DOCUMENT RESUME

ED 100 063 EA 006 686

TITLE	Designing Schools for the Physically Handicapped.
INSTITUTION	Ontario Dept. of Education, Toronto.
PUB DATE	[74]
NOTE	38p.
AVAILABLE FROM	Publications Centre, Ministry of Government Services, Macdonald Block, Queen's Park, Toronto, Ontario (Canada) M7A 1N8 (Identification No. 74-75/4036; $2.50, payment must accompany orders, make checks payable to Treasurer of Ontario)
EDRS PRICE	MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
DESCRIPTORS	*Architectural Barriers; Design Needs; Elementary Secondary Education; Facility Planning; Facility Requirements; Human Engineering; *Physically Handicapped; *School Design; *School Improvement; *School Planning

ABSTRACT

Society now realizes that people who are physically handicapped need not be segregated but should be integrated into community activities whenever possible. This document provides specifications for removing architectural barriers and modifying existing structures so that all citizens will have access to school buildings. The document has three main sections: (1) general design information, (2) modification of regular schools, and (3) additional criteria for special schools. (Author/MLF)

Designing Schools for the Physically Handicapped

Cover:
The stylized symbol of a person in a wheelchair is the international symbol used to indicate a building accessible to the handicapped.

1977 Identification No. 74-7[illegible]

The contents of this document have been arrived at as a result of experience in planning and developing the most economical means of removing architectural barriers and modifying existing structures so that all citizens will have access to school buildings.

Since it would not be financially possible to provide all existing buildings or, indeed, all new school buildings with all of these facilities, school boards should consider attempting to make these provisions available for groups of schools within their particular area.

School boards planning to incorporate treatment facilities such as occupational therapy and physiotherapy facilities should contact the Ministry of Health for design assistance.

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The Ministry of Education, Ontario has an ongoing policy to improve the educational opportunities for the children, youth, and adults of this province.

In the past, students who were physically handicapped and unable to manage in regular schools were sent to special schools. This resulted in the segregation of persons who were handicapped. Consequently, regular schools were designed for "the average person", thus limiting the entry of the handicapped.

Society now realizes that people who are physically handicapped need not be segregated, but should be integrated into all community activities, whenever possible.

Implementation of the concepts presented in this study would make it possible for children and youth who have physical disabilities to be educated with their peer groups. The adult population who are physically handicapped would then be better able to participate in community activities held in schools.

The special needs of the handicapped should be taken into account in the design and planning stage of school buildings. Failure to do so may make access to the buildings difficult. The most common faults are:

– steps, curbs, and sidewalks that are too steep and/or too narrow;

– doors that are too narrow or too hard to open;

– lack of accommodation for wheelchairs in auditoriums and sports facilities;

– narrow aisles in cafeterias, libraries, auditoriums, etc.;

– toilet stalls that are too small or have the doors opening inwards;

– telephones, drinking fountains, vending machines, light switches, and fire alarms that are out of reach;

– walkways that are highly polished or slippery when wet;

– elevators that are inaccessible because of their size or design.

Those most seriously affected by architectural barriers are persons who are confined to wheelchairs, either temporarily or permanently. Other handicapped people include the following:

– persons with semi-ambulatory disabilities who walk with difficulty or require the aid of braces or crutches;

– amputees who require prosthetic devices;

– those with visual problems (either totally blind or partially sighted) who cannot travel with safety in public areas;

– the deaf and the partially deaf, who are unable to communicate or hear warning signals;

– persons with faulty co-ordination.

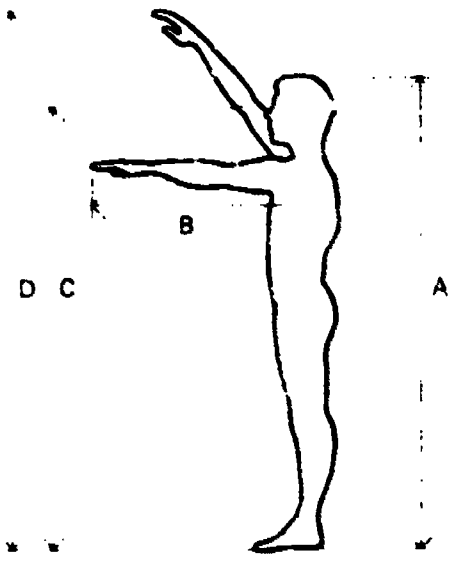
In elementary schools, it would be more convenient for young handicapped children if all facilities were on the ground level. However, if the building is raised above the ground, ramps leading to the main entrance and to the playground should be provided. School buildings of more than one storey should have an elevator large enough to accommodate a wheelchair. At least one entrance to all areas should be accessible to chairbound persons. All classrooms should be accessible to wheelchairs. Where the school comprises a number of detached buildings, it should be possible to travel between them without having to negotiate steps.

It is increasingly important that secondary school buildings also accommodate students who are handicapped. The introduction of the credit system, which permits individual programming, allows more handicapped students to attend secondary school. And, with the trend to greater use of schools by the community at large, it is vital that the handicapped adult and the elderly have barrier-free access to the buildings.

This document has three main sections:
– general design information;
– modification of regular schools;
– additional criteria for special schools.

Implementation of the suggestions contained herein would bring the goal of equality of educational opportunity for all citizens of Ontario another step closer to realization.

The dimensions given in the building standards codes are for adults of average stature (e.g. Supplement No. 5 to the National Building Code of Canada). The following charts provide anthropometric data needed in designing for the handicapped, both children and adults.

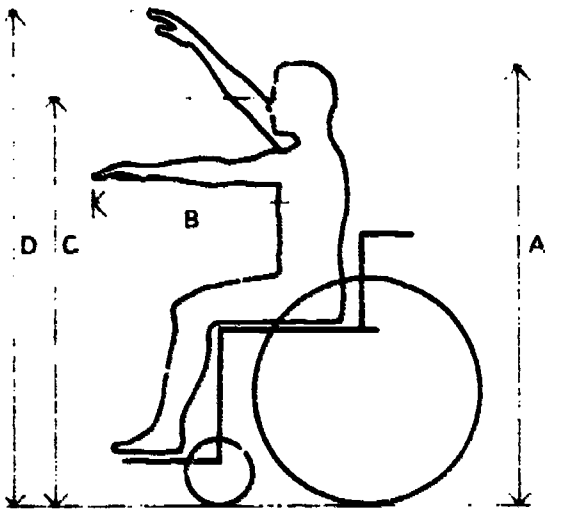


Men

	Imperial units	*Metric units*
A Stature	69	175.2 cm
B Forward reach	18¼–21½"	46.3–53.9 cm
C Eye level	64½"	163.8 cm
D Vertical reach	83"	210.8 cm

Women

	Imperial units	*Metric units*
A Stature	64"	163.8 cm
B Forward reach	16½–20"	41.9–50.8 cm
C Eye level	60¼"	153 cm
D Vertical reach	76½"	194.3 cm

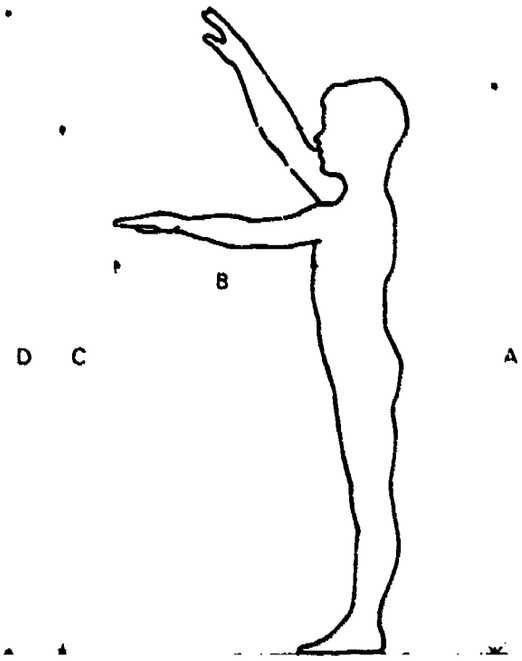


Men

	Imperial units	*Metric units*
A Head height	52½"	133.3 cm
B Forward reach	17¾–21¾"	45–55.2 cm
C Eye level	48¼"	122.5 cm
D Vertical reach	67½	171.4 cm

Women

	Imperial units	*Metric units*
A Head height	49½"	125.7 cm
B Forward reach	15¼–19"	38.7–48.2 cm
C Eye level	45½"	115.5 cm
D Vertical reach	62"	157.5 cm

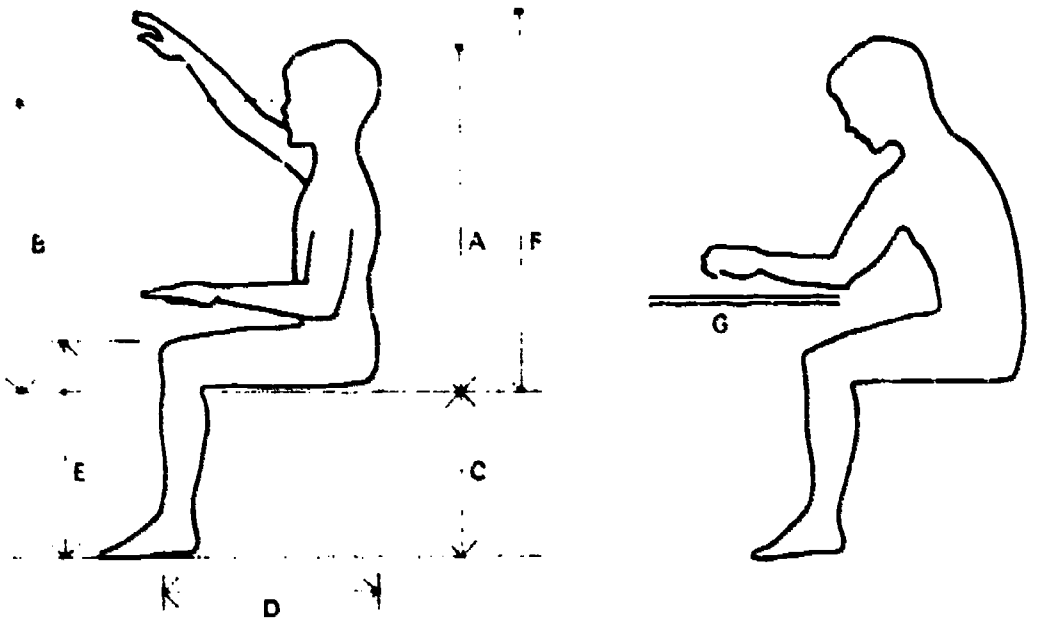


Boys (Age range 3-18)

Age	A Stature		B Forward reach		C Eye level		D Vertical reach	
	cm	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*
3	99	38.9	39.6	15.6	96.5	38	104.1	41
4	105	41.3	42.4	16.7	102.8	40.5	111.7	44
6	117	46	47.7	18.8	114.3	45	125.7	49.5
8	128	50.3	54.6	21.5	123.1	48.5	139.7	55
10	139	54.7	59.4	23.4	134.6	53	152.4	60
12	147.8	58.6	64.2	25.3	140.9	55.5	165.1	65
14	163	64.1	70.8	27.9	154.9	61	180.3	71
16	173	68.1	75.4	29.7	165.1	65	194.3	76.5
18	176	69.3	76.2	30.0	168.9	66.5	198.1	78

Girls (Age range 3-18)

Age	A Stature		B Forward reach		C Eye level		D Vertical reach	
	cm	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*
3	97	38.1	38.6	15.2	93.9	37	101.6	40
4	105	41.3	41.6	16.4	101.6	40	111.7	44
6	116	45.6	48	18.9	114.3	45	125.7	49.5
8	128	50.3	53.8	21.2	123.1	48.5	139.7	55
10	139	54.7	59.1	23.3	134.6	53	152.4	60
12	150	59	65.2	25.7	143.5	56.5	166.3	65.5
14	159	62.5	69.3	27.3	152.4	60	176.5	69.5
16	162	63.7	70.8	27.9	154.9	61	181.6	71.5
18	162	63.7	70.8	27.9	154.9	61	181.6	71.5

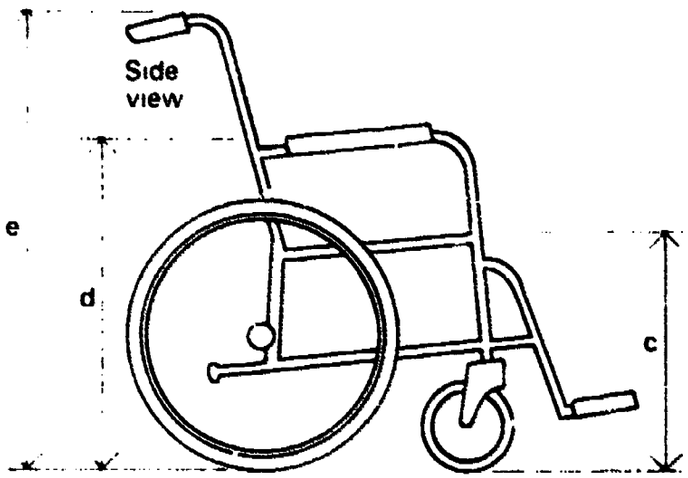


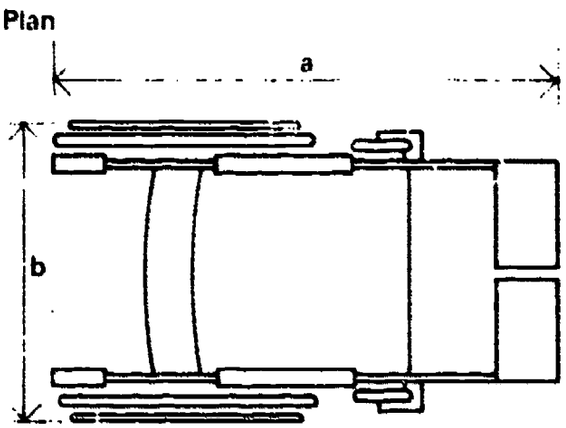
Boys (Age range 3-18)

Age	A Sitting height		B Sitting eye height		C Sole to popliteus		D Back buttocks to top of knee		E Sole to top of knee		F Sitting vert. reach		G Sitting horiz. reach	
	cm	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*
3	56.5	22.2	46	18.1	24	9.4	29.5	11.6	29.5	11.6	61.4	24.2	33	13
4	59	23.2	49	19.2	26	10.2	32	12.6	31.5	12.4	66.5	26.2	34.2	13.6
6	64.5	25.3	54	21.2	29.5	11.6	36.5	14.3	35.5	13.9	73.1	28.8	39.3	15.5
8	69.5	27.3	58.5	23	32.5	12.8	41	16.1	39.5	15.5	82	32.3	43	17
10	74.5	29.3	63.5	25	35.5	13.9	45	17.7	43	16.9	87.1	34.3	46.9	18.5
12	78.5	30.9	68	26.7	38.5	15.1	49	19.2	46.5	18.3	94.9	37.4	49.5	19.5
14	85	33.4	74	29.1	42	16.5	54.5	21.4	51.5	20.2	102.6	40.4	54.6	21.5
16	89.5	35.2	78	30.7	45	17	58	22.8	55	21.6	109.7	43.2	58.4	23
18	90.5	35.6	79.5	31.3	46	18.1	59.5	23.4	56	22	113	44.6	59.6	23.5

Girls (Age range 3-18)

Age	A Sitting height		B Sitting eye height		C Sole to popliteus		D Back buttocks to top of knee		E Sole to top of knee		F Sitting vert. reach		G Sitting horiz. reach	
	cm	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*	*cm*	*in.*
3	54.5	21.4	45	17.7	24	9.4	29.5	11.6	29	11.4	59.4	23.4	31.7	12.4
4	58.5	23	48.5	19.1	26	10.2	33	12.9	31.5	12.4	66	26	34.2	13.4
6	63.5	25	53.5	21	29	11.4	37	14.5	35.5	13.9	72.3	28.5	38.1	15
8	69	27.1	59	23.2	32.5	12.7	42	16.5	39.5	15.5	81.5	32.1	43.2	17
10	74.5	29.3	64	25.2	35	13.7	46	18.1	43	16.9	87.1	34.3	46.9	18.5
12	79.5	31.2	69	27.1	38	14.9	50.5	19.8	46.5	18.3	95.7	37.7	50.8	20
14	83.5	32.8	73	28.7	40.5	15.9	54	21.2	50	19.6	101	39.8	53.3	21
16	85	33.4	74	29.1	41.5	16.3	55	21.6	51	20	102.6	40.4	54.6	21.5
18	85	33.4	74	29.1	41.5	16.3	55	21.6	51	20	102.6	40.4	54.6	21.5





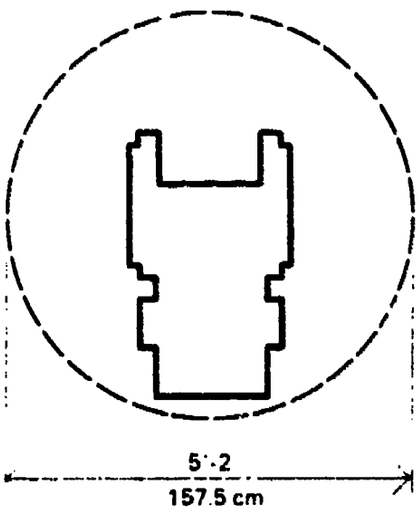
Standard adult wheelchair dimensions

a	Length	38½ – 41½ inches 98 – 105.5 cm
b	Width when open	24 - 27¾ inches 61 – 70.5 cm
	Width when collapsed	9½ – 12 inches 24 – 30.5 cm
c	Height of seat from floor	19¼ – 20½ inches 48 – 52 cm
d	Height of armrest from floor	20 – 30 inches 71 – 76 cm
e	Height of rear pusher handles from floor	35 – 37½ inches 89 – 95 cm

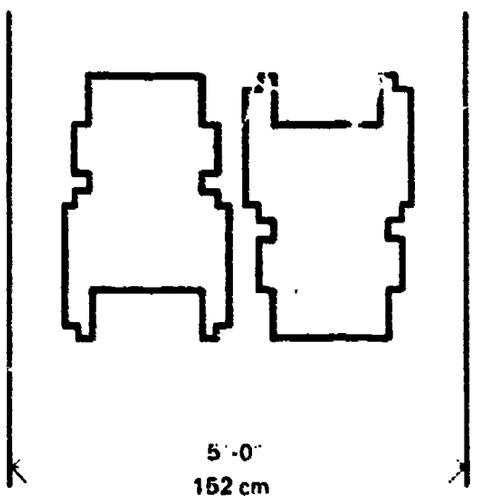
Junior size

a	Length	29 inches 73.5 cm
b	Width when open	18-½ inches 47 cm
e	Height of rear pusher handles from floor	33 inches 84 cm

The average turning space required is 5 feet 2 inches (157.5 cm).



