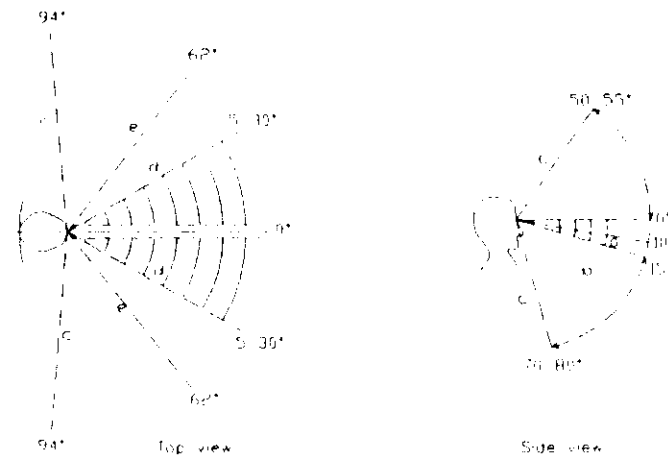


7



Common reaching zone

8

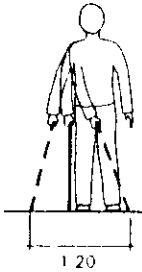


Field of vision

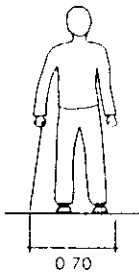
- a Normal optical axis, standing person
- b Normal optical axis, sitting person
- c Limits of field of vision
- d Normal angle of vision
- e Max. angle of vision



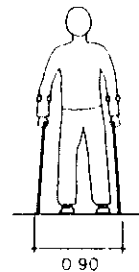
Visually impaired person using a long white cane



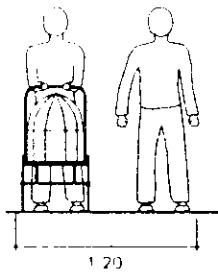
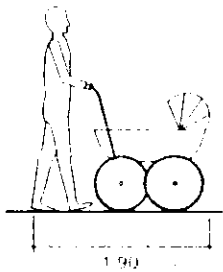
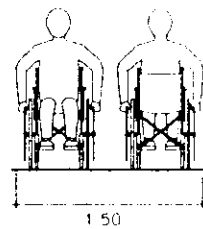
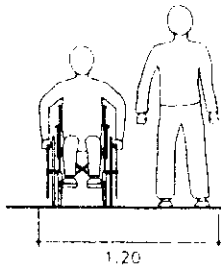
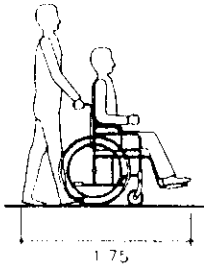
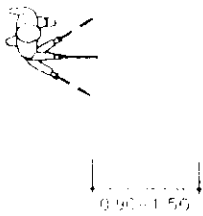
Person using a cane



