

Indian Standard

RECOMMENDATIONS FOR
BUILDINGS AND FACILITIES FOR THE
PHYSICALLY HANDICAPPED

(First Revision)

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

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RECOMMENDATIONS FOR BUILDINGS AND FACILITIES FOR THE PHYSICALLY HANDICAPPED

(First Revision)

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(Continued on page 2)

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(*Continued from page 1*)

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Indian Standard

RECOMMENDATIONS FOR BUILDINGS AND FACILITIES FOR THE PHYSICALLY HANDICAPPED

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 20 March 1987, after the draft finalized by the Functional Requirements in Buildings Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 In the recent years, there has been great emphasis on encouraging the less fortunate members of the society, who, for the reasons of certain physical handicaps are not at par with their counterparts. This is being done in many places where human labour with physical disabilities is being utilized by many organizations.

0.3 In order to create circumstances, environment and conditions of work, suitable for those who are physically handicapped, certain basic requirements in the buildings, at the planning stage itself, must be taken care of.

0.4 While constructing hospital complexes, paraplegic centres and other facilities for the use of physically handicapped, user administrator's involvement should be made an essential feature.

0.5 This standard was originally published in 1968. The standard is being revised to align it with ISO publication: 'Needs of disabled people in buildings — Design guidelines'. The important changes incorporated in this revision are as follows:

- a) Listing of additional categories of handicapped people;
- b) Modification in requirement of ramps, stairs, doors, handrails and controls; and
- c) Additional requirements regarding windows.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value, should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard applies to all buildings and facilities used by the public. It applies to temporary or emergency conditions as well as permanent conditions. It does not apply to private residences.

1.2 This standard is concerned with non-ambulatory disabilities, semi-ambulatory disabilities, sight disabilities, hearing disabilities, disabilities of inco-ordination, aging, allergies, heart and lung diseases, epilepsy, haemophilia, incontinence and enterostomy.

1.3 This standard is intended to make all buildings and facilities used by the public accessible to, and functional for the physically handicapped through and within their doors, without loss of function, space or facility where the general public is concerned. It supplements existing standards, and reflects greater concern for safety of life and limb. In cases of practical difficulty, unnecessary hardship, or extreme differences, administrative authorities may grant exceptions from the literal requirements of this standard or permit the use of other methods or materials, but only when it is clearly evident that equivalent facilities and protection are thereby secured.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Aging — Those manifestations of the aging processes that significantly reduce mobility, flexibility, co-ordination and perceptiveness but are not accounted for in the categories mentioned in 2.3.1 to 2.3.9.

2.2 Appropriate Number — The number or a specific item that would be necessary, in accordance with the purpose and function of building or facility, to accommodate individuals with specific disabilities in proportion to the anticipated number or individuals with disabilities who would use a particular building or facility.

*Rules for rounding off numerical values (*revised*).

2.3 Disabilities

2.3.1 Non-ambulatory Disabilities — Impairments that, regardless of cause or manifestation, for all practical purposes, confine individuals to wheelchairs.

2.3.2 Semi-ambulatory Disabilities — Impairments that cause individuals to walk with difficulty or insecurity. Individuals using braces or crutches, amputees, arthrities, spastics, and those with pulmonary and cardio ills may be semi-ambulatory.

2.3.3 Sight Disabilities — Total blindness or impairments affecting sight to the extent that the individual functioning in public areas is insecure or exposed to danger.

2.3.4 Hearing Disabilities — Deafness or hearing handicaps that might make an individual insecure in public areas because he is unable to communicate or hear warning signals.

2.3.5 Disabilities of Inco-ordination — Faulty co-ordination or palsy from brain, spinal, or peripheral nerve injury.

2.3.6 People with Allergies — People with allergies may be sensitive to dust, mildew, pollen, animal hair, formalin, turpentine, etc. Some are sensitive to contact with substances and materials such as nickel, chromium and rubber.

2.3.7 People with Heart and Lung Diseases — People with heart and lung diseases may only be able to walk short distances and may be unable to climb stairs. The requirements of these people are similar to those with impaired mobility.

2.3.8 People with Epilepsy, Haemophilia, etc — The requirements of those with epilepsy, haemophilia, etc, are related primarily to the design of buildings and the need to minimize the risk of injury caused by falling or encountering obstacles.

2.3.9 People with Incontinence, Enterostomy Operations, etc — The requirements of people with incontinence, enterostomy operations, etc, (colostomies, ileostomies and urostomies) are mainly related to bathroom provision. In certain circumstances, for example, in public WC compartments, it may be desirable to provide a special sink for emptying urine bags.

2.4 Fixed Turning Radius, Front Structure to Rear Structure — The turning radius of a wheelchair, left front-foot platform to right rear wheel, or right front-foot platform to left rear wheel, when pivoting on a spot.

2.5 Fixed Turning Radius Wheel — The tracking of the caster wheels and large wheels of a wheelchair when pivoting on a spot.

2.6 Involved (Involvement) — A portion or portions of the human anatomy or physiology, or both, that have a loss or impairment of normal function as a result of genesis, trauma, disease, inflammation, or degeneration.

2.7 Ramps, Ramps with Gradients — Because the term 'ramp' has a multitude of meanings and uses, its use in this text is clearly defined as ramps with gradients (gradual slope joining two level surfaces) that deviate from what would otherwise be considered the normal level. An exterior ramp, as distinguished from a 'walk', would be considered an appendage to a building leading to a level above or below existing ground level.

