

# San Francisco Arts Commission Guidelines for ADA Access

San Francisco Arts Commission Civic Art Collection and Public Art  
Program policies and guidelines around implementation of the  
Americans with Disabilities Act and Title II, with a manual that  
provides examples of the ADA issues most commonly encountered  
by these programs (September 2015)

*Civic Art  
Collection  
and Public  
Art  
Programs*



## San Francisco Arts Commission Guidelines for ADA Access to the Civic Art Collection and Public Art Programs

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## Introduction

*The San Francisco Arts Commission (SFAC) integrates the arts into community life to further a creative cultural environment for residents, workers and visitors. It provides services and support to the city's artists and diverse arts organizations, and works with communities, neighborhoods, local agencies, and government to make the arts accessible to San Franciscans of all ages, economic circumstances and backgrounds.*

This document is intended to serve two purposes. The first is as documentation of the San Francisco Arts Commission's (SFAC) policies and guidelines around implementation of requirements of the Americans with Disabilities Act and Title II as it applies to the Public Art and Civic Art Collection programs. The second is to provide assistance to both artists and staff in implementing these requirements by providing a manual that provides the code requirements and describes the most commonly encountered design issues by these programs. Also included are additional design safety issues not related to ADA, but nonetheless are critical design criteria for many artworks in the public realm.

***People with disabilities are the largest "minority" group in the United States—over 43 million Americans live with some sort of disability that affects their daily activities.***

## What is ADA?

The Americans with Disabilities Act (ADA), a federal law passed in 1990, makes it illegal to discriminate against people who have a mental disability or physical impairment that substantially limits one or more major life activity. The ADA applies to areas of employment, public services, transportation, public accommodations and telecommunications.

Title II of the Americans with Disabilities Act extended earlier legislation of the 1973 Rehabilitation Act mandating that public entities, such as the SFAC, "operate each service, program or activity so that the service, program or activity when viewed in its entirety is readily accessible to and usable by individuals with disabilities." The standard is known as **program accessibility**.

While physical accommodations such as wheelchair ramps have perhaps been the most visible result of accessibility efforts, accommodations are being made to all aspects of everyday life, including workplaces, schools and businesses. As the introduction to these guidelines implies, **access to the arts happens on two levels, physical and programmatic**. Our sensory experience of an artwork—seeing, touching, or hearing it—enables us to apprehend the work's content and meaning.

## **Civic Art Collection and Public Art Program Action Steps**

Finding creative ways to make the city's public artwork accessible to everyone is one of the goals of the Civic Art Collection and Public Art Programs. The San Francisco Arts Commission has developed a series of action steps towards making the Civic Art Collection and Public Art Program physically and programmatically accessible.

### **1. Distribute Guidelines to Staff and Artists**

These guidelines have been written and assembled to aid SFAC staff, artists, and other contractors design, display, and provide interpretive materials that meet ADA and other safety requirements. SFAC staff will provide artists contracted for Public Art Program commissions with copies of these guidelines so that artists can incorporate accessible design within their earliest design concepts.

### **2. Hold Accessible Public Meetings**

Community meetings, artist selection panel meetings, public display of maquettes, artwork dedications, and other events associated with commissioning of artwork are held in ADA accessible locations. Provide accessibility information on all announcements of public meetings as per the following example:

*The African American Arts & Culture Complex is ADA accessible and can be reached by public transportation (include MUNI lines).*

### **3. Plan for Accessibility:**

Artists are required as part of their contractual agreement with the city to meet ADA requirements and to cooperate with the city to take reasonable steps to ensure that the Artwork is accessible to the disabled, with respect to the elimination of both physically and programmatic barriers. The SFAC staff works with artists to assist them in their work with project design team, the Department of Public Works and the Mayor's Office of Disability to ensure that new commissions or purchases of artwork meet all applicable accessibility building codes.

In addition to code compliance, it is hoped that artists will also be inspired by the principles of Universal Design to create projects that can be enjoyed by people of many levels of physical and cognitive abilities.