A minimum width of 5 feet 0 inches (152 cm) is required for two wheelchairs to pass each other.



Site

Grading Provide a ground-level entrance accessible to individuals with physical disabilities.

Walks

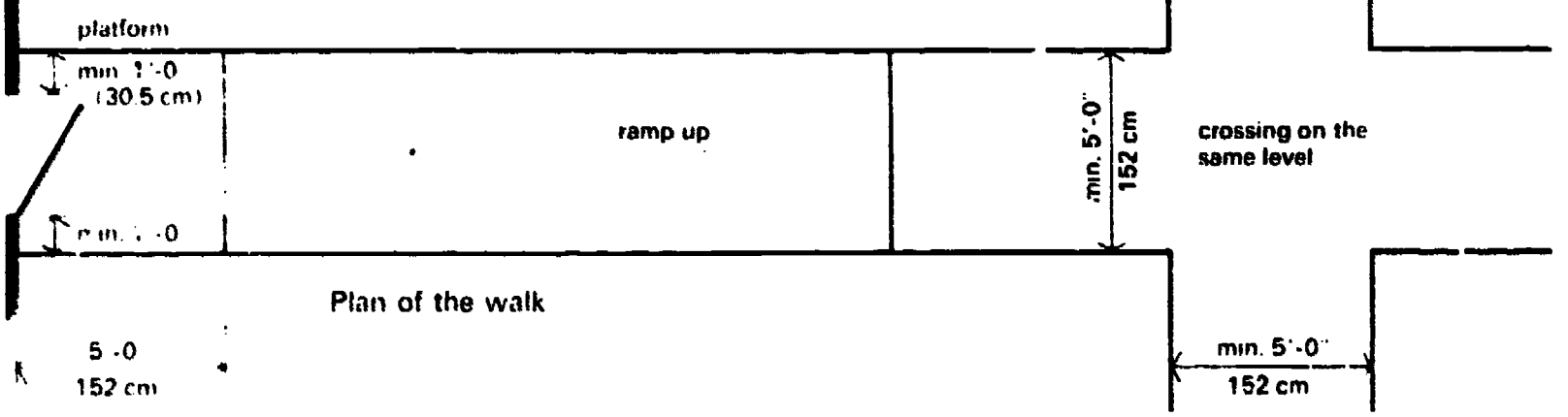
Walks should be at least 5 feet (152 cm) wide with a maximum gradient of one in twenty. It is very important that the gradient of walks and driveways be less than that prescribed for ramps, since the walks would lack handrails and would be considerably longer. Walks of near maximum grade and considerable length should have level areas at intervals for purposes of rest and safety.

– Such walks should be of continuing common surface, not interrupted by steps or abrupt changes in level.

– The platform should extend at least 1 foot (30.5 cm) beyond each side of the doorway.

– Walks or driveways should have a non-slip surface.

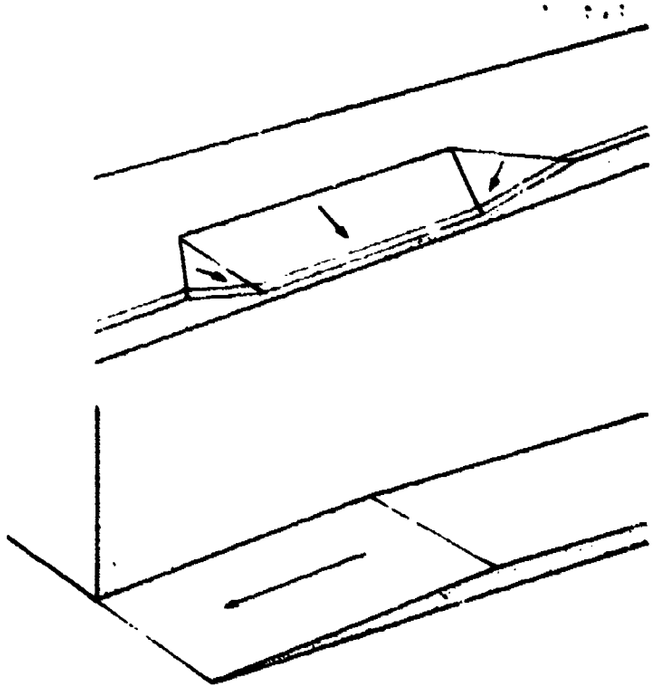
– Where walks cross a curb, the curb should be cut and a ramp provided in the walk to meet the road level at the curb.



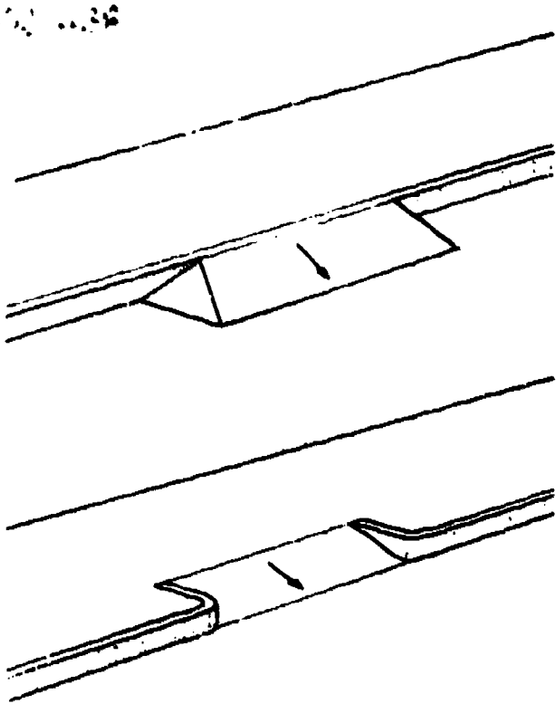
Plan of the walk

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

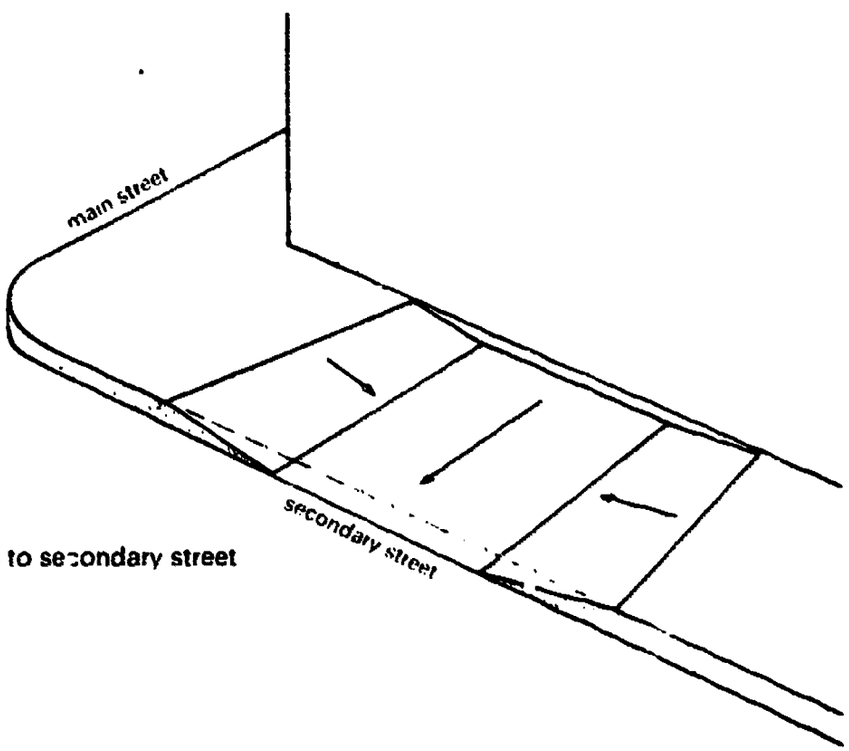
– A walk should have a level platform at an entrance, at least 5 feet by 5 feet (152 cm by 152 cm) if a door swings out onto the platform or toward the walk.



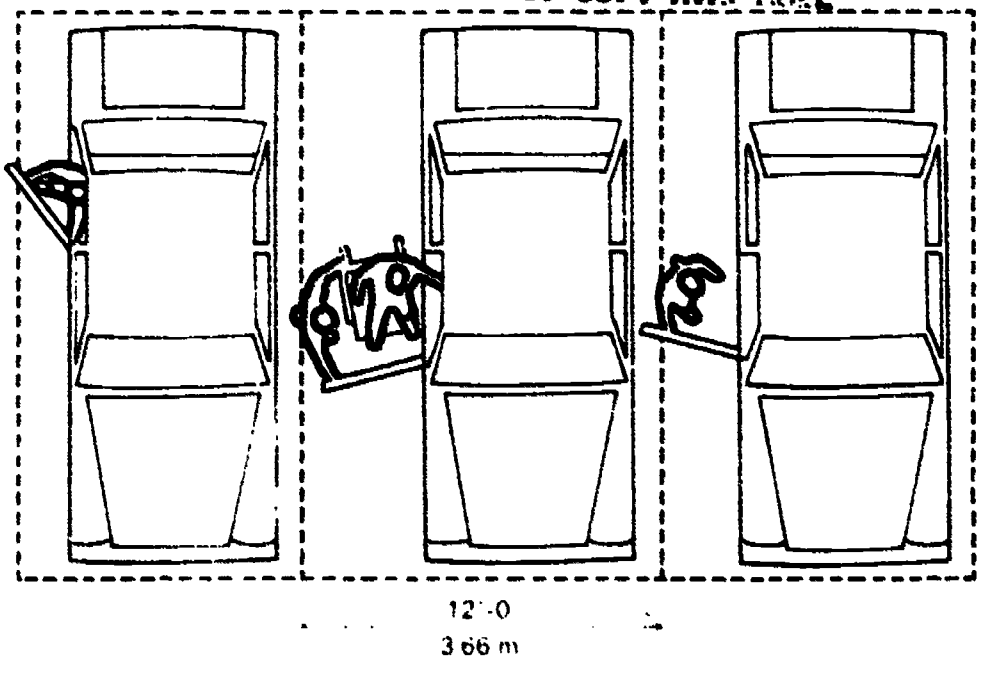
Different ways of cutting the curb to provide for ramp in the walk to meet the road level



Note: Where walks are ramped they should lead onto roads carrying the lesser amount of vehicular traffic.



Walk connected by ramp to secondary street



Plan of a parking place

Parking Lots

Spaces that are accessible and close to the entrance-ways should be reserved and identified for use by persons with physical disabilities.

– Walks from parking spaces for non-ambulatory or semi-ambulatory persons should not be located behind parked cars.

Parking places for disabled persons should be 12 feet (3.66 m) wide, situated on level ground, and paved if possible.

- A curb ramp leading to the sidewalk should be in the immediate area.

Building

Gradient of Ramps

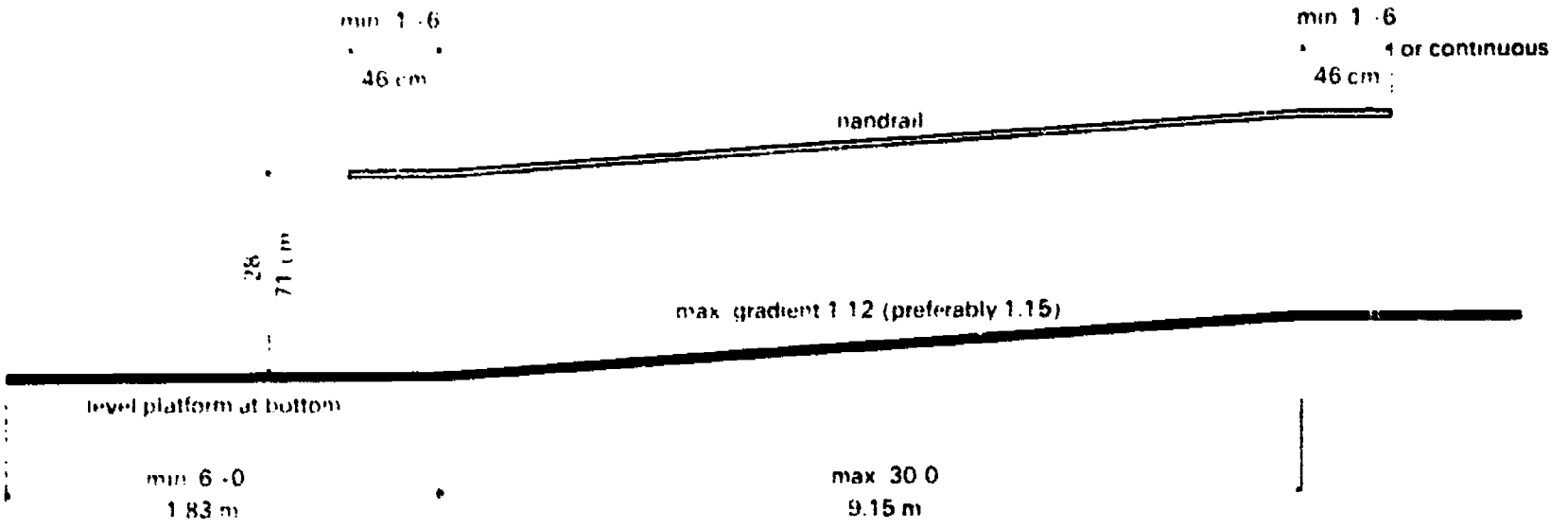
A preferred maximum gradient of 1 in 15 for general purpose ramps is recommended. However, even the steepest ramp is more easily managed by wheelchair users than a flight of steps. If circumstances are such that only a steep ramp may be incorporated, then it is better to install a ramp with maximum gradient of 1 in 12, rather than no ramp at all, provided that steps are available for the use of non-handicapped and ambulant disabled people.

– Ramps should have a nonslip surface.

- A minimum width for the ramps should be 3 feet (91.5 cm).

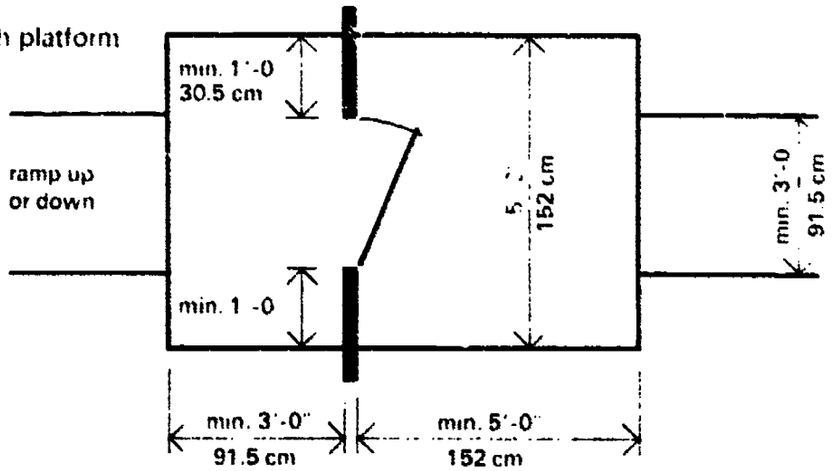
– A ramp should have handrails on at least one side, and preferably on two sides, to assist those who can walk without crutches, but still need support.