2.8 Walk, Walks — Because the terms 'walk' and 'walks' have a multitude of meanings and uses, their use in this standard is clearly defined as a predetermined, prepared-surface, exterior pathway leading to or from a building or facility, or from one exterior area to another, placed on the existing ground level and not deviating from the level of the existing ground immediately adjacent.

3. GENERAL PRINCIPLES AND CONSIDERATIONS

3.1 Wheelchair — For details regarding wheelchair, *see* IS : 7454-1974* and IS : 8086-1976†.

3.2 Functioning of a Wheelchair

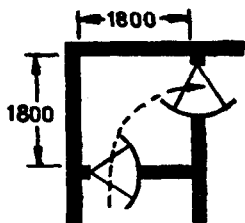
3.2.1 When planning spaces in buildings to cater for wheelchair turning, a guide is to impose on the plan a circle of 1 500 mm diameter. If this space is clear, the plan arrangement will normally be satisfactory. However, spaces in doorways, niches and under work-tops, desks or furniture can often be used when turning. Where a high degree of accessibility is required, such as in hospital buildings, spaces should be more generous. Considerable energy is needed to propel a wheelchair manually up ramps, over changes in level or over soft or uneven surfaces. Thresholds and changes in level should be avoided. Ground and floor surfaces should be hard and even.

3.2.2 The fixed turning radius of a standard wheelchair, wheel to wheel, is 450 mm. The fixed turning radius, front structure to rear structure, is 785 mm.

*Specification for wheelchairs, folding with removable armrests and swinging footrests.

†Specification for wheelchair, folding type, junior size.

3.2.3 The average turning spaces required is $1\,800 \times 1\,800$ mm (see Fig. 1).



All dimensions in millimetres.

NOTE — Actually, a turning space that is longer than it is wide, is more workable and desirable in an area with two open ends, such as might be the case in a corridor, a minimum of 1 350 mm between two walls would permit a 360 degree turn.

FIG. 1 AVERAGE TURNING SPACE FOR A WHEELCHAIR

3.2.4 A minimum width of 1 650 mm, preferably 1 800 mm, is required for two individuals in wheelchairs to pass each other.

3.2.5 The width of corridors in the hospital rehabilitation centre and in the paraplegic centres should be two metre.

3.3 Adult Individual Functioning in a Wheelchair

3.3.1 The average unilateral vertical reach is 1 500 mm and ranges from 1 350 to 1 600 mm.

3.3.2 The average horizontal working (table) reach is 775 mm and ranges from 715 to 830 mm.

3.3.3 The bilateral horizontal reach, both arms extended to reach side shoulder high, ranges from 1 350 to 1 770 mm and averages 1 560 mm.

3.3.4 An individual reaching diagonally, as would be required in using a wall-mounted dial telephone or towel dispenser, would make the average reach (on the wall) 1 200 mm from the floor.

NOTE — Extremely small, large, strong, or weak and involved individual could fall outside the ranges in 3.3.1 to 3.3.3, and their reach could differ from the dimensions given in 3.3.4.

3.4 Individual Functioning on Crutches

3.4.1 When walking with a normal gait, the distance between crutch tips ranges from 760 to 840 mm depending on the height of the person.

3.4.1.1 Most individuals ambulating on braces or crutches, or both, or on canes are able to manipulate within the specifications prescribed for wheelchairs, although doors present quite a problem at time. However, attention is called to the fact that a crutch tip extending laterally from an individual is not obvious to others in heavily trafficked areas, certainly not as obvious or protective as a wheelchair and is, therefore, a source of vulnerability.

3.4.1.2 Some cerebral palsied individuals, and some severe arthrities, would be extreme exceptions to **3.4.1** and **3.4.1.1**.

3.5 People with Hearing Disabilities

3.5.1 People with hearing disabilities have particular difficulty in comprehending sounds and words in noisy environments. Rooms should be acoustically well insulated. In public buildings loudspeaking systems should be clearly audible. Supplementary visual information should be provided, for example, in bus terminals, railway stations and airports.

3.5.2 People with hearing disabilities may rely on lip reading; this is helped if there is good overall lighting which is non-reflective. They may have difficulty using telephones, etc. Audible signals may in certain cases be supplemented with visual signals.

3.5.3 Induction loops may be installed in auditoria, theatres, meeting rooms, etc, to improve sound reception for people using hearing aids

3.6 People with Sight Disabilities

3.6.1 For people with sight disabilities, orientation can be aided by marking with the use of colour, illumination and, in certain cases, the texture of material. Design and plan arrangements should be simple and uncomplicated. Contrasting colours should be used to aid the identification of doors, stairs, ramps, passage ways, skirting boards, etc. Surfaces can be varied to indicate passage ways, changes of direction, etc. Orientation cues should be specially illuminated. Handrails can be used as a locational aid.

3.6.2 To minimize the risk of falls and injuries, hazards such as posts, single steps and projections from walls should be avoided wherever possible. Hazards should be emphasized by means of illumination and by contrasting colours and materials.

3.6.3 People with sight disabilities are often sensitive to glare. Unwanted mirroring affects and reflections may be avoided by attention to the location of windows and illumination, and the choice of floor and wall surfaces. People with sight disabilities often have difficulty in reading signs and other printed information. Blind people are restricted to tactile

reading. Visual information in, for example, bus terminals, railway stations and airports should be supplemented with audible information.

4. SITE DEVELOPMENT

4.1 Almost any building can be made accessible to handicapped persons by planning the site so that the terraces, retaining walls and winding walks are used effectively.