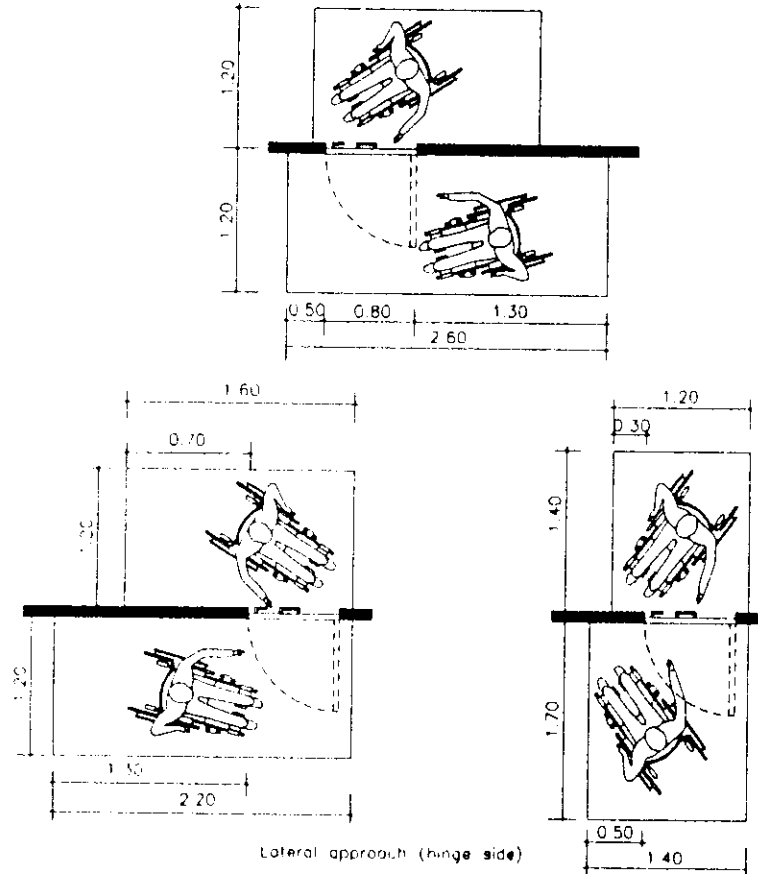
Person using crutches



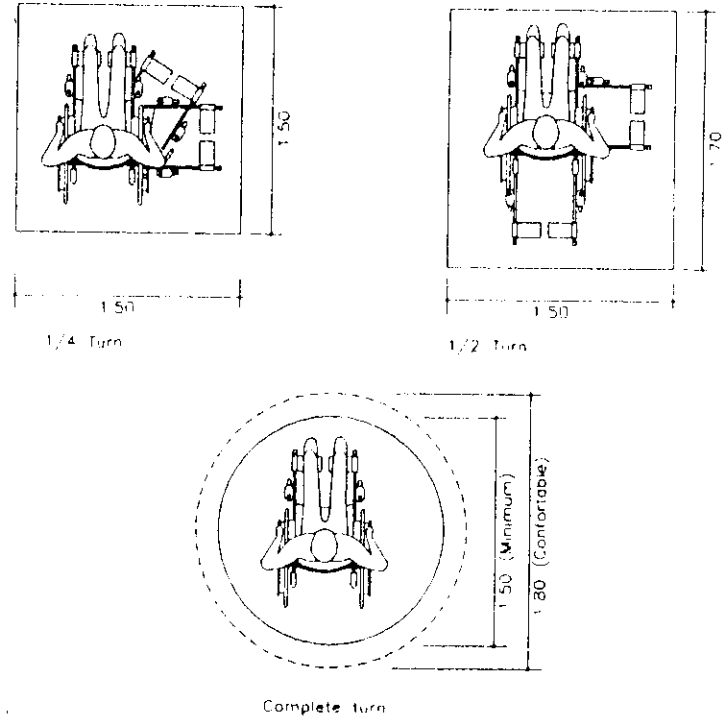
Detectable path dimension



10



11



COMPARATIVE STUDY

Tables below represent a comparison between the minimum and/or recommended measurements prevailing in different countries, for some selected items:

ANS= American National Standards

Canada = Code of Manitoba

DNS= Dutch National Standards

France

Jordan

The Netherlands

SIDA = The Swedish International
Development Authority

BCD = Beirut Central District

الجمهورية اللبنانية
مكتب وزير الدولة لشؤون التنمية الإدارية
مركز مشاريع ودراسات القطاع الخاص

Comparative Study

		ANS	Canada	DNS	France	Jordan	Netherlands	SIDA	Manual
Dimensional Data-Normal Person									
Height	Male			1.74	1.59-1.81	1.76		1.9	1.80-1.90
	Female			1.63	1.51-1.70	1.63		1.5	
Eye Level	Male			1.61		1.64	1.50-1.61	1.75	1.40-1.76
	Female			1.5		1.53		1.4	
Shoulder	Male			1.46		1.43		1.55	1.20-1.88
	Female			1.34		1.34		1.2	
Dimensional Data-Wheelchair user									
Head	Male		1.34	1.38	1.35-1.45	1.36	1.30-1.38	1.4	1.25-1.48
	Female		1.25	1.3	1.31-1.40	1.26			
Eye Level	Male		1.2	1.26	1.25-1.33	1.23	1.17-1.26	1.10-1.30	1.16-1.33
	Female			1.17	1.21-1.28	1.16			
Shoulder	Male		1.05	1.08	1.06-1.14	1.04	1.02-1.08		0.89-1.14
	Female			1.02	1.03-1.09	0.99			
Elbow	Male		0.67		0.74-0.77art.	0.69			0.64-0.64
	Female				0.74-0.76art.	0.69			
Knee/Lap	Male					0.61	0.60-0.64		0.60-0.64
	Female					0.61			
Foot	Male		0.22		0.18-0.22	0.21	0.22	0.2	0.18-0.22
	Female					0.17			