A ramp should have a level platform at the top that is at least 5 feet by 5 feet (152 cm by 152 cm) if a door swings out onto the platform or toward the ramp.



Section of the ramp and platform

Plan of doorway with platform

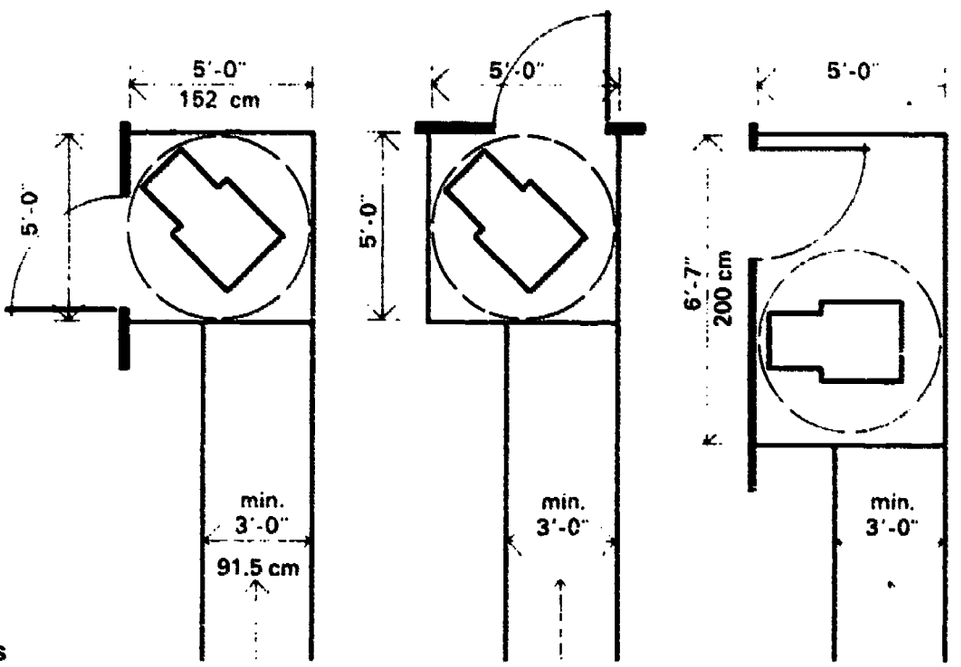


– The platform should extend at least 1 foot (30.5 cm) beyond each side of the doorway. In special cases if the door opens inwards, the depth of the level area may be reduced to 3 feet (91.5 cm) but extend 1 foot (30.5 cm) beyond each side of the doorway.

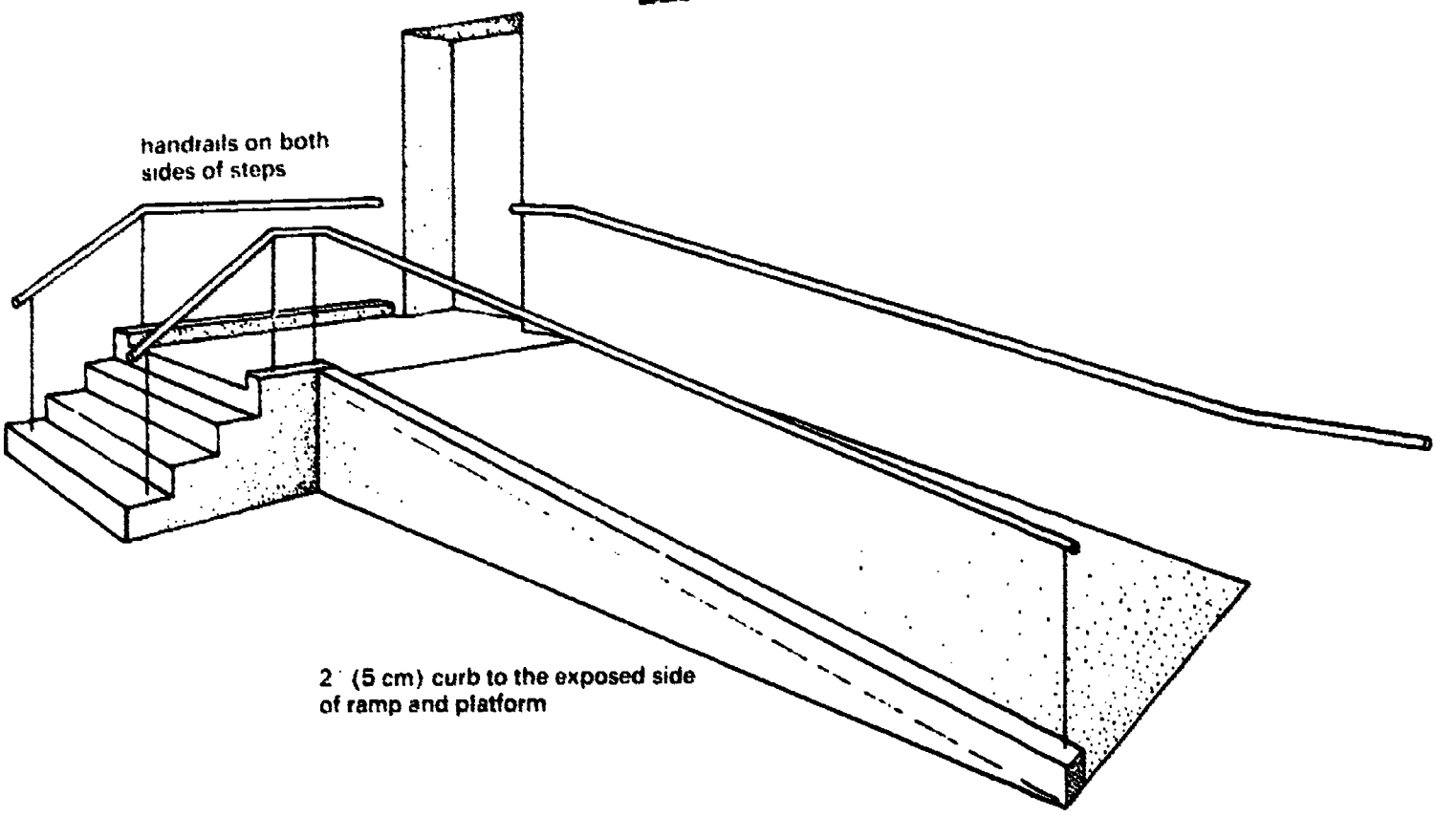
– Ramps should have level platforms at 30-foot (9.15 m) intervals for the purpose of rest and safety. The platform should be the same width as the ramp and at least 4 feet (122 cm) long.

– Each ramp should have at least 6 feet (1.83 m) of level platform at the bottom.

– Ramps should have a level platform wherever they turn.



Turning ramps



– Exposed ramps should be protected from snow and ice accumulation. This can be accomplished by providing a roof over the ramps or by installing snow-melting devices.

– A curb should be provided to the exposed side of the ramp where the gradient exceeds 1 in 20. Curbs should be 2 inches (5 cm) high.

– Care should be taken to ensure that curbs provided for wheelchair users do not present a hazard for others.

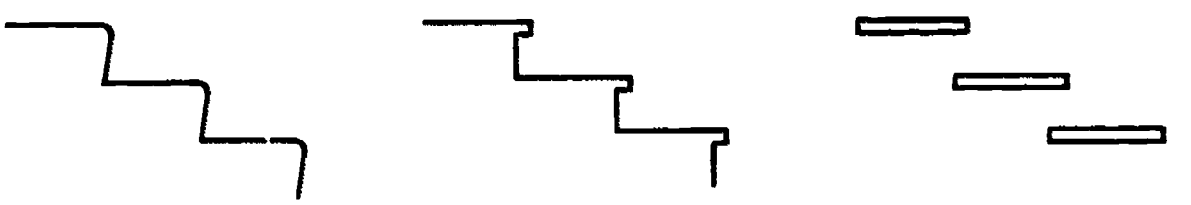
Stairs

– The ratio of rise to run dimensions of stairs should conform to the National Building Code of Canada and must be the same for all steps in one staircase.

– Open riser staircases must be avoided.

– Steps with projecting noses are not recommended.

– Single or double steps should never be used.



Recommended

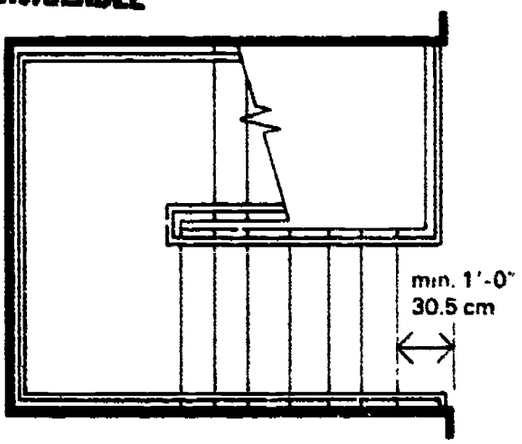
Not recommended

– Steps less than 4 inches (10 cm) high are hazardous.

– Stairs should have at least one handrail and it should extend at least 18 inches (46 cm) beyond the top and bottom steps.

Note: Care should be taken that the extension of the handrails is not in itself a hazard. The extension may be made on the continuing wall.

– The line of the nosing of the top step of a staircase should not be closer than 1 foot on plan to the point where an adjacent wall returns.



Plan of the nosing of the top step of a staircase

– No door should open directly on the top of a staircase or swing so as to obstruct the top or bottom step.

– Surfaces must be non-slip. If carpeting is used, it must be securely fixed.

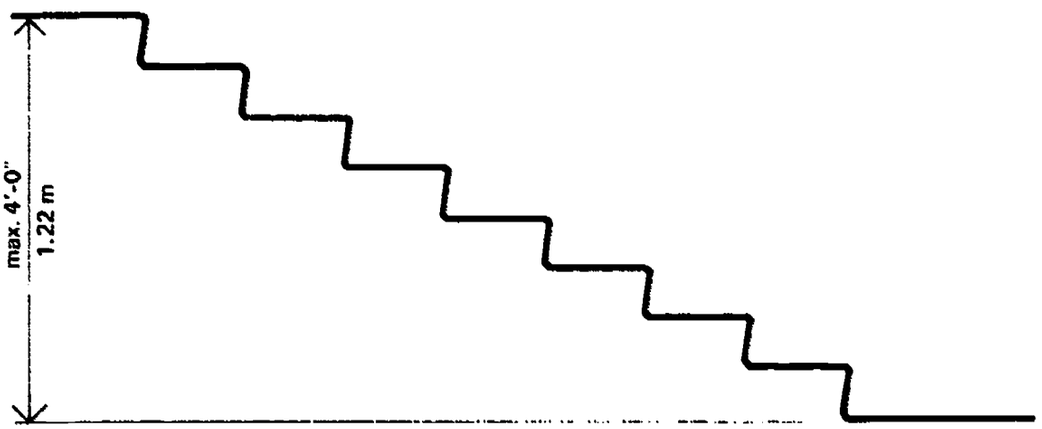
Note: Terrazzo stairs can be made nonslip by using aluminum oxide abrasive as a finish; stairs of wood or steel may be covered with premoulded treads or carpet material.

– For general purposes and to allow for the ambulant disabled, the stair rise should not exceed 6½ inches (16.5 cm). The tread should not be less than 10½ inches (26.5 cm). This gives a maximum inclination of 35 degrees.

– The vertical rise of any flight of stairs should not exceed 4 feet (1.22 m).

– A landing in the middle of the stair flight provides a safe stopping and resting place.

– When steps are exposed to the weather they should have risers of not more than 6½ inches (16.5 cm), preferably 6 inches (15 cm). The treads should not be less than 11 inches (28 cm), preferably 14½ inches (37 cm).



Maximum vertical rise of flight of stairs

Handrails and balustrades must be securely fixed.

A handrail should be provided at least on one side of any staircase or ramp.

In some situations corridor handrails should be provided on both sides to assist those who can walk without crutches but need a little support.

A recommended height for children is 24 to 28 inches (61 to 71 cm), depending on the age group: for adults, 30 inches (76 cm).

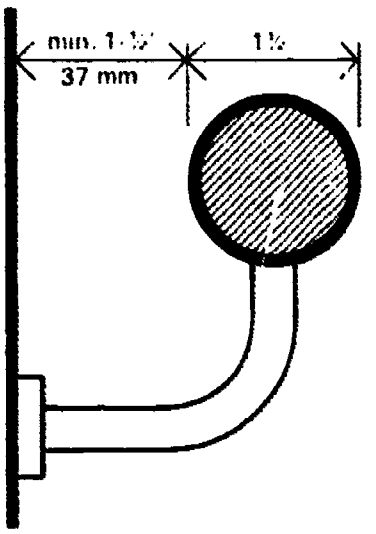
Handrails should be continuous and should not be broken at half landings or where windows are situated over staircases.

– Handrails should be easy to grip and should not exceed 1½ inches (37 mm) in diameter for children and 1¾ inches (44 mm) for adults.

There should be at least 1½ inches (37 mm) of free space between the handrail and the wall.

- Brackets should be fixed to the underside of rails.

- Rough-textured finishes to wall surfaces behind handrails should be avoided.

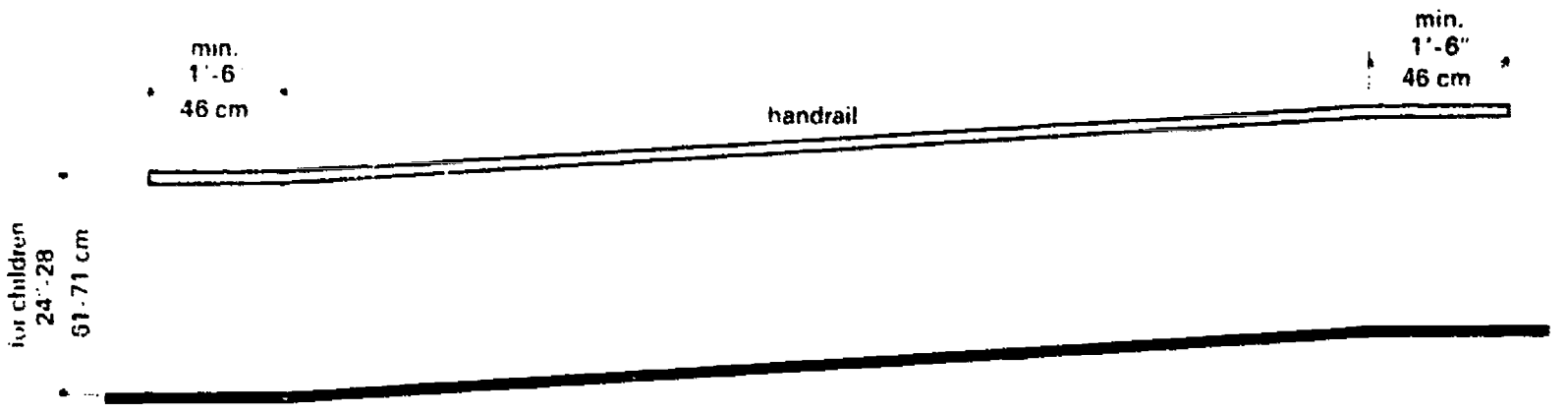


Section of a handrail

– It is recommended that the interior handrail be smoothly finished hardwood; where metal handrails are used they should be covered with a thermoplastic material.

- Handrails should extend at least 1 foot 6 inches (46 cm) at each end of any ramp.

-- Where a ramp is above the level of the ground storey of a building a balustrade, parapet, or railing not less than 3 feet 6 inches (107 cm) high should be provided, and the handrail should be fixed to it at the proper height.