4.1.1 Site development is the most effective means to resolve the problems created by topography, definitive architectural designs or concepts, water table, existing streets, and typical problems, singularly or collectively, so that ingress, egress, and egress to buildings by physically disabled may be facilitated while preserving the desired design and effect of the architecture.

4.2 Walks

4.2.1 Public walks should be at least 1 200 mm wide and should have a gradient not greater than 1 in 20.

4.2.1.1 It is essential that the gradient of walks and driveways be less than that prescribed for ramps, since walks would be free of handrails and kerbs and would be considerably longer and more vulnerable to the elements. Walks of near maximum grade and considerable length should have level areas at intervals for purposes of rest and safety. Walks or driveways should have a non-slip surface.

4.2.2 Such walks shall be of a continuing common surface not interrupted by steps or abrupt changes in level.

4.2.3 Wherever walks cross other walks, driveways or parking lots, they should blend to a common level.

4.2.3.1 This specification does not require the elimination of kerbs which, particularly if they occur at regular intersections, are a distinct safety feature for all of the handicapped, particularly the blind. The preferred method of meeting the specification is to have the walk inclined to the level of the street. However, at principal intersections, it is vitally important that the kerb run parallel to the street, up to the point where the walk is inclined, at which point the kerb would turn in and gradually meet the level of the walk at its highest point. A less preferred method would be to gradually bring the surface of the driveway or street to the level of the walk. The disadvantage of this method is that a blind person would not know when he has left the protection of a walk and entered the hazards of a street or driveway (*see* Fig. 2).

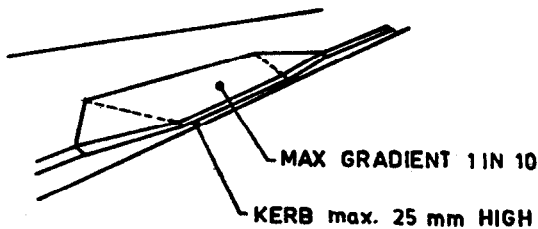


FIG. 2 SUITABLE METHOD OF BLENDING PAVEMENT AND ROADWAY SURFACES

4.2.4 A walk shall have a level platform at the top which is at least 1 500 mm long, if a door swings out on the platform or towards the walk. This platform shall extend at least 300 mm beyond each side of the doorway. A walk shall have a level platform at least 900 mm deep, if the door does not swing on to the platform or towards the walk. This platform shall extend at least 300 mm beyond each side of doorway.

4.3 Parking Space

4.3.1 Spaces that are accessible and approximate to the facility should be set aside and identified for use by individuals with physical disabilities.

4.3.2 A parking space open on one side, allowing room for individuals in wheelchairs or individuals on braces and crutches to get in and out of an automobile on to a level surface, is required. It should have a minimum width of 2 700 mm preferably 2 800 mm for ambulant disabled and minimum 3 000 mm preferably 3 300 mm for wheelchair users.

4.3.3 Parking spaces for individuals with physical disabilities, when placed between two conventional diagonal or head-on parking spaces, should be 3·6 to 3·8 m wide and the length of aisle should be 7·3 m, 6·1 m and 6·5 m for head on, 90° and 60° parking respectively.

4.3.4 Care in planning should be exercised so that individuals in wheelchairs and individuals using braces and crutches are not compelled to wheel or walk behind parked cars.

4.3.5 Consideration should be given to the distribution of spaces for use by the disabled in accordance with the frequency and persistency of parking needs.

4.3.6 Walks shall be in conformity with 4.2.

5. BUILDINGS

5.1 Ramps with Gradients — Where ramps with gradients are necessary or desired, they shall conform to the following specifications (*see* Fig. 3).

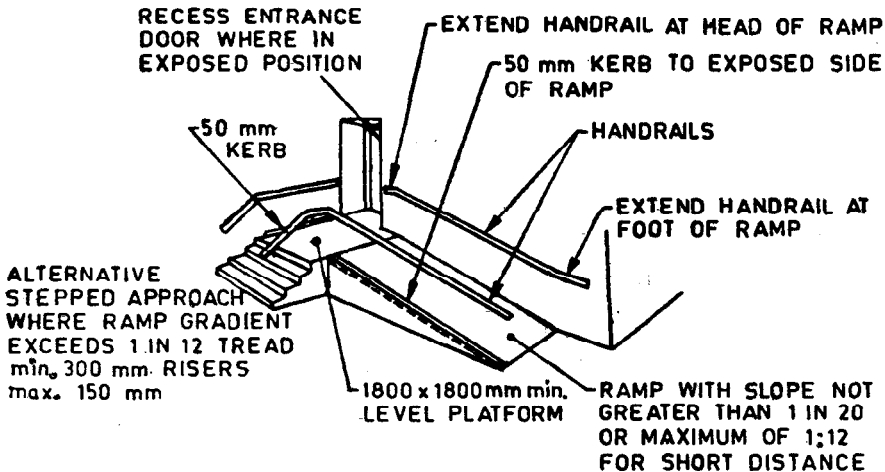


FIG. 3 EXAMPLE OF RAMPED APPROACH

5.1.1 A ramp when provided should not have a slope greater than 1 in 20 or maximum of 1 in 12 for short distance up to 9 000 mm.

5.1.2 A ramp shall have handrails on at least one side, and preferably two sides, that are 900 mm high, measured from the surface of the ramp, that are smooth, that extend 300 mm beyond the top and bottom of the ramp. Where major traffic is predominantly children, the handrails should be placed 760 mm high.