Comparative Study

		ANS	Canada	DNS	France	Jordan	Netherlands	SIDA	Manual
Vertical Reaching Zones -Normal Person									
Max. up	Male			2.05		2.11			1.85-2.10
	Female			1.86		1.95			
Oblique up	Male					1.95		2.1	1.65-2.0
	Female					1.79		1.65	
Forward	Male					1.43			1.3-1.45
	Female					1.34			
Vertical Reaching Zones-Wheelchair user									
Max.up	Male		1.72		1.70-1.90	1.72			1.58-1.90
	Female				1.64-1.79	1.58			
Oblique up	Male		1.6		1.54-1.79	1.6		1.55	1.47-1.79
	Female				1.49-1.69	1.47			
Forward up	Male		1.42		1.31-1.49	1.41		1.20-1.35	1.28-1.49
	Female		1.3		1.28-1.42	1.3			
Farward	Male		1.05		1.01-1.08	1.04			0.99-1.08
	Female				1.00-1.05	0.99			
Forward down	Male				0.71-0.67				0.67-0.72
	Female				0.72-0.68				
Oblique down	Male				0.48-0.37				0.37-0.51
	Female				0.51-0.41				
Max. down	Male		0.34		0.32-0.26	0.38		0.23	0.26-0.45
	Female		0.45		0.36-0.31	0.42			
Forward Reach -Wheelchair Person									
Easy	Male		0.54			0.60-0.68			0.50-0.68
	Female		0.5			0.54-0.61			
Maxdum	Male		0.92			0.84-0.92			0.71-0.92
	Female		0.87			0.71-0.78			

Comparative Study

		ANS	Canada	DNS	France	Jordan	Netherlands	SIDA	Manual
Ramps									
Width		0.92 min							see tables below
Slope	Max.Recom.	1:20m 15	1:20m unlimited		1:20m	1:20m L=15		1:20m	
	Exceptions new const.	1:16-1:19 L=12	1:12m		1:12m L=2	1:12m L=9		1:12m L=6	
		1:12-1:15 L=9	1:10-1:11m L=3		1:8m L=0.5			1:8m	
			1:8-1:9 L=0.6					1:6m	
			1:6m L=0.3						
	Exception exist const.	1:8-1:10 L=0.6			1:12m L=6				
1:10=1:12 L=1.5				1:8m L=2					
				1:6m L=0.5					
Rest Area		1.8-12m relative to slope		every 10m (slope >= 1:25)			every 6m		
Handrail				required (slope >= 1:25)					

Max. slope	Ramp length
1:20	14m & more
1:18	11m
1:16	8m
1:14	5m
1:12	2m
1:10	1.25m
1:8	0.5m

Existing Situation

Max. slope	Ramp length
1:20	14m & more
1:18	12m
1:16	10m
1:14	8m
1:12	6m
1:10	4m
1:8	2m