Handrail extension at ends of ramp

Elevators

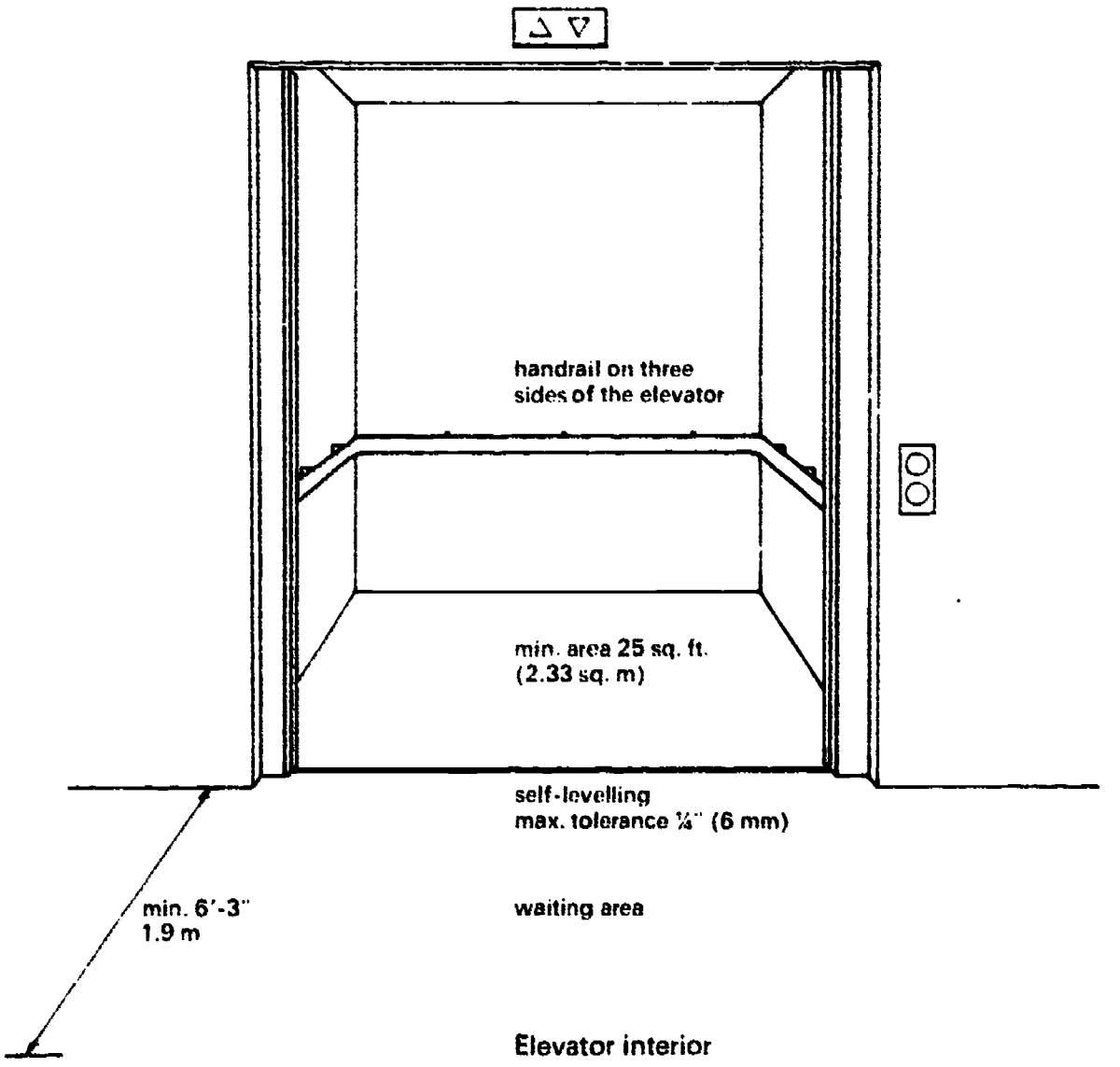
In buildings utilised by individuals who are handicapped an elevator is the only efficient means of vertical transportation.

Elevators should be provided in buildings of more than one storey

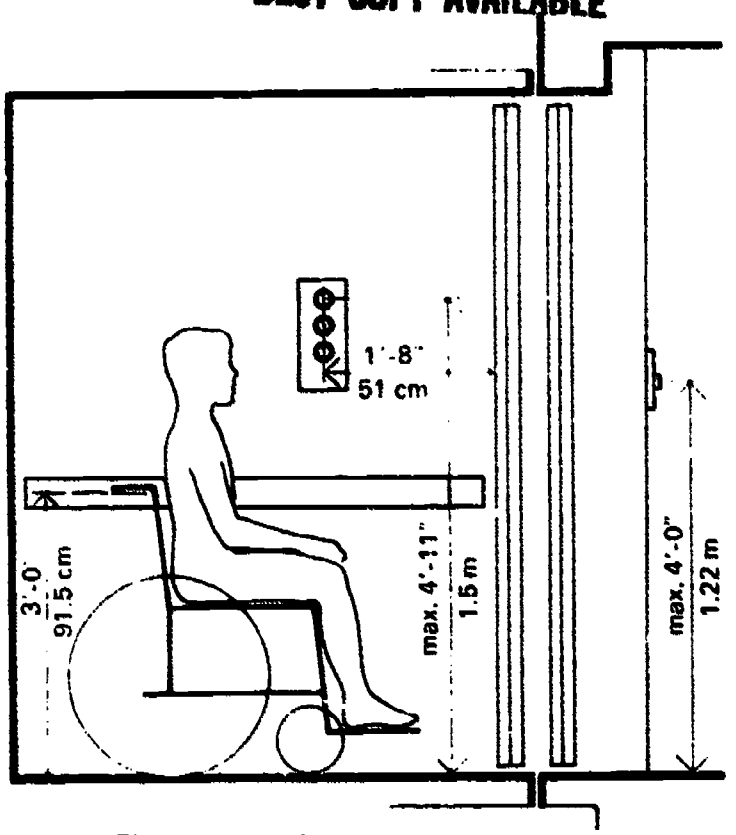
For large wheelchairs the area inside the elevator should not be less than 25 square feet (2.33 square metres).

Push buttons low enough so that they can be reached easily by a person in a wheelchair, and a prominent "hold" button, are important. In case of emergency, elevators should also be equipped with a telephone or two-way communication system that can be easily reached from a wheelchair.

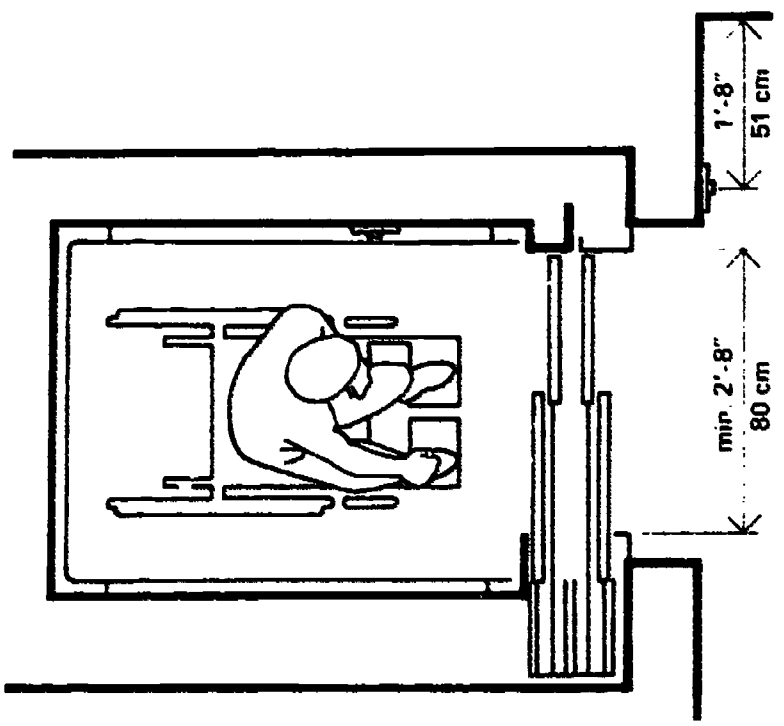
· Handrails should be provided on three walls of the elevator, or on two if there is a rear door.



Elevator interior



Elevator – section



Elevator - plan

Elevators should be automatically self-levelling and should stop precisely at floor level with a maximum tolerance of ± ¼ inch (6 mm).

– The elevator waiting area should have an unobstructed space in front of the elevator door of not less than 6 feet 3 inches (1.9 m) deep.

– Mats or gratings should not be placed immediately in front of elevator doors.

– A durable material is recommended for the inside elevator walls to prevent damage by the wheelchairs.

– Elevator doors should have a minimum clear opening of 2 feet 8 inches (81 cm).

– Automatic elevators should have delayed-action doors.

Note: When an elevator is impractical, a special stair lift is available that can be fixed to the existing staircase.

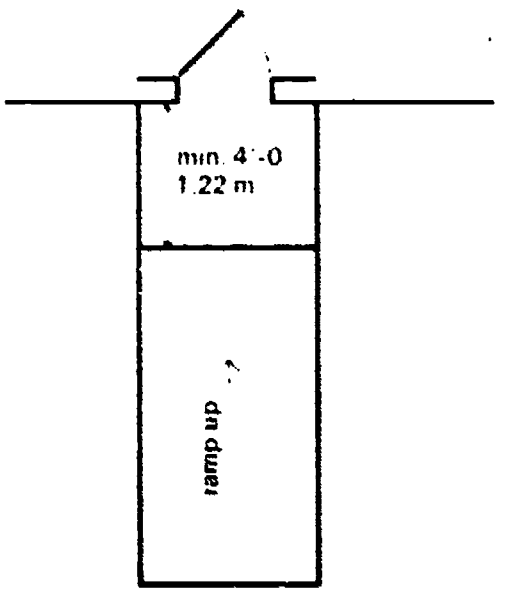
Entrances

– At least one entrance to each building should allow access to persons in wheelchairs.

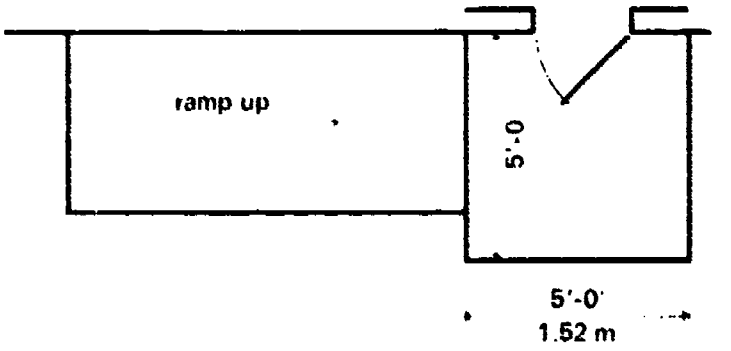
– A canopy of at least 3 feet (91.5 cm) should be provided over the wheelchair users' entrance.

– When the main entrance is not usable by persons in wheelchairs, a sign should be installed in front of the building indicating the location of such an entrance at the ground level.

– External and internal door mats should be recessed to lie flush with the adjacent floor surface.



Frontal approach



Lateral approach

– When a ramp gives a frontal approach, the platform should be a minimum of 4 feet (1.22 m) deep; where a ramp gives a lateral approach, the platform should be at least 5 feet (1.52 m) deep.

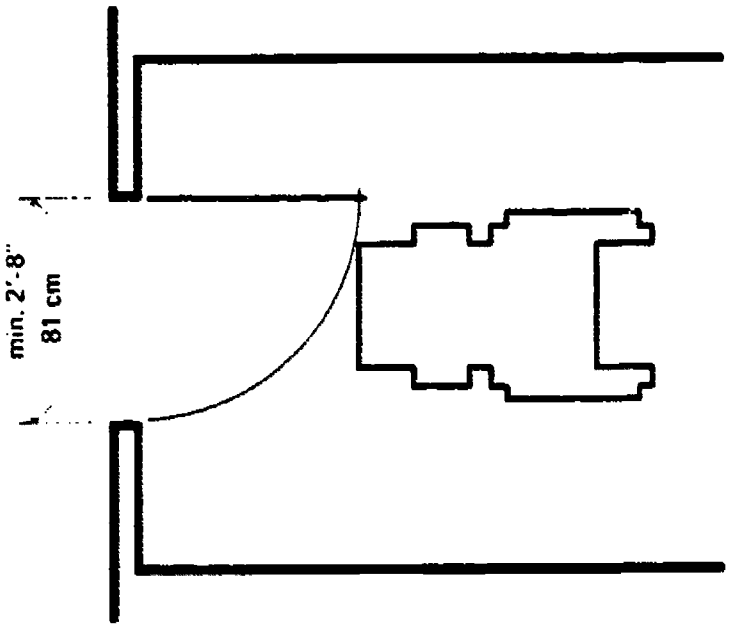
Doors and Doorways

Careful attention should be given to the placement and specification of doors.

– Doorways should have a clear opening (free of protruding hardware) of at least 2 feet 6 inches (76 cm) when the door is open.

– The door should be at least 2 feet 8 inches (81 cm) wide.

Note: Two-leaf doors are not suitable for persons who are physically handicapped unless they operate by a single effort, or unless one of the halves is a minimum of 2 feet 8 inches (81 cm) wide.



Standard doorway

– Doors opening into corridors should be recessed to avoid accident hazard.

– Where convenient positioning is possible, side-hung doors are preferable to sliding doors.

– Manually operated sliding doors should be installed only in situations where a side-hung door would hinder movement, for example inside a washroom or for closets and cabinets.

Windows

– Large windows should be carefully planned, particularly where they are glazed to a low level.

– In many areas it is important that window sills be sufficiently low to provide convenient vision. In some cases high window sills will be required for privacy.

– The hazard of an in-swinging window may be lessened by the provision of a deep sill or shelf.

– For safety reasons, no opening part of an upper-level window should be less than 2 feet 9 inches (84 cm) above floor level.

– Floors on a given storey should be at the same level throughout the building or connected by a ramp. (See ramp specifications.) This condition cannot always be achieved in an auditorium. In such cases a part of the seating should be removed to make space available for wheelchairs where the floor is level.

– At entrances intended for use by persons who are handicapped, the floor inside and outside a doorway should be level. This level area should extend at least 1 foot (30.5 cm) beyond the latch edge of the doorway, 5 feet (1.52 m) in the direction that the door swings and 3 feet (91.5 cm) in the opposite direction.

Interior Finishes

In schools where physically handicapped students are likely to attend, special protection will be necessary.

– Different wall finishes may be provided above and below dado level, so that the lower area, which is liable to rough treatment from wheelchairs, may be renewed independently of the rest of the wall.

– Wall finishes should allow for easy cleaning and maintenance. Materials should be resistant to marks and be easy to repair when damaged.

– Colours for interior walls should be considered very carefully. Sometimes too strong a colour may be irritating to hyperactive persons, but strong colours may be useful when used with discretion to emphasize obstructions or hazards such as ramps, radiators, or exposed beams.

Note: In areas where wheelchairs will be commonly used, a buffer baseboard should project from the wall 4 inches (10 cm) with a minimum height of 6 inches (15 cm) above floor level. This buffer baseboard serves to protect the hands from being scraped between the wall and the wheel of the chair.

Floor Finishes

For persons who are physically handicapped, the floor surface can present a serious problem.

– All floor surfaces used should be of the non-slip variety. Slippery surfaces are particularly hazardous to ambulatory handicapped, especially crutch users.

– Floors that look slippery (although they may have non-slip characteristics) should also be avoided.

– Floors should be durable, but resilient, and they should be attractive and easy to clean. Carpeting should be provided for some sections of Junior Kindergarten and Kindergarten rooms. In washrooms, lobby areas and other areas where water is used, waterproof materials are more practical. If wax has to be applied, it should be used sparingly. Floor drains are helpful in washrooms, so that floors can be more easily cleaned and water damage minimized in case of overflows.

Washrooms

In washrooms sufficient space should be provided for the passage of wheelchairs.

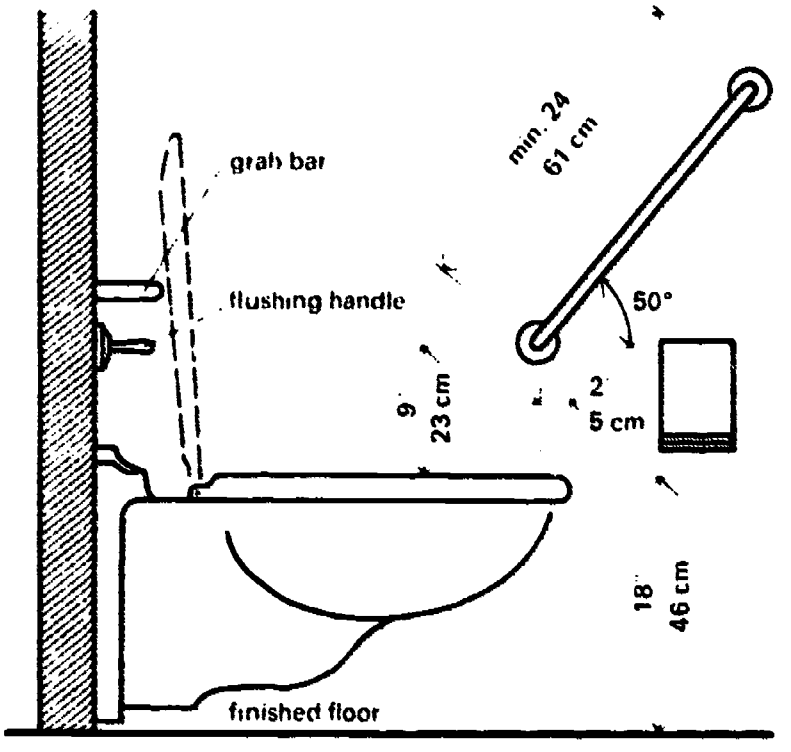
– There should be one men's and one women's washroom on each floor, each of which should have at least one toilet compartment 4 feet 6 inches (1.37 m) wide and at least 5 feet (1.52 m) deep. The door (where doors are used) should be 2 feet 8 inches (81 cm) wide and must swing outward, preferably against a side wall.

Note: The door lock should be operable from the outside in case of emergency.