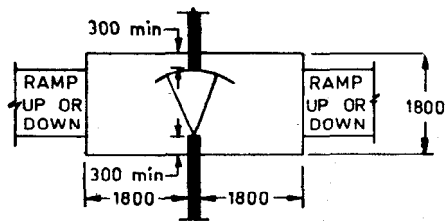
NOTE 1 — Where codes specify handrails to be of heights other than 900 mm, it is recommended that two sets of handrails be installed to serve all people. Where major traffic is predominantly children, particularly physically disabled children, extra care should be exercised in the placement of handrails, in accordance with the nature of the facility and the age group or groups being serviced (*see also* 6.1).

NOTE 2 — Care should be taken that the extension of the handrails is not in itself a hazard. Extension up to 300 mm may be made on the side of a continuing wall.

5.1.3 A ramp shall have a surface that is non-slip and if length is 3 500 mm, the minimum width shall be 1 500 mm.

5.1.3.1 The provision of non-slip surface on ramps greatly assists the handicapped persons with semi and ambulatory disabilities. Non-slip surfaces are provided by many finishes and materials. The surfaces of the concrete ramps can be made non-skid by brooming the surface or by finishing with an indenting roller.

5.1.4 A ramp shall have a level platform at the top which is at least 1 800 mm long, if a door swings out onto the platform or towards the ramp. This platform shall extend at least 300 mm beyond each side of the doorway (see Fig. 4).



All dimensions in millimetres.

FIG. 4 LEVEL AREAS REQUIRED AT END OF RAMPs LEADING TO DOORWAYS

5.1.5 Each ramp shall have at least 1 800 mm of straight clearance at the bottom.

5.1.6 Ramps shall have level platforms at 10-12 m intervals for purposes of rest and safety, and shall have platforms of minimum 1.5 m length wherever they turn.

5.1.7 For visually impaired people, ramps may be colour contrasted with landing.

5.1.8 To minimize risk to wheelchair users, ramps should be equipped with kerbs approximately 50 mm high at exposed sides.

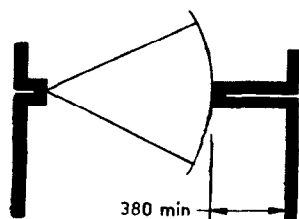
5.2 Entrances

5.2.1 At least one primary entrance to each building shall be usable by individuals in wheelchairs (see Fig. 5A) and shall be indicated by a sign (see Fig. 5B).

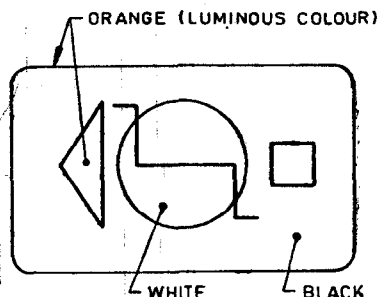
5.2.2 At least one entrance usable by individuals in wheelchairs shall be on a level that would make the elevators accessible.

5.3 Doors and Doorways

5.3.1 Doorwidth — To enable wheelchair users to pass through doors,



5A PLAN OF DOORS SUITABLE
FOR THE WHEELCHAIR BOUND



5B SIGN FOR USE AT THE ENTRANCES

NOTE — Because entrances also serve as exits, some being particularly important in case of an emergency, and because the proximity of such exits to all parts of buildings and facilities, in accordance with their design and function, is essential, it is preferable that all or most entrances (exits) should be accessible to and usable by individuals in wheelchairs and individuals with other forms of physical disability herein applicable.

FIG. 5 ENTRANCES

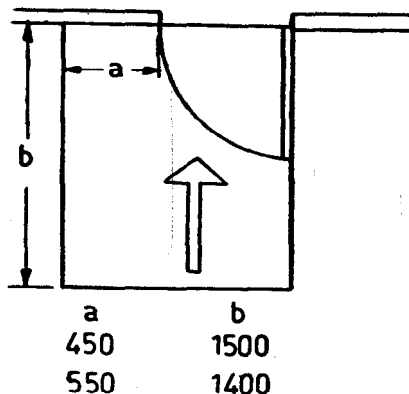
the minimum clear width should be 900 mm and shall be operable by single effort. In certain cases the clear width should be 900 to 1 000 mm; for example, if the wheelchair has to be turned in the doorway, where there is a door closer or at entrance doors to public buildings and in other situations where there is considerable traffic.

5.3.1.1 Two-leaf doors are not usable by those with disabilities defined in 2.1, 2.2 and 2.5, unless they operate by a single effort, or unless one of the two leaves meets the requirements of 5.3.1.

5.3.1.2 Side-hung doors — To facilitate wheelchair manoeuvre, doors should be hung with the hinges in room corners. Doors opening out into corridors or circulation spaces should be avoided as far as possible.

5.3.1.3 It is recommended that all doors have kick plates extending from the bottom of the door to at least 400 mm from the floor, or be made of a material and finish that would safely withstand the abuse they might receive from canes, crutches, wheelchair foot-platforms or wheelchair wheels.

5.3.2 Wheelchair Manoeuvring Space — To enable wheelchair users to approach doors manoeuvring space is needed as shown in the Fig. 6. A corridor should have a width of at least 1 200 mm to allow a 90° turn to be made through a door. In narrow spaces sliding doors may be preferable.



All dimensions in millimetres.