Comparative Study

		ANS	Canada	DNS	France	Jordan	Netherlands	SIDA	BCD
STAIRS									
Outdoor	Riser			0.15 max.				0.15 max	0.180 max.
	Tread			0.43 min				0.30 min	0.30 min.
Indoor	Riser	0.18 max.	0.125 -0.20	0.175 max	0.17 max	0.165 max	0.14-0.15	0.15	0.125-0.175
	Tread	0.28 min.	0.23-0.355	0.30 min.	0.28 min	0.28 min	0.32-0.34	0.3	0.28-0.35
HANDRAILS									
Height	Top Rail	0.76 - 0.86	0.8-0.92	0.85	0.9		0.85 - 0.95	0.9	0.86-0.96
	2nd Rail		0.725 - 0.75		0.7			0.7	0.70-0.75
	3rd Rail							0.6	0.6
	Low Rail		0.15				0.1		0.10-0.15
Cross Section		0.032 - 0.038	0.04		0.04			0.04	0.04
Extention		0.3	0.3 - 0.45	0.45			0.45	0.3	0.30-0.45
Dist. from Wall		0.038	0.4 -0.6	0.05	0.05			0.05	0.04-0.06
DOORS									
Door Width		0.85 depth<0.6	0.76		0.8-0.9			0.76/0.9/1.0	
Handle Height			0.92		0.9-1.0			0.8-0.9	0.8-1
Kick plate			0.3						
Extra Handle			0.8					0.8	0.8-1.0
Lock Height								1	0.8-0.1
Push Buttons			0.94						
WORKING SURFACES									
Knee Spece	a	0.69 min.	0.69 min.	0.7 min.		0.65 min.			0.7
Surface height	b	0.71-0.87	0.73-0.87	0.75-0.8	0.75-0.8	0.8	0.7		0.7-0.9
Depth	c	0.49	0.5 min.	0.6 min.	0.8		0.6		0.8
Clearance	d	0.76	0.72 min.						0.75
Width	e	0.76	0.76 min.	0.85 min.	1.25		1.2		0.85

HEIGHT LIMITS- SELECTED ITEMS

Item Name		Height Limits	Comfort. Height	Planning Ref.
Controls	Alarms	0.40-1.40	0.90-1.20	Common comfortable reaching zone between a standing and a sitting person.
	Electrical Switches	0.40-1.40	0.90-1.20	
	Electrical Outlets	0.40-1.40	0.90-1.20	
	Fire Extinguishers	C 0.90-1.40	0.90-1.20	
	Push Buttons	0.70-1.40	0.90-1.20	
	Parking Meters	0.70-1.40	0.90-1.20	
Doors	Bells	0.90-1.40	0.90-1.20	Common comfortable reaching zone between a standing and a sitting person.
	Handles	0.90-1.20	0.90-1.00	
	Locks	0.40-1.40	0.90-1.20	
	Signage	1.20-1.60	C 1.35	Common field of vision between a standing and a sitting person.
Elevators	Call Buttons	0.90-1.40	1	Common comfortable reaching zone between a standing and a sitting person.
	Control Panel	0.90-1.40	0.90-1.20	
	Handrail	0.90-1.40	0.90-1.20	
	Hall Signal	1.20-1.80	1.40-1.60	Common field of vision between a standing and a sitting person.
Interior Fixtures	Clothing Hooks	1.00-1.40	1.2	Common comfortable reaching zone between a standing and a sitting person.
	Mirrors	LL 0.90-1.10	LL 0.90	
	Shelves(food)	0.70-1.20	0.90-1.00	
	Shelves(books, clothes)	0.40-1.40	0.40-1.40	
	Water Fountains	UL 0.90	0.9	
Signage	Information Panels	0.90-1.80	C 1.35	Common field of vision between a standing and a sitting person.
	Obstruction Mark.	1.20-1.60	C 1.35	
Street Furniture	Garbage Bins	0.90-1.20	1	Common comfortable reaching zone between a standing and a sitting person.
	Public Telephones	0.70-1.40	0.90-1.20	
	Letter Box Slot	0.70- 1.40	0.90-1.20	
	Vending Machines	0.40-1.40	0.90-1.20	
Washrooms	Accessories	0.40-1.40	0.40-1.20	Comfortable reaching zone of a sitting person.
	WC Paper Dispenser	0.40-1.40	0.70-0.90	
Windows	Handle	0.40-1.40	0.90-1.20	Common comfortable reaching zone between a standing and a sitting person.
	Sill	max 1.10	0.6	Common field of vision between a standing and a sitting person.
	Ticket Windows	0.80-1.10	0.9	Common comfortable reaching zone between a standing and a sitting person.

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