Individual Toilet Compartment

– The toilet fixture should be located 1 foot 6 inches (46 cm) from the centre of the fixture to the side wall.

– A wall-mounted toilet with a narrow understructure that recedes sharply is most desirable. Height and size of the seat should be planned according to the users' age group. Special toilet fixtures and seats are available for Junior Kindergarten children.

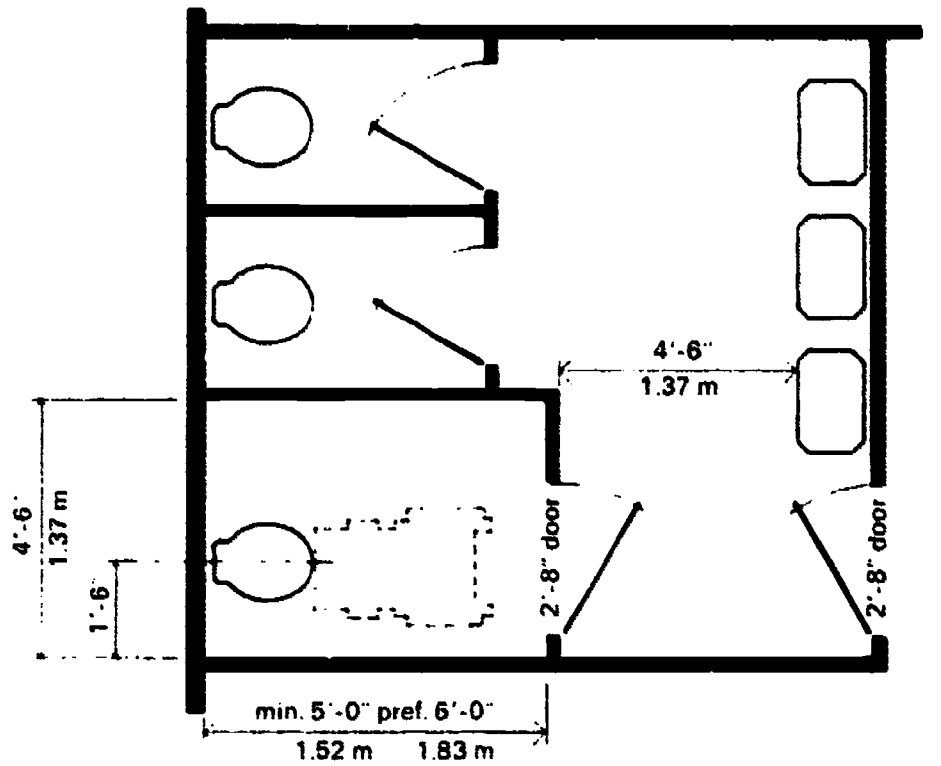


Toilet elevation

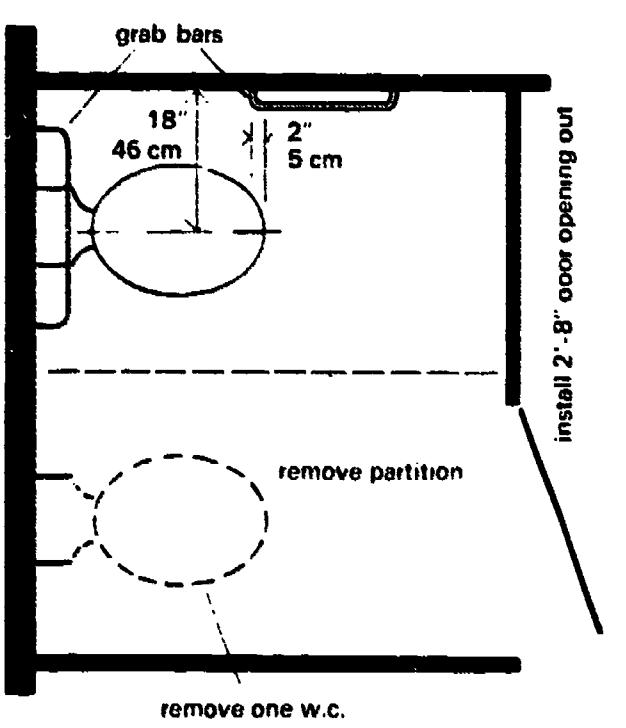
– The compartment for the handicapped persons should include grab bars. They should be fixed securely on the side wall and on the back wall. The bars should be at least 2 feet (61 cm) long, and 1 inch or 1¼ inch (25 mm or 31 mm) in diameter with a 1½ inch (37 mm) minimum between the bar and wall. The bar on the rear wall should be placed on the centre line of the toilet and fixed at approximately 11 inches (28 cm) (for children – depending on the age group – slightly lower) above the toilet seat. The bar on the side wall should be installed at a 50 degree angle to the floor. (See diagram)

Note: By combining two standard toilet compartments into one, by removing the common partition and installing a door 2 feet 8 inches (81 cm) wide and adding grab bars, it is possible to convert existing compartments to meet the needs of the handicapped. If the grab bars have to be installed to the rear of the toilet for a specific disability, tank type toilets cannot be used.

– A change table with a plastic-covered mat is essential to meet the needs of children with uncontrolled bowel and bladder.



Plan of the individual toilet compartment

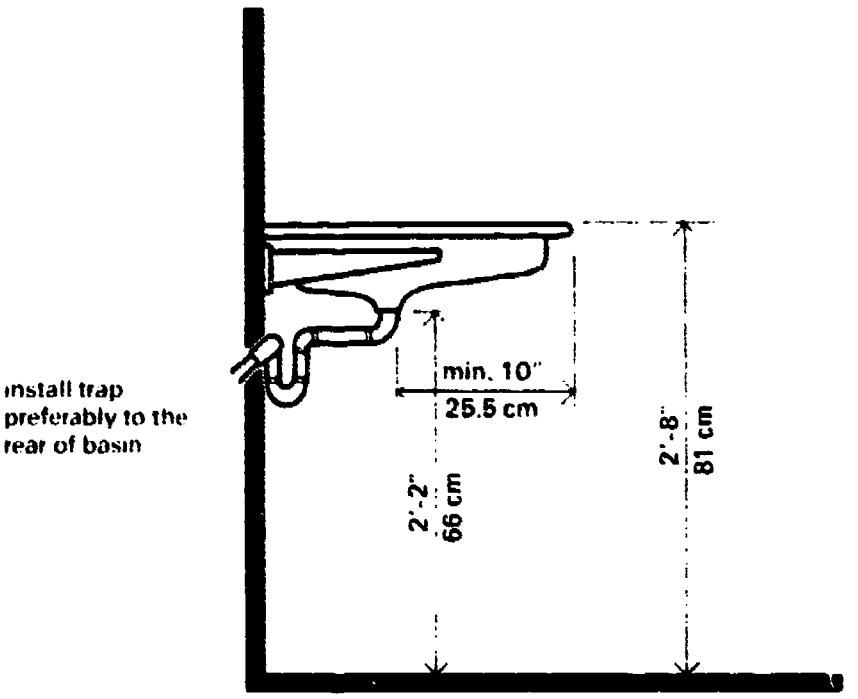


Combining two standard toilet compartments into one for use of a person in a wheelchair

Wash Basins

- A wash basin should be wall-mounted, without legs or pedestal, to permit easy approach by chairbound persons.

– Wash basins should have a clearance of 2 feet 2 inches (66 cm) under the apron and bowl to a point at least 10 inches (25.5 cm) from the front of the fixture.



Basin installation

- Basin heights should vary to accommodate different types and ages of handicapped persons.

- Single lever faucet handles are preferred.

Note: It is important that drain pipes and hot water pipes under wash basins be covered or insulated so that chairbound persons without sensation will not burn their legs.

Urinals

- Urinals may be wall-mounted at the proper height, or floor-mounted.

– Floor under urinals should be level with the main floor of the washrooms.

– Grab bars may be required depending on the type of handicapped persons using the facility.

Accessories

– Low mirrors and shelves should be provided for wheelchair users as well as standard heights for the ambulatory.

– Washrooms should have an appropriate number of towel racks, towel dispensers, disposal units, toilet paper dispensers, electric hand dryers, and soap dispensers within reach of wheelchair users.

– Exhaust fans with multiple vent-speed should be installed in areas where bowel and bladder cases will be changed.

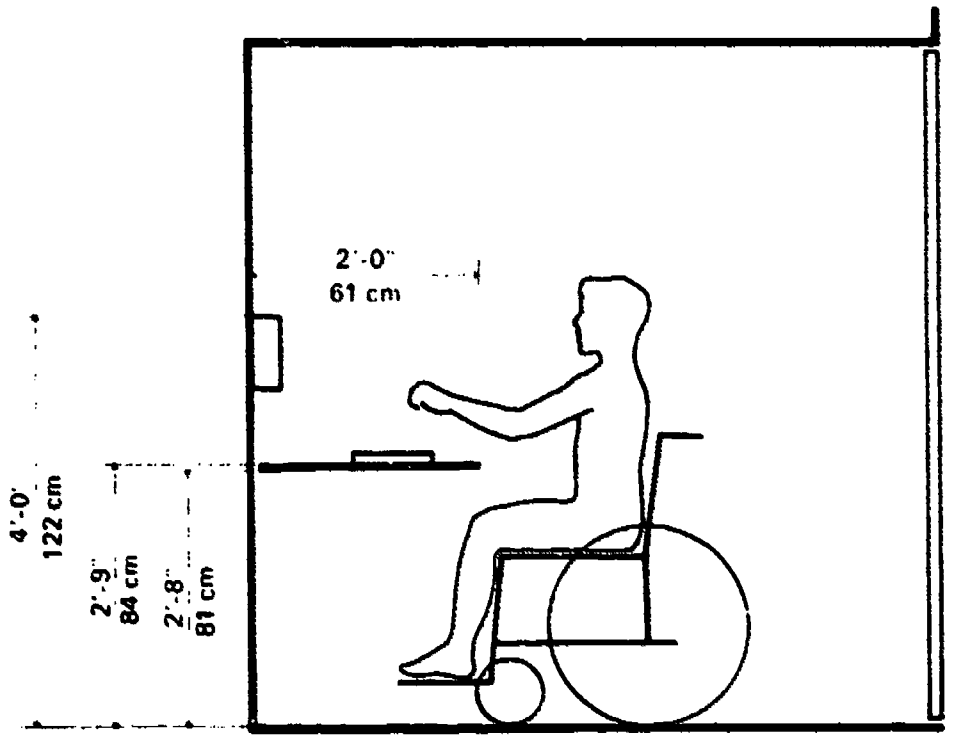
Water Fountains

– Water fountains should be placed in appropriate areas and provided with up-front spouts and with dual hand and foot control.

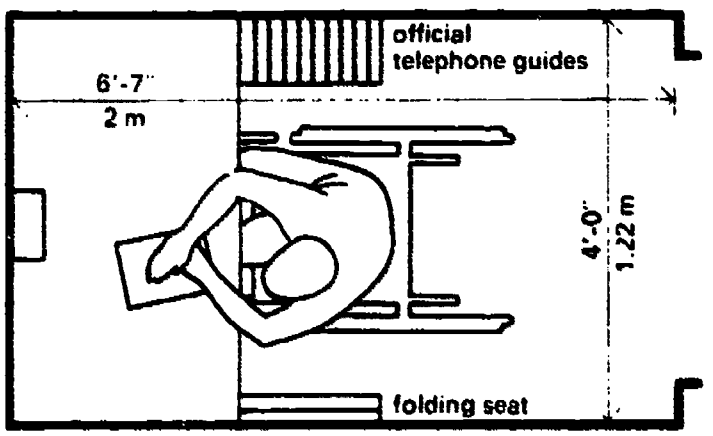
– The recommended height for water fountains for elementary schools is 26 inches (66 cm) above floor level; for secondary schools, 30 inches (76 cm).

Note: Fully recessed water fountains are not accessible to wheelchair users.

Standard telephone booths are generally convenient for ambulant disabled people, but are inaccessible to chairbound persons. Where public telephones are provided other than in booths, allowance should be made for individuals confined to wheelchairs.



Telephone booth - section



Telephone booth · plan

– For both the non-handicapped and the wheelchair users, it will be more convenient to locate the telephone receiver and coin slot exactly 4 feet (1.22 m) above floor level. The telephone directory shelf should be provided at approximately 2 feet 8 inches (81 cm) above floor level to provide ample leg room and wheelchair clearance.

Cafeterias

Cafeterias should be designed in such a way as to allow passage of wheelchairs through the food service lanes and between tables. Food display racks and cutlery should be visible and within easy reach of a person in a wheelchair.

Lockers

In regular schools, standard lockers are quite satisfactory for the use of students who are physically handicapped. Combination lockers are impractical for this purpose.

Cloakrooms

The width should permit easy turning of a wheelchair. Mirror modifications may be made to meet the particular needs of the individual student.

Hazards

Every effort should be made to eliminate hazards for those persons with physical disabilities.

– Access panels or manholes in floors or walk areas can be hazardous. They should be exactly level with the floor surface and should be well protected when opened.

– Door closers, signs, and fixtures that protrude into regular corridors or traffic ways should be avoided or mounted at least 6 feet 6 inches (1.98 m) above the floor.

– In learning areas where fixed furniture is installed and particularly where a fire hazard exists, special consideration must be given to the rapid evacuation of persons who are physically handicapped.

Additional Criteria for Special Schools

Schools designed specifically for children who are physically handicapped and classrooms attached to crippled children's treatment centres require more specialised facilities. Classrooms located in treatment centres for handicapped children provide education for those children admitted to the centres for medical treatment. It would be impractical for children or youth requiring intensive specialised medical treatment to attend regular schools, hence the need for classrooms located in the treatment centres. Educational programming in treatment centre schools is provided by qualified teachers, usually with a special education background.

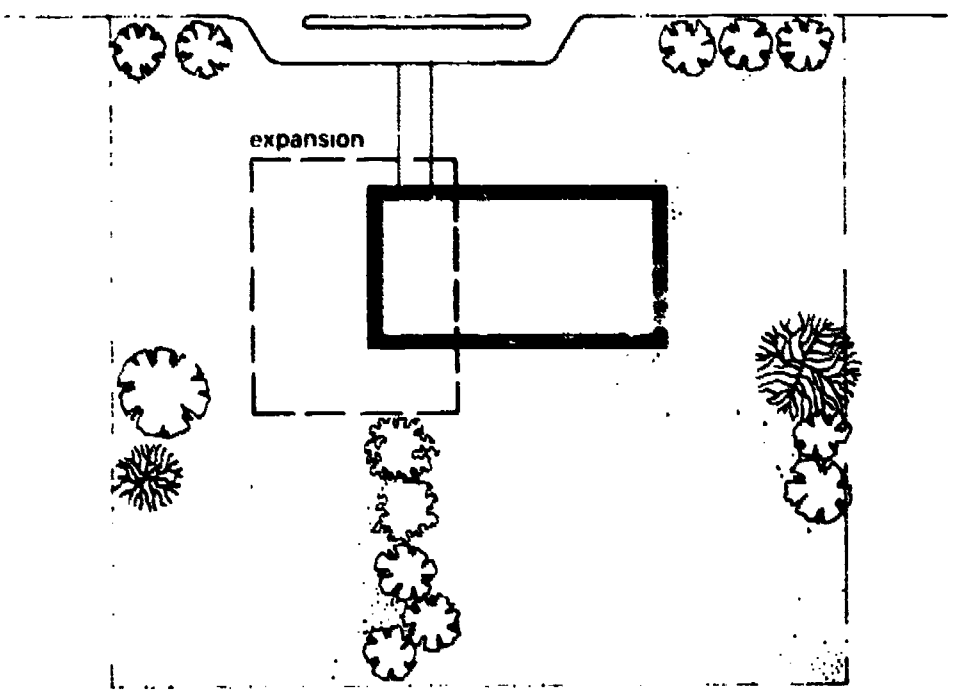
Since most medical gains are made during early childhood, the centres tend to concentrate on the pre-school and elementary-school-aged child. In addition, some older students up to the age of 19 are admitted. The school programs in the centres must have a very wide range to assist students who have neurological impairment, autism, emotional exceptionalities, visual handicaps, auditory handicaps, mental retardation, speech disorders, and other forms of exceptionality that interfere with learning, in addition to the physical disability.

Site

As with all buildings, a major consideration when planning specialised educational facilities should be the selection of the site.

Size and Shape

The size of the site will depend upon the planned activities, but future expansion should be kept in mind. Specifications for the size of the lot should take into consideration such matters as parking, service areas, outdoor therapy, recreation, and bussing requirements. Odd-shaped lots are not usually practical because some of the area may not be usable.