NOTE — Depending on the free space beside the opening side of the door (450 or 550 mm), the depth of the free space should be 1 500 or 1 400 mm.

FIG. 6 MANOEUVRING SPACE NEEDED FOR WHEELCHAIR USERS TO APPROACH DOORS

5.3.3 Thresholds — Raised thresholds should be avoided, but where this is not possible, their height should not exceed 25 mm. Rubber thresholds are advantageous for wheelchair users.

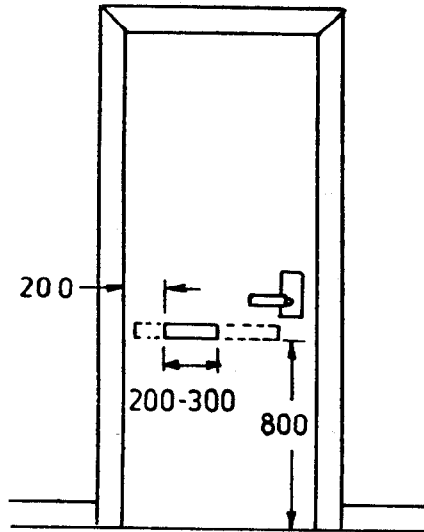
5.3.3.1 Care should be taken in the selection, placement and setting of door closers so that they do not prevent the use of doors by the physically disabled. Time-delay door closers are recommended.

5.3.3.2 Self-closing doors — Wheelchair users and other with impaired mobility have difficulty in using self-closing doors. The force required to open them should be reduced as far as possible. Public buildings should preferably have sliding automatic doors.

5.3.4 Door Identification — To help people with impaired vision to see doors, the door and frame should be in a colour which contrasts with the adjoining wall. Glass or glazed doors should be marked with a coloured band or frame, a little below eye-level.

5.3.5 Handles — Door handles and locks should be easy to manipulate. To facilitate the closing of a door by wheelchair users (for example, a WC compartment), the door should have a horizontal handle approximately 800 mm from the floor. Self-closing doors should be equipped with an easily gripped vertical pull-handle with a length of at least 300 mm, and

with the lower end approximately 800 mm above floor level. For many people and specially those with impaired vision, it is helpful to make clear whether doors are to be pulled or pushed (*see Fig. 7*).



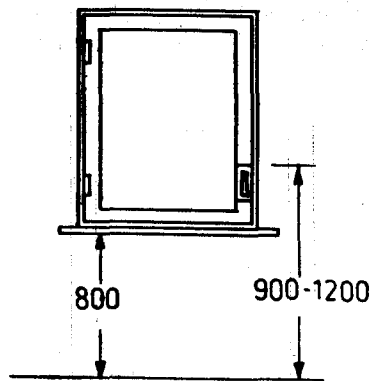
All dimensions in millimetres.

FIG. 7 POSITION OF HANDLE

5.4 Windows — Windows should be designed to avoid the glare which is a particular problem for people with impaired vision. Large glass areas close to circulation spaces should be marked a little below eye-level with a coloured band or frame. To enable wheelchair users to see through a window comfortably, the sill should be not higher than 800 mm from the floor. Windows should be easy to open and close. Their controls should be placed in the zone 900 to 1 200 mm from the floor (*see Fig. 8*).

5.5 Stairs — Stairs should not be the only means of moving between floors. They should be supplemented by lifts or ramps.

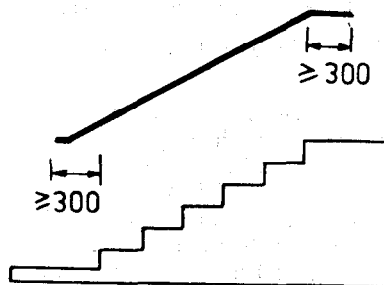
5.5.1 Straight flights of steps are preferred by ambulant disabled people. Treads should be approximately 300 mm deep and risers not higher than 150 mm. Steps should be of a consistent height and depth throughout the stair. Projecting nosings and open stairs should be avoided to minimize the risk of stumbling.



All dimensions in millimetres.

FIG. 8 POSITION OF SILL AND WINDOW CONTROL

5.5.2 Handrails should be provided to both sides of any stairway. They should be continuous and extend not less than 300 mm beyond the top and bottom step (otherwise it is difficult for the disabled to use the rail at the first and last step; see Fig. 9).



All dimensions in millimetres.

FIG. 9 EXTENSION OF HANDRAIL IN STAIRS

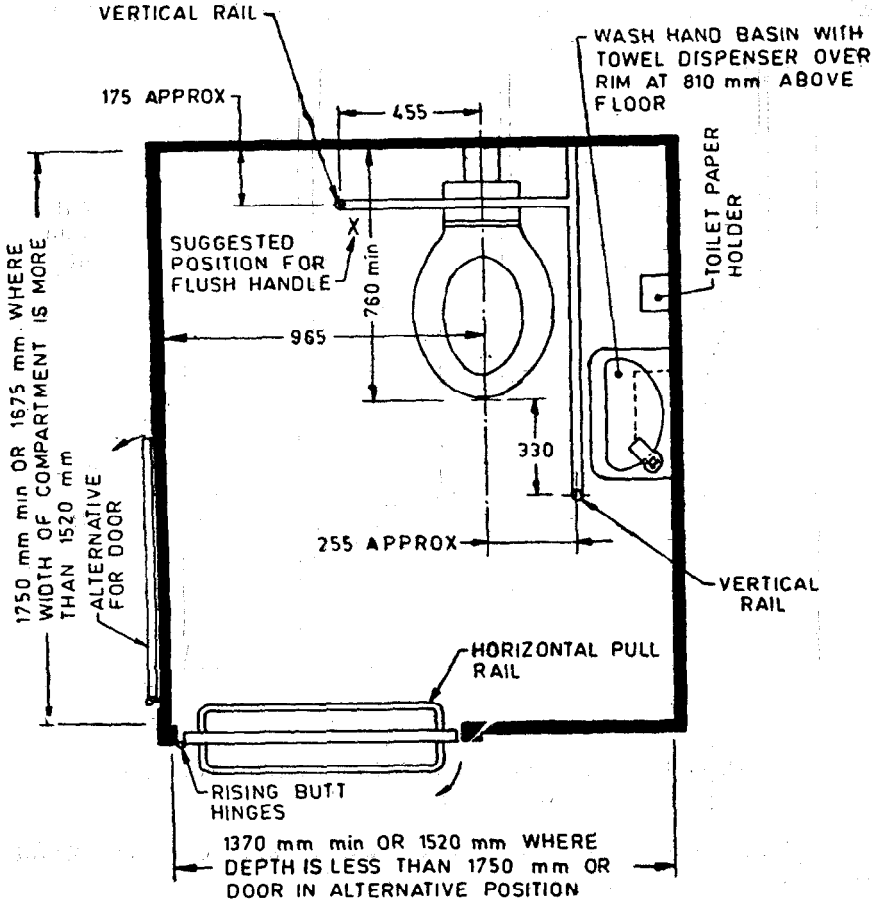
5.5.3 For people with impaired vision, there should be a colour contrast between landings, and top and bottom steps of a flight of steps, or the front edge of each step should have a contrasting colour.

5.6 Floors

5.6.1 Floors shall have a non-slip surface.

5.6.2 Floors on a given storey shall be of a common level throughout or be connected by a ramp in accordance with 5.1.1 to 5.1.8.

5.6.2.1 A gentle slope up to 10 mm may be given between the level of the floor of the corridor and the level of the floor of the toilet rooms.



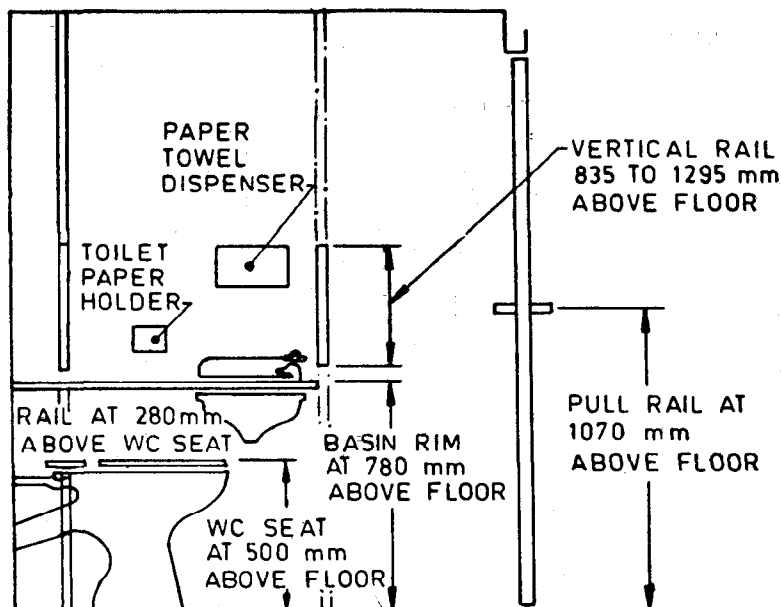
All dimensions in millimetres.

FIG. 10 SUGGESTED PLAN WC COMPARTMENT FOR THE WHEELCHAIR BOUND

5.6.2.2 There should not be a difference between the level of the floor of a corridor and the level of floor of meeting room, dining room or any other room, unless proper ramps are provided.

5.7 Sanitary Facilities — It is essential that sanitary facilities, in accordance with the nature and use of a specific building or facility, be made accessible to, and usable by the physically handicapped.

5.7.1 Sanitary facilities shall have space to allow traffic of individuals in wheelchairs, in accordance with 3.1, 3.2 and 3.3 (*see* Fig. 10 and 11).



All dimensions in millimetres.

FIG. 11 SECTION THROUGH WC COMPARTMENT FOR THE WHEELCHAIR BOUND

5.7.2 Sanitary facilities shall have at least one water closet cubicle for the ambulant disabled (*see* Fig. 12 and 13) that:

- a) is 900 mm wide;
- b) is at least 1 500 mm preferably 1 600 mm deep;

- c) has a door shutter (where doors are used), that is, 800 mm wide and swings out;
- d) has handrails on each side, 780 mm high and parallel to the floor, 40 mm clearance between rail and wall, and fastened securely at ends and centre; and
- e) has a water closet with the seat 500 mm from the floor.

NOTE — The design and mounting of the water closet is of considerable importance. A wall-mounted water closet with a narrow understructure that recedes sharply is most desirable. If a floor mounted water closet is to be used, it should not have a front that is wide and perpendicular to the floor at the front of the seat. The bowl should be shallow at the front of the seat and turn backward more than downward to allow the individual in a wheelchair to get close to the water closet with the seat of the wheelchair.