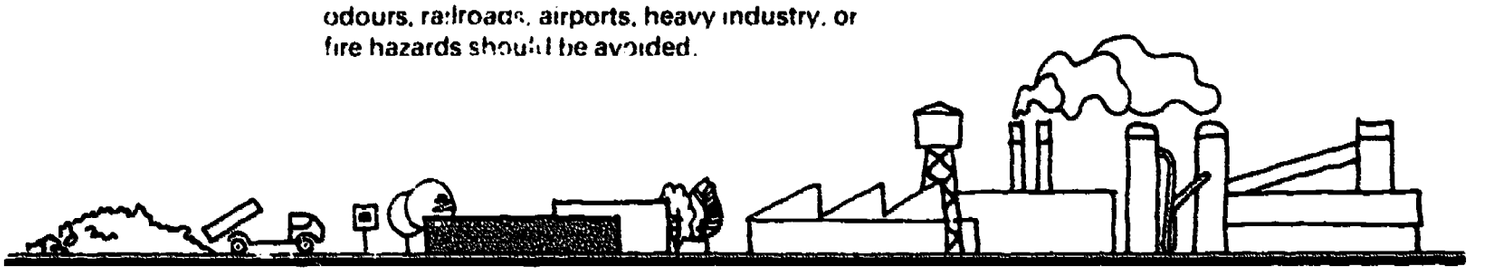


Provision for expansion

Location

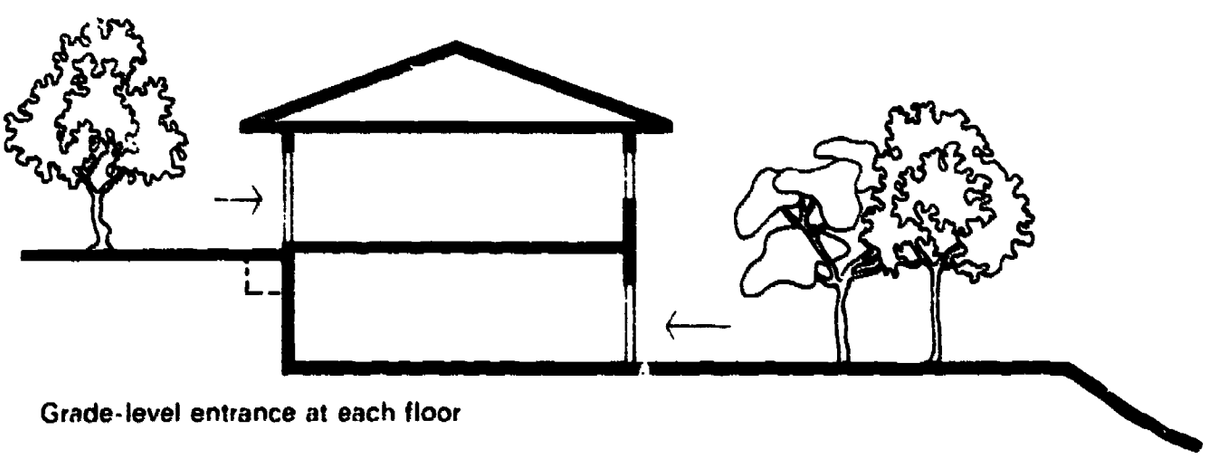
It is important that the site be centrally located to reduce transportation costs and increase the number of children served efficiently. A location close to other schools, hospitals, and diversified community resources is advantageous.

A location near smoke, noise, dumps, dirt, odours, railroads, airports, heavy industry, or fire hazards should be avoided.



Topography

A level site presents fewer planning problems, but the sloping site in combination with level areas may help in providing grade-level entrances at each floor, when the building is of more than one storey. Small hills, either natural or artificial, provide an area for recreation and outdoor training.

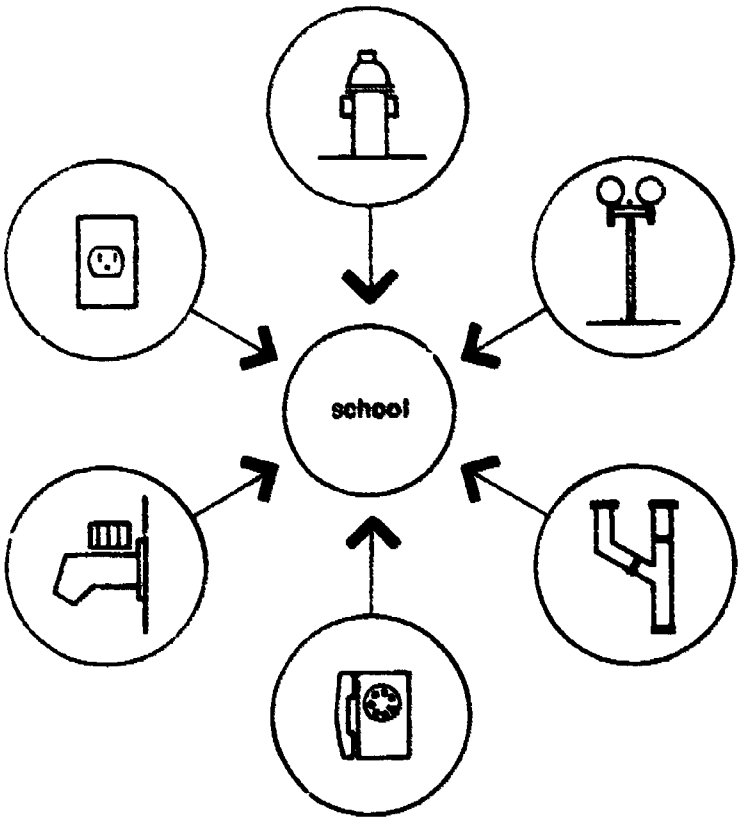


Grade-level entrance at each floor

The presence of trees and other plants on the site creates a pleasing environment for recreation, instruction and relaxation. An area set aside where the children can grow flowers and vegetables is useful.

Utilities

The site should have access to electricity, water, telephone service, sanitary sewers, storm sewers, street lighting and modern fire protection.



Equipment

Play is essential for physical, as well as mental, social and emotional, development. For physically handicapped children, as for normal children, the play environment should present a series of challenges to be mastered gradually. The needs and interests of the children should be met not only by indoor play activities, but also by outdoor play experiences, to increase their learning and physical development.

The playground should be planned by a team composed of therapists, recreational staff, and educators. It should be protected and well supervised.

Depending on the activities, the various areas will have a variety of surfaces that will harmonize with the location and the play equipment to be used. Soft surfaces like grass or shredded wood may be used for some types of ball games, and under climbing equipment and swings to cushion falls. Hard but resilient surfaces are used for walking, for wheeled toys, and for equipment that can be pulled or pushed. Ramps and paths leading directly from the classroom areas should be provided with a hard surface for the use of children in wheelchairs. Sand and water are sources of great enjoyment to many children. A raised portable waterplay tub, and a portable sandbox that can be wheeled about and used for indoor or outdoor play, could be included in the hard-surfaced area.

A raised soil area is ideal for gardening. A garden area should be separated and protected from the play area.

During hot, rainy or snowy days a large covered area is useful.

Wading pools, fish ponds and fountains must have special protection to control wheelchair entry.

An important function of the playground should be to create the awareness of nature, trees, shrubs, and flowers. Seats such as benches, logs, chairs, boxes, etc., could be provided under the trees for storytelling, drama, singing, and outdoor classes.

Bicycle paths and areas for circulation should be clearly defined.
A small artificial hill adds to the variety of physical activities.

Equipment for the playground
Suitable equipment should be selected for children who are physically handicapped. It should be challenging and stimulate children to action involving the usable parts of their bodies – climbing, pushing, pulling, swinging, crawling and rolling. It is of great importance that the equipment serving the children be constructed of durable materials. They have to feel secure while using it.

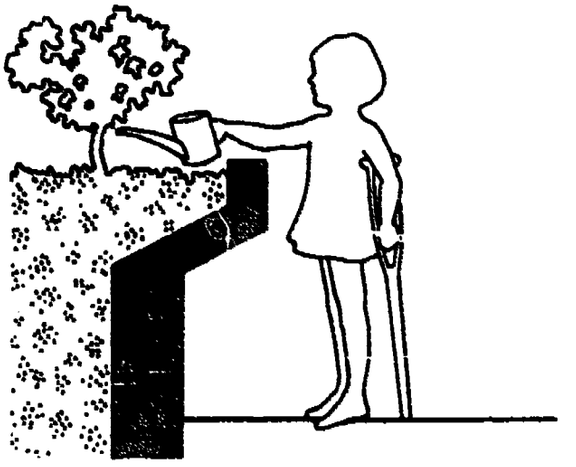
Storage space for equipment and toys is necessary. All equipment and installations must meet the highest possible safety standards to protect the handicapped users. Equipment should also have an eye appeal for youngsters. Primary colours provide freshness to a play area and contrast well with the buildings and the green of the grass, trees, and shrubs.

A playhouse with a store, puppet stage, and doll centre is popular with these children.

An outdoor area where the children can be assembled to watch plays, view films, or have a barbecue, should be considered. This area could face a back wall of the building. Electrical outlets, lights, and the place where the fire could be built may be planned. If shade trees are not present, they should be planted as soon as the area is designated.

It is very important that the supervising teacher recognize each individual's disabilities and select the equipment most suitable.

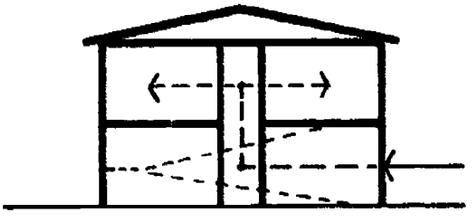
Raised sandbox



Raised garden

Building

One of the major problems in planning facilities for students who are disabled is presented by transportation within the building. For that reason, a single-level building is preferable. Where area is limited a multi-storey building serviced by an elevator and/or ramps is quite satisfactory.



Multi-storey building serviced by elevator and/or ramps

One-storey building

Planning Interior Facilities

When the building is designed for adults as well as children, it should be planned in such a way that the children can be separated from adults for part of the program.

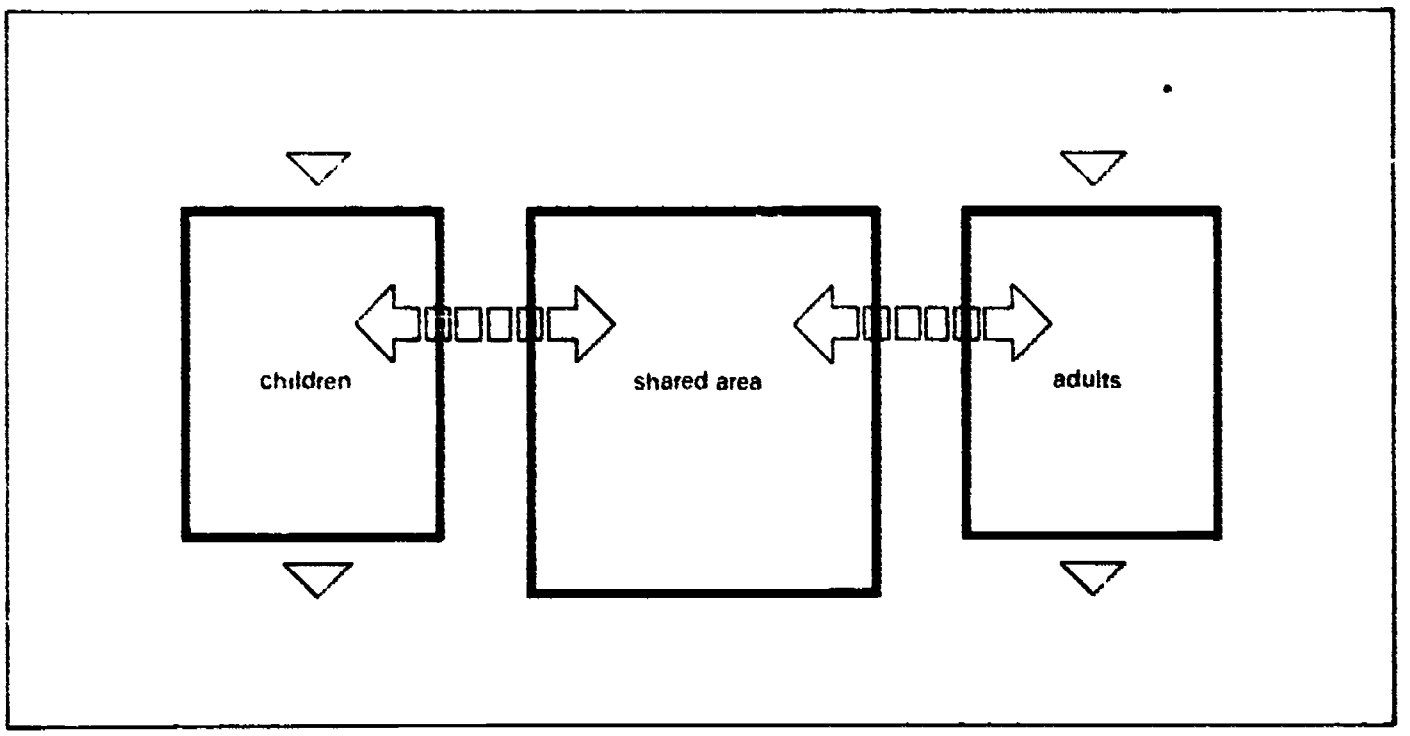
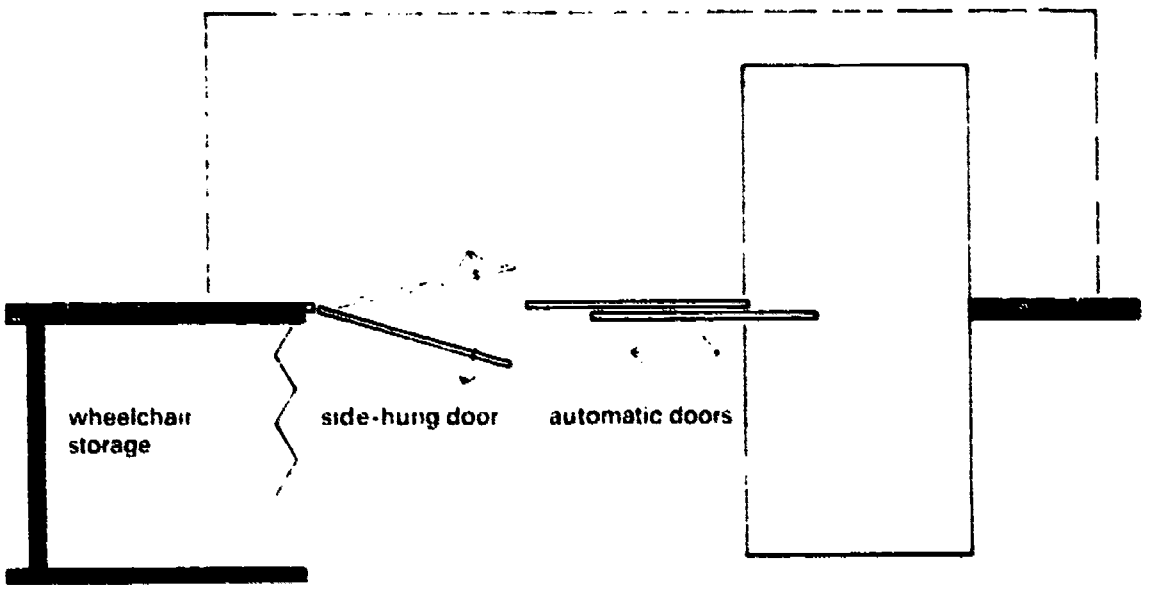


Diagram of a building designed for adults and children

The students' entrance to the school should be covered and provided with ample space for loading and unloading busses, taxis and cars. Automatic opening doors at this entrance are essential.

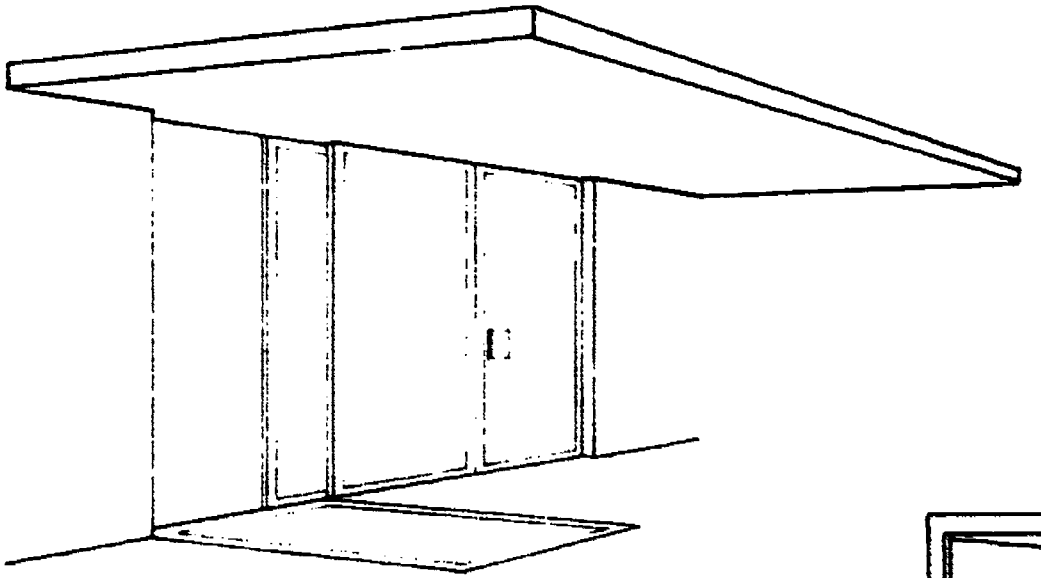
It is important that speech and hearing rooms be located in a quiet area of the building, preferably away from corridors that carry heavy traffic. To minimize the traffic it is desirable to locate classrooms in an area close to the main bus entrance. The physiotherapy and occupational therapy rooms should be located next to the classrooms for efficient internal movement. Since the outdoors will be used a great deal for educational purposes, it is desirable that classrooms should have outside doors that lead to the playground.