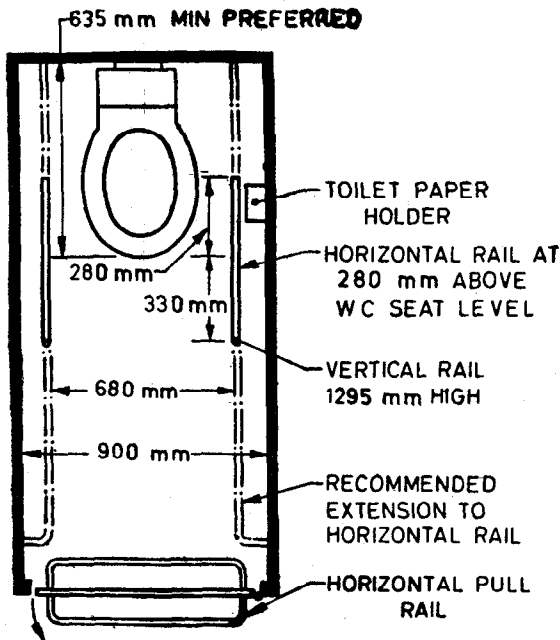


FIG. 12 SUGGESTED PLAN WC COMPARTMENT FOR THE AMBULANT DISABLED

5.7.3 Sanitary facilities shall have wash basins with narrow aprons which, when mounted at standard height, are usable by individuals in wheelchairs; or shall have wash basins mounted higher, when particular designs demand so that they are usable by individuals in wheelchairs.

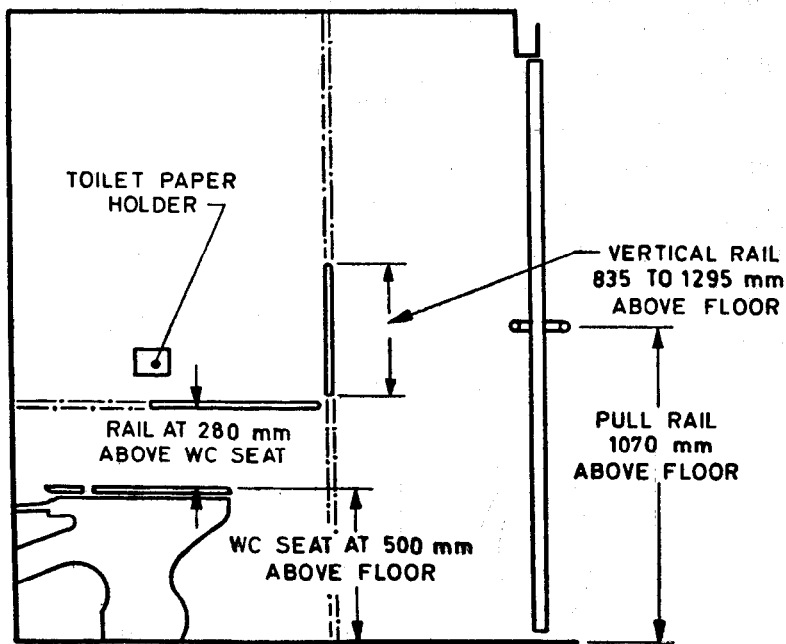


FIG. 13 SECTION THROUGH WC COMPARTMENT FOR THE AMBULANT DISABLED

5.7.3.1 The drain pipes and hot-water pipes under a sanitary appliance be covered or insulated so that a wheelchair individual do not find it inconvenient.

5.7.4 Some mirrors and shelves shall be provided above wash basins at a height as low as possible and not higher than 1 m above the floor, measured to the top of the shelf and the bottom of the mirror.

5.7.5 Sanitary facilities for men shall have wall-mounted urinals with the opening of the basin 460 mm from the floor, or shall have floor mounted urinals that are on level with the main floor of the toilet room.

5.7.6 Toilet rooms shall have an appropriate number of towel racks, towel dispensers, and other dispensers and disposal units mounted not higher than 910 mm from the floor.

5.8 Drinking Fountains — An appropriate number of drinking fountains or other water-dispensing means shall be accessible to and usable by the physically disabled.

5.8.1 Drinking water fountains or water coolers shall have up front spouts and control.

5.8.2 Drinking water fountains or water coolers shall be hand-operated or hand and foot-operated.

5.8.2.1 Conventional floormounted water coolers may be convenient to individuals in wheelchairs if a small fountain is mounted on the side of the cooler 800 mm above the floor.

5.8.2.2 Fully recessed drinking water fountains are not recommended.

5.8.2.3 Drinking water fountains should not be set into an alcove unless the alcove is wider than a wheelchair (*see 3.1*).

5.9 Public Telephones — An appropriate number of public telephones should be made accessible to and usable by the physically disabled.

NOTE — The conventional public telephone booth is not usable by most physically disabled individuals. There are many ways in which public telephones may be made accessible and usable. It is recommended that architects and builders confer with the telephone companies in the planning of the building or facility.

5.9.1 Such telephones should be kept so that the dial is placed at minimum 1 200 mm from floor and the handset may be reached by individuals in wheelchairs, in accordance with 3.3.

5.10 Handrails — Handrails are used as a locational and mobility aid by blind and visually impaired people, and as a support for people with mobility impairments. The handrail should be securely fitted to the wall to withstand heavy pressure. Handrails should turn in towards the wall at either end.