– A wheelchair storage area should be located immediately next to this entrance. A large folding door will keep the area neat when not in use.



Entrance – plan

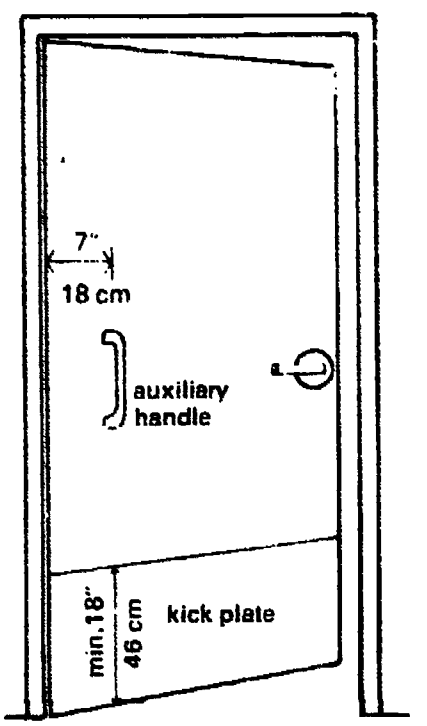
– The most suitable automatic door for disabled people is the sliding door operated by a contact mat. Doors are held open for as long as the area to either side is occupied. Mats must be sensitive to pressure exerted un evenly, as by crutch users. Doors operated by electric eyes and switches may also be used.



Entrance – side view

– Where automatic opening doors are installed there should also be a side-hung door in case of power failure.

Note: When automatic doors are not used, an auxiliary handle may be located on the push side, 7 inches (18 cm) from the hinged edge of the door, so the door may be closed by a person in a wheelchair. Lever type door handles are preferred to knobs, so that they can be opened easily by students whose grip is impaired.



– In schools for handicapped students it is advisable to protect the doors against wheelchair damage.

– A kick plate should be provided to a minimum height of 18 inches (46 cm) above the floor level.

– Doors faced both sides with durable material are recommended.

– Fully glazed doors should be shatter-proof.

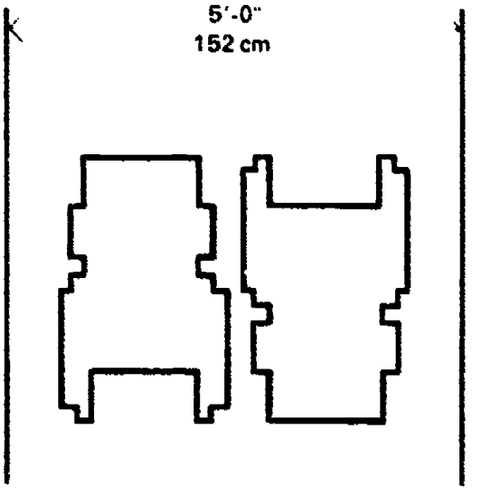
– Internal smoke and fire doors in main hallways should be connected to the fire alarm system. This matter should be discussed with the local fire marshal.

Corridors

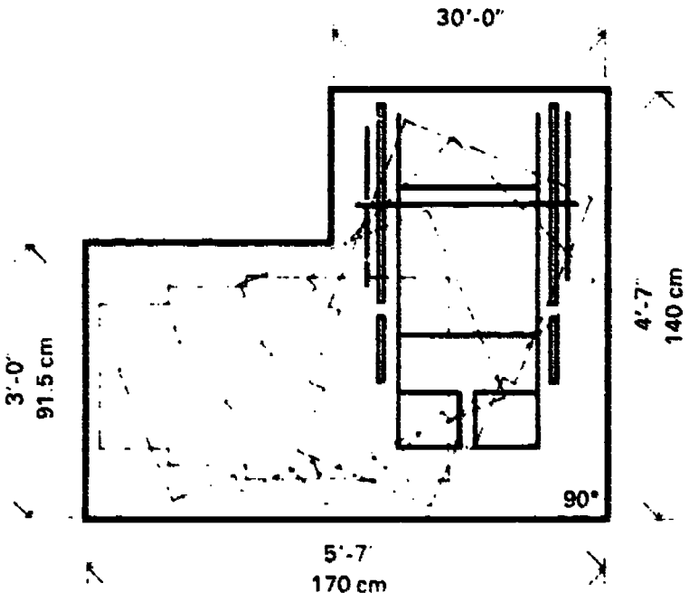
For those who are physically handicapped, corridors should ideally have a minimum width of 8 feet (2.44 m) increasing to 12 feet (3.66 m), depending upon the size of the building and the amount of traffic, to permit free flow of traffic for persons using wheelchairs, crutches and walkers.

– Side walls in corridors should be equipped with handrails.

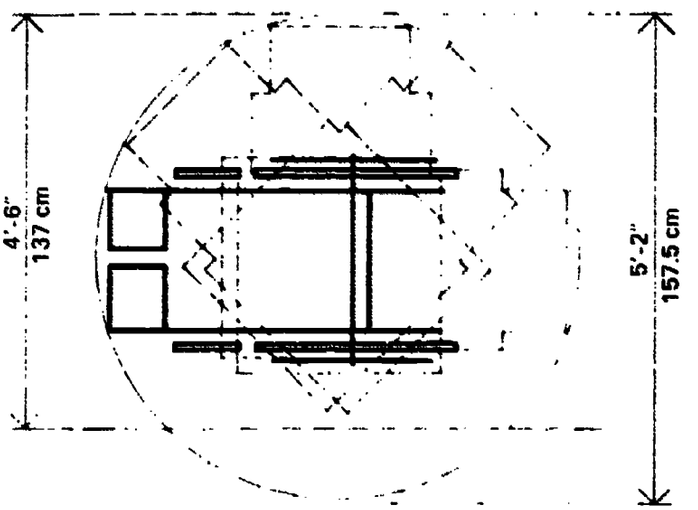
– Protruding corners should be protected from wheelchair damage by metal corners 3 feet (91.5 cm) from the floor.



Minimum width to pass



Minimum space needed for 90° turn



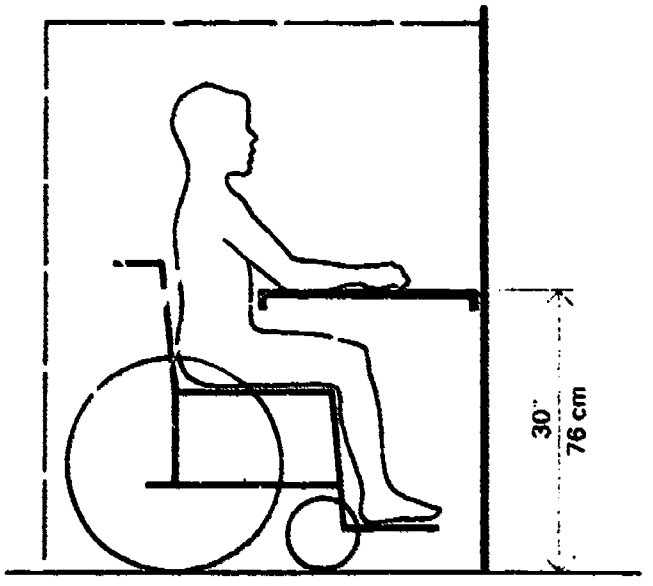
Minimum space needed for 180° turn-around, one wheel as the fixed pivoting point

Preparation Room

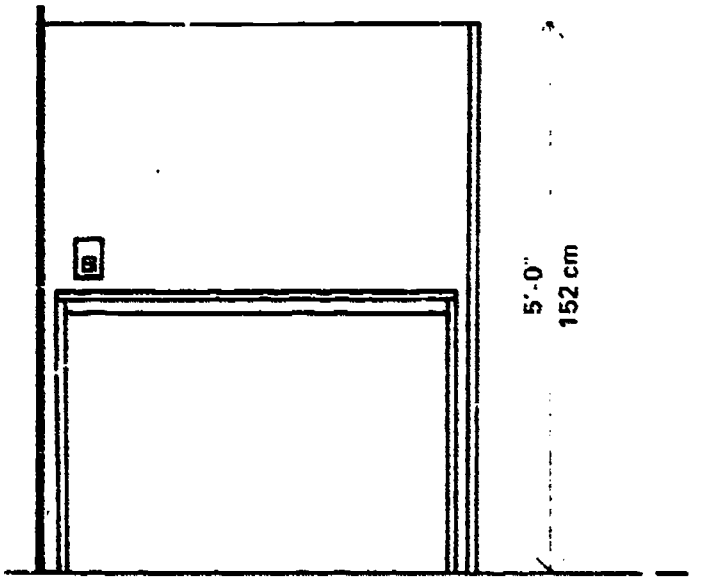
A teachers' preparation room is required to provide a working and meeting area for the teachers and classroom volunteers.

Volunteers' Room

If a large number of volunteers take part in the program, it may be necessary to provide a volunteers' room with lockers, washroom facilities, work tables, and a sitting area.



Reading carrel – section



Reading carrel – elevation

Media Centre

The media centre should contain all the features of a standard school media centre, but shelving heights should not exceed the arm reach of students in wheelchairs. Reading tables and carrels should be adjustable for different wheelchair heights.

Common Staff Room

The establishment of one common staff room will encourage the unity of the various disciplines.

General Purpose Room

This room could serve as a gym, recreation area, rest area, lunchroom, assembly area, and entertainment space for the students as well as a meeting place for parents and staff.

The stage should be accessible for wheelchair users.

Basketball backboards should be made adjustable for the use of young wheelchair students as well as the non-handicapped.

Swimming Pool

Most children who are physically handicapped benefit from the use of a pool. If an indoor pool is considered, the size recommended would be approximately 20 by 40 feet (6.1 m by 12.2 m). Part of the pool should be designed for very young children and should not exceed 2 feet (61 cm) in depth. The depth suitable for older students is 4 feet (1.22 m). A ramp, equipped with a handrail, leading to the pool, is essential. A handrail around the water line of the pool is also necessary to provide independent support for the handicapped. Planning the swimming pool in close proximity to the general purpose room gives the advantage of using the same shower and change rooms.

Note: In existing school pools, a special lifting device can be installed economically to accommodate the physically handicapped.

Junior Kindergarten and Kindergarten

Size and Arrangement of Areas

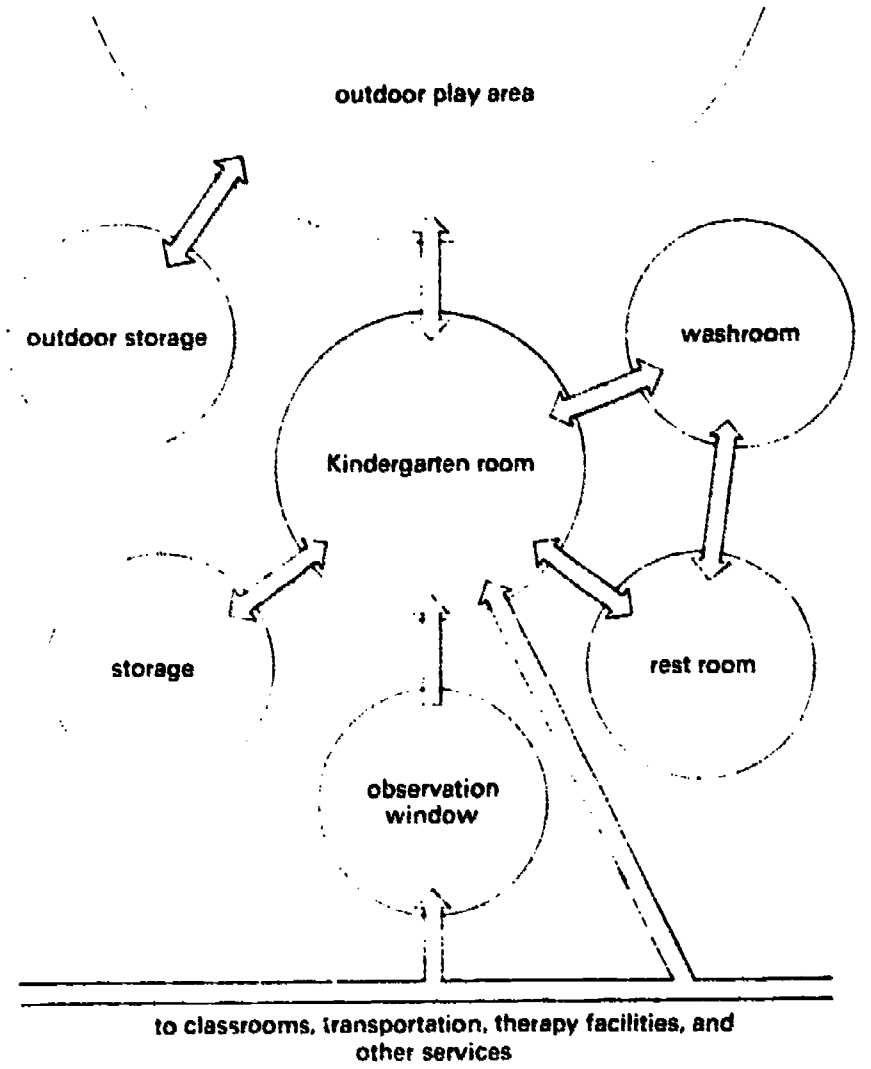
The Junior Kindergarten and Kindergarten should be planned for a maximum of 10 to 12 children and located close to the playground.

The decisive factors regarding the size of the room are:
– the number of children and the number in wheelchairs, beds, and striker frames;

– the amount of space required for their free movement;

– storage area for larger equipment, toys and rest mats, adjacent to the activity area;

– the coat-change area, which should be placed in the classroom. Movable coat racks provide more flexibility than the fixed coat-hooks. In addition, storage bins should be provided for each child.



Toilet facilities should be placed in the Kindergarten and near the outdoor play area. Wash basins and toilets should be scaled to the age level.

Ample cupboards and containers in the washroom are required to store soiled diapers, clean clothing, etc. A table or large fold-down shelf is required for changing the children. A multiple-speed exhaust fan is essential in this room. Laundry facilities would be very useful near the washroom area.

Doll centres, wet areas, music centres, furniture, sand tables, water tables, easels, should all be in scale with the children.

A piano and record player are important items for the kindergarten music centres.

Water play is one of the basic activities in programs for young children. Sinks designed for two different wheelchair heights with recessed plumbing and controlled water pressure are essential for that age group.

One or two cubicles, equipped with a small table, chair and mirror, would be useful in assisting children with speech and hearing problems. The same cubicles could be used to develop eating skills.

When space permits, a separate rest area may be very helpful. Small plasticized mats are usually more efficient than cots. This area should be placed next to the Kindergarten and washroom.

The Observation Room

The observation room is planned for several reasons.

– To enable research investigators to observe and record the behaviour of children.

– To allow visiting professionals to observe the facility and the program without disturbing the activities of the children and teachers.

– To give parents a chance to make judgments on their children's work in comparison with other pupils, to see the methodology of the teacher in attempting to achieve the maximum responses from their children, and to observe their children at play.

The observation room should be equipped with a writing surface, one-way observation window, communication system, and some chairs.

A small signal light should be provided to indicate to the classroom teacher when the observation room is in use.

Work Tables

A group work table is required in each room. Shapes such as circular, rectangular, or multi-sided can be used for socializing activities. The group table can also be made by putting several individual tables of similar shape together.