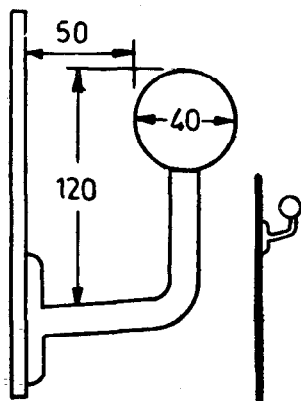
5.10.1 Handrails should be approximately 900 mm from the floor. The rail should be easy to grip, having a circular section with a diameter of approximately 40 mm and fixed as shown in Fig. 14.

5.10.2 To aid identification, the colour of the rail should contrast with the wall behind.

5.11 Elevators — In a multi-storey building, elevators are essential to the successful functioning of physically disabled individuals. They shall conform to the requirements given in 5.11.1 and 5.11.2.

5.11.1 Elevators shall be accessible to, and usable by the physically disabled on the level that they use to enter the building, and at all levels normally used by the general public.

5.11.2 Elevators shall allow for traffic by wheelchairs in accordance with 3.1, 3.2, 3.3 and 5.3.



All dimensions in millimetres.

FIG. 14 FIXING OF HANDRAIL

5.12 Controls — It is advantageous for wheelchair users if controls are placed at low level. For visually impaired people, they should be at eye-level.

5.12.1 To enable wheelchair users to reach controls while not placing them too low for visually impaired people, controls should be in the zone 900 to 1 200 mm from the floor. It is advantageous if controls in, for example, lifts are placed at an angle of approximately 45° to the wall so that they are easier to read and operate. To cater for wheelchair users, controls should be placed not less than 400 mm from room corners. All the power and electric points should be placed at one metre above the floor level and should not project outside walls.

5.12.2 Again, to cater for visually impaired people, controls should be colour-contrasted with backgrounds. Information should preferably be in relief for tactile reading.

5.12.3 To aid operation for people with impaired co-ordination or impaired vision, switches, etc, should have large push plates.

5.12.4 Controls for powered door openers to hinged doors should be located so that the doors do not conflict with wheelchairs, sticks, walking aids, etc.

5.12.5 To facilitate operation for people with limited strength in arms and hands, handles should be easy to grip and turn.

5.13 Identification — Appropriate identification of specific facilities within a building used by the public is particularly essential to the blind

5.13.1 Raised letters or numbers shall be used to identify rooms or offices.

5.13.2 Such identification should be placed on the wall, to left of the door, preferably at a height of 1500 mm from the floor.

5.13.3 Doors that are not intended for normal use, and that might prove dangerous if a blind person were to exit or enter by them, should be made quickly identifiable to the touch by knurling the door handle or knob (see Fig. 15).

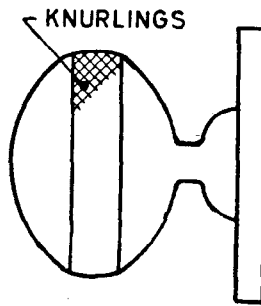


FIG. 15 DOOR HANDLE

5.14 Warning Signals

5.14.1 Audible warning signals shall be accompanied by simultaneous visual signals for the benefit of those with hearing disabilities.

5.14.2 Visual signals shall be accompanied by simultaneous audible signals for the benefit of the blind. To assist blind people, lettering and symbols on signs should be in relief for tactile reading.

5.14.3 Signs should be designed and located so that they are easy to read. For visually impaired people, signs should preferably be at eye-level and it should be possible to approach them closely. Text and symbols should be colour-contrasted with the background. The letters should not be less than 12 mm high.

5.14.4 Signs should be well illuminated and surfaces should not cause mirroring or reflections. Signs should not be behind glass or similar materials.

5.14.5 Information based on colour codes only should be avoided; colourblind people may find them difficult to understand.

5.15 Work Bench — This should be at least 800 mm wide, 600 mm deep and 650 to 700 mm high. For wheelchair users, the convenient height of work tops is between 750 and 850 mm: flexible provision is preferred. Further for wheelchair access to a work bench, wash basin or table, a clear space for knees and footrests is needed.

5.16 Hazards — Every effort shall be exercised to obviate hazards to individuals with physical disabilities.

5.16.1 Access panels or manholes in floors, walks, and walls may be extremely hazardous, particularly when in use, and should be avoided.

5.16.2 When manholes or access panels are open and in use, or when an open excavation exists on a site, particularly when it is in proximity of normal pedestrian traffic, barricades shall be placed on all open sides, at least 8.5 m from the hazard, and warning devices shall be installed in accordance with 5.14.2.

5.16.3 Low-hanging door closers that remain within the opening of a doorway, when the door is open or that protrude hazardously into regular corridors or traffic ways when the door is closed, shall be avoided.

5.16.4 Low-hanging signs, ceiling lights, and similar objects or signs and fixtures that protrude into regular corridors or traffic way shall be avoided. A minimum height of 2.1 m measured from the floor is recommended.

5.16.5 Ramps shall be adequately lighted.

5.16.6 Exit signs shall be in accordance with IS : 4878-1968*.

5.16.7 Equipment and materials causing allergic reactions should as far as possible be avoided in dwellings and buildings.

6. DESIGNING FOR CHILDREN

6.1 The dimensions given in the standard are for adults of average stature. In designing buildings for use by children, it may be necessary to alter some dimensions, such as height of handrails according to IS : 4838 (Part 1)-1969† and IS : 4838 (Part 2)-1979‡.

*Byelaws for construction of cinema buildings.

†Anthropometric dimensions for school children: Part 1 Age group 5-11 years.

‡Anthropometric dimensions for school children: Part 2 Age group 12-15 years (first revision).