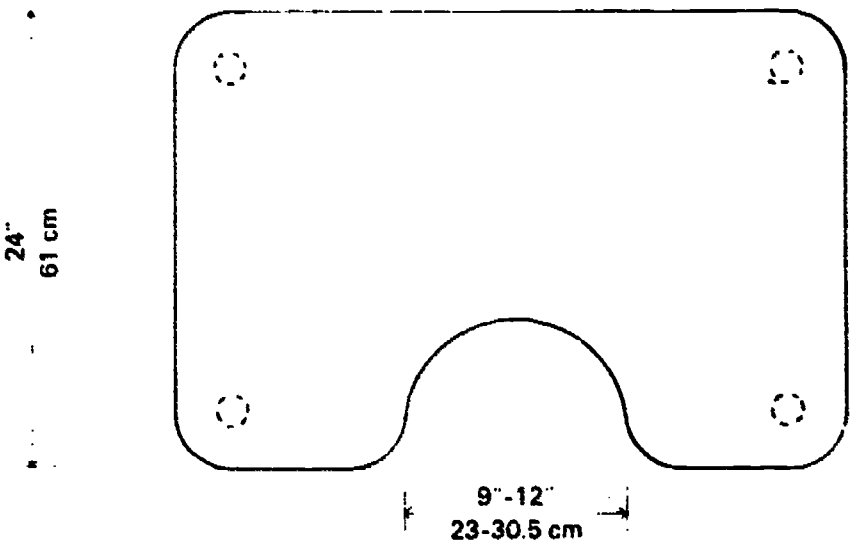


Table with cut-out section--plan

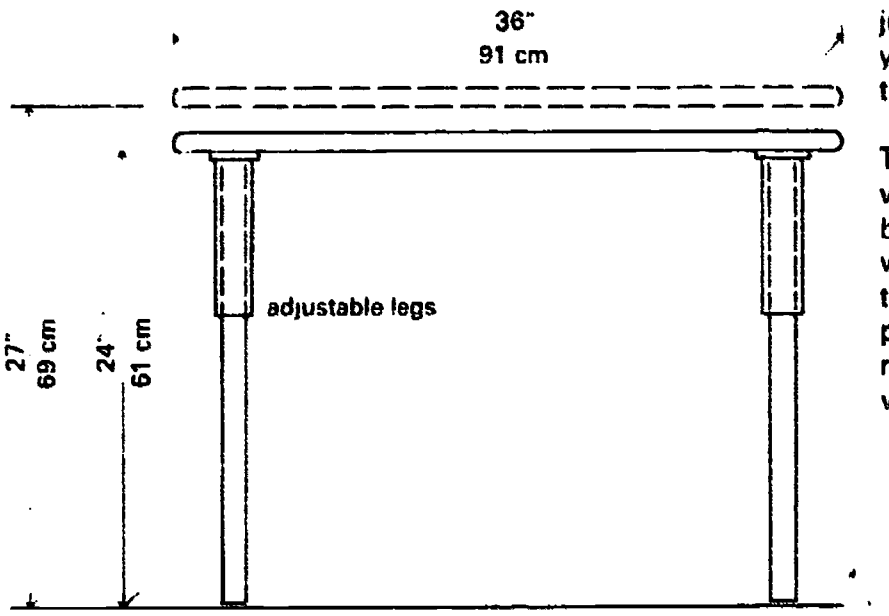


Table with cut-out section elevation

Some children in wheelchairs require a cut-out section, which allows a child with weak musculature a convenient resting place for his arms while working. The cut-out encircles the child's waist, thus decreasing the possibility of items falling from the table. The dimensions of the cut-outs should vary from 9 inches to 12 inches (23 cm to 30.5 cm). The height of the tables should be adjustable. Heavy tables are more easily moved on casters with individual locks.

Sand and Water Tables

The tables for sand and water play may have features similar to the work table. They should be available to children in wheelchairs, children who use conventional chairs, and children who work from a standing position. The table is more useful if designed for more than one child. It has to be wide enough to allow for a cut-out at each end and long enough to give freedom for each child to work independently. The table has to be deep enough to contain a sufficient amount of sand or water to prevent spillage. A table designed for kneeling children may also be appropriate. A sand table should be lined with some durable and waterproof material and be equipped with locking casters.

The Art Easel

Conventional easels usually have bases which are too narrow and the angle of the painting surface is fixed. For disabled children an easel has to be much more flexible. Movement on the vertical axis has to be adjustable to make the surface available for young children, who paint in standing position or sitting in their wheelchairs.

The best range for rotation would be from the vertical to 45 degrees. The paint trays should be adjustable to any height convenient to the working child and should be attached across the front of the easel. It is important that the painting surface be made of tackboard material, so that the paper can be firmly attached with thumb tacks.

Size
The classroom should be planned for approximately 6 to 12 students. The teacher should not be required to teach more than that number, because of the extra assistance needed by students who are physically handicapped. Planning the size of the classroom depends on certain factors:

– age range of the group;

- severity of the physical disability;

– number of ancillary personnel available;

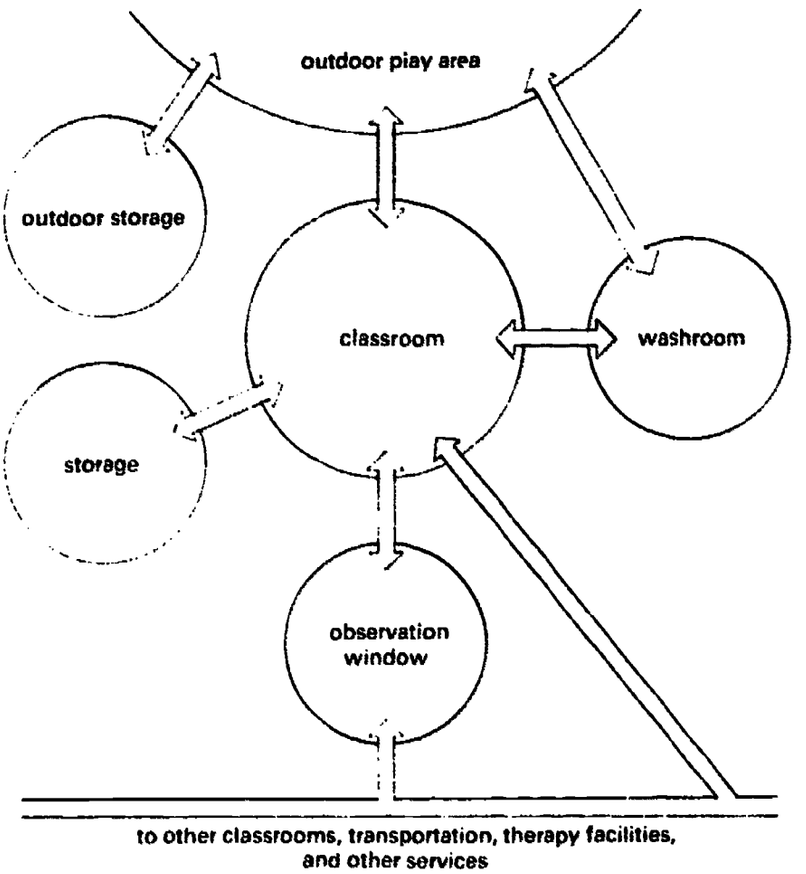
- the possible number of wheelchairs, beds or striker frames to be accommodated;

– specialised equipment required;

– the usual number of desks, chairs, tables, etc.

One hundred square feet of space is recommended for each child.

Special Features and Equipment
Chalkboards should be placed as low as 24 inches (61 cm) above the floor level to serve children in wheelchairs. Chalkboards with a railing may be helpful to provide support to some students. For students who have difficulty using a wall chalkboard, various types of portable chalkboards may be used When planning for the physically handicapped, work surfaces should be adjusted in height for user's size; bookshelves and storage cabinets should also be at lower levels for independent use.

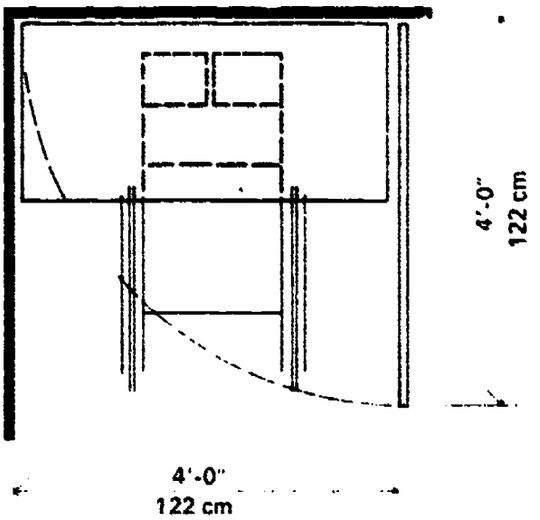


Some carrels with partitions that can be folded to the wall are convenient and conserve space when not in use. A ball caster should be used under the moving corner to provide support and prevent floor marking.

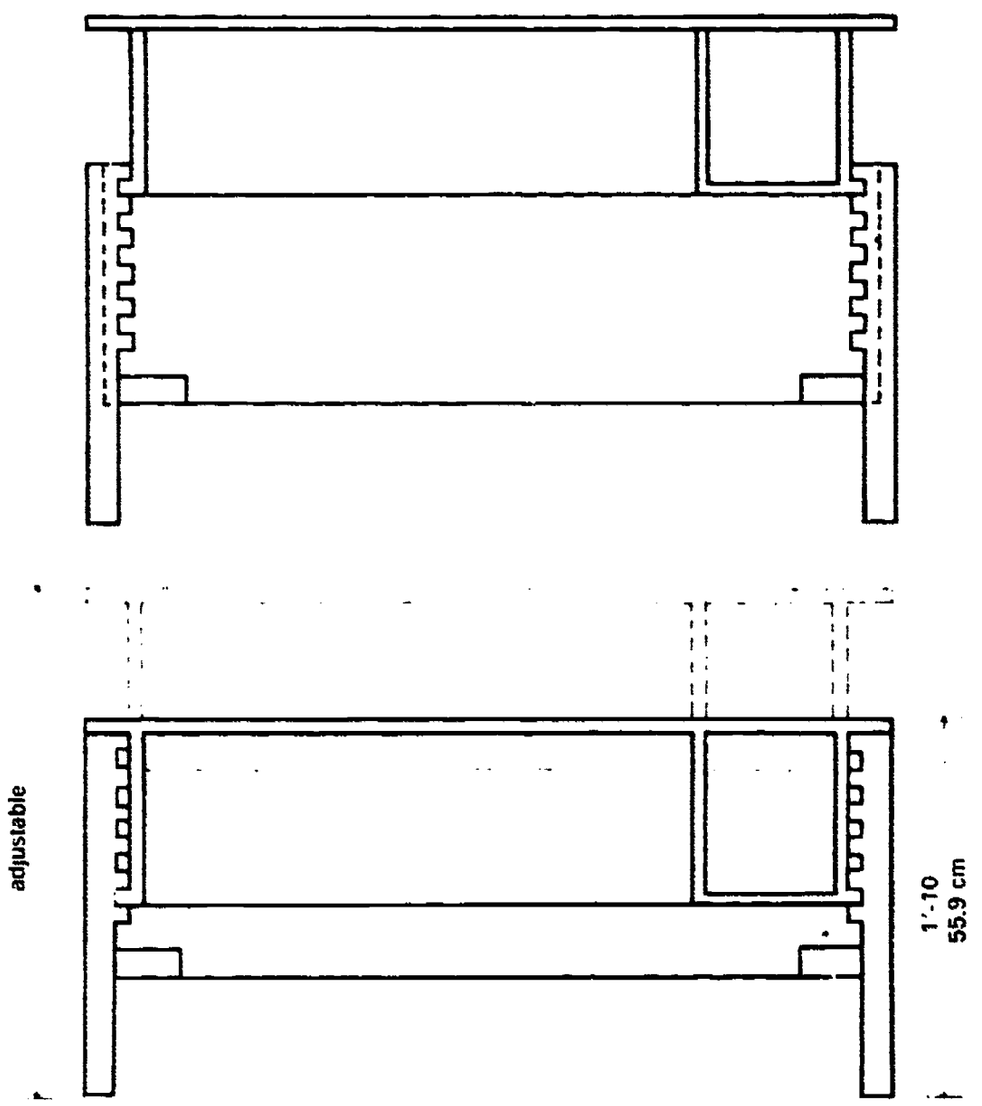
Running water is a required feature in all classrooms. The sink may project into the room to be accessible from three sides and should have knee space underneath to permit the students in wheelchairs to use the taps independently. Counters surrounding the sink should be 24 to 30 inches (61 to 76 cm) in height and covered with plastic laminate.

One of the classroom walls may be covered with tackboard material for display purposes.

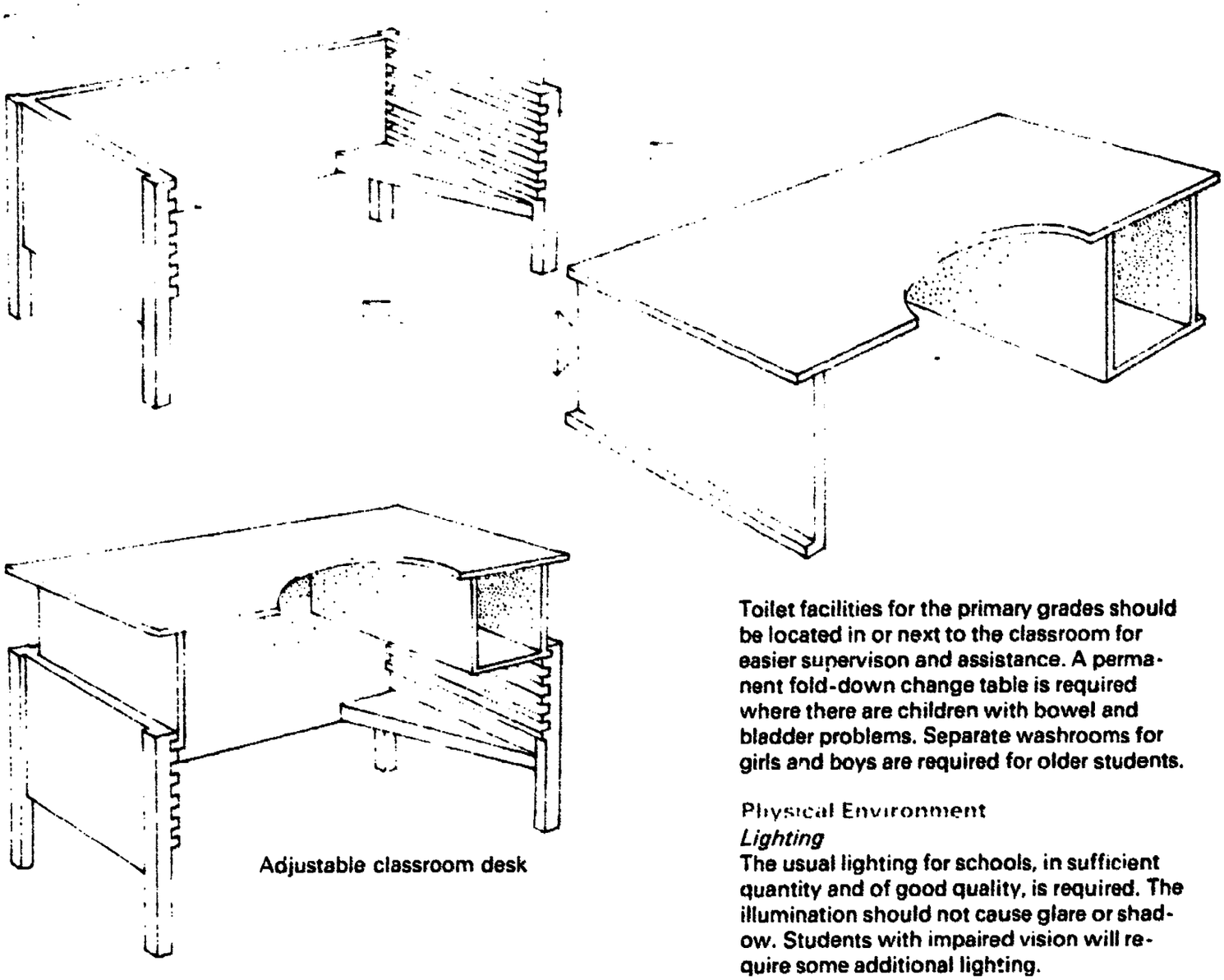
Extra-wide window sills, finished with a durable surface, will provide an added teaching space for scientific experiments, plant growing, aquaria etc.



Carrel with a folding partition



Adjustable classroom desk



Adjustable classroom desk

An intercom or a telephone is essential in each room for emergencies, which are usually more common with these students.

Since electric typewriters are commonly used by the physically handicapped, it is necessary to provide a large number of electrical outlets. Floor outlets with flush protective caps, overhead outlets and/or baseboard strip outlets, can provide flexibility of arrangement.

Each classroom should be equipped with an outdoor exit, for fire safety and to extend the learning environment beyond the classroom. Part of the outdoor area may be used for growing vegetables and flowers. Some of the planting beds may be raised to permit the child to work conveniently from the wheelchair.

Toilet facilities for the primary grades should be located in or next to the classroom for easier supervison and assistance. A permanent fold-down change table is required where there are children with bowel and bladder problems. Separate washrooms for girls and boys are required for older students.

Physical Environment

Lighting

The usual lighting for schools, in sufficient quantity and of good quality, is required. The illumination should not cause glare or shadow. Students with impaired vision will require some additional lighting.

Temperature

Students who have limited mobility require a higher temperature than more physically active students. Special consideration must be given to the floor. It should be draught-free. Heated floors are desirable in rooms for younger children, because of the great number of floor activities that take place at this age level.

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