#### **A. Encourage Principles of Universal Design**

Artworks can be made accessible in a variety of ways, but it is most effective to begin planning for accessibility at the earliest conceptual stages of a project. "Universal Design" is the term



used by designers for products and environments created to be used by all people to the greatest extent possible, without adaption or specialized design. Not every principle applies to every design, but they are a good starting place to evaluating a design for accessibility. At its best, creative use of universal design principles makes accessibility accommodation invisible because the design solution is one that works for all users, regardless of abilities.

An example is Cliff Garten's design of a sculptural handrail for Laguna Honda Hospital and Rehabilitation Center. By observing Laguna Honda residents using wheelchairs and the handrails located throughout the building, the artist saw the potential for a public artwork in the form of a handrail. While meeting all codes and functional requirements, he transformed a ubiquitous handrail into a sensuous sculpture that addresses the space at a visual, tactile and psychological level.



*Laguna Line (Possibility of the Everyday) is a sculptural handrail designed by Cliff Garten.*

Simplified, the seven principles of Universal Design are as follows:

- 1) Equitable Use: The design is useful to people of diverse abilities.
- 2) Flexibility in Use: The design accommodates a wide range of individual abilities.
- 3) Simple and Intuitive Use: Interaction with the design is easy to understand, regardless of the user's experience, knowledge, or language skills.
- 4) Perceptible Information: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
- 5) Tolerance for Error: The design minimizes hazards and the adverse consequences of accidental or unintended actions.
- 6) Low Physical Effort: The design can be used efficiently and comfortably with a minimum of fatigue.

- 7) Size and Space for Approach and Use: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

**B. Use Accessible Design Check List:**

The following is a check list of some of the issues that should be considered in selecting a site and developing a design. Not every item below is appropriate for every situation, but, like the principles of universal design, the list serves as a good starting point for evaluation a location or design for a work of art.

- 1) Is the site being considered accessible to people using a wheelchair, walker, or stroller?
- 2) Can the artwork be experienced through more than one sense?
- 3) Will there be enough light so that individuals with low vision can see as much of the piece as possible?
- 4) If the artwork incorporates a tactile component, can it be reached by children or people using wheelchairs? Is the artwork durable enough for repeated handling?
- 5) If the artwork is interactive, can it be used by users of all abilities?
- 6) Is there an opportunity for secondary interpretation of the artwork in the space it is in?
- 7) If long pieces of text are an integral part of my artwork, can a short, simple overview be incorporated that is easier for many people to read and comprehend?
- 8) Is written information, or areas of fine detail, placed within the comfortable viewing zone for both standing and seated people (between 48" x 67" above the floor?)
- 9) Can people get close to view the artwork, or read explanatory text (3")?



#### 4. Design Didactic Text, Labels, and other Interpretive Materials for Accessibility

##### A. Use Smithsonian Guidelines for Design of Accessible Labels

The following recommendations for label design and text, display boards, and other interpretive materials are summarized from the *Smithsonian Guidelines for Accessible Exhibition Design*:

- 1) Essential information in label text should be accessible to people who have difficulty reading English.
- 2) Avoid the use of colloquial and complex English, jargon, and technical language unless such language is explained within the text.
- 3) Use active voice; limit sentence length. **Subject-verb-object sentence structure** ensures better understanding. Sentence length should be no more than 25 words.
- 4) Use a line length for text that facilitates reading. Text containing too many characters on a line is difficult to read.
- 5) Provide a short overview paragraph at the beginning of introductory and thematic label panels.
- 6) Carefully link sentences and paragraphs. Avoid pronouns that are more than a few words away from their antecedents.
- 7) Use typefaces that are readily legible. The typefaces that are easiest for people who have low vision, language problems or cognitive disabilities are sans serif or simple serif.
- 8) Examples of accessible sans-serif fonts are:
  - a) Arial
  - b) Futura
  - c) Optima
  - d) Trebuchet
  - e) Frutiger
  - f) Helvetica
  - g) Tahoma
  - h) Universe

Accessible serif fonts have limited varied stroke width. Examples:  
NPS Rawlinson and Century.

- 9) Do not set text in all caps; use upper and lower case.
- 10) Select type size appropriate to viewing distance
- 11) Justify left margin and keep a ragged right margin.
- 12) Provide high contrast between text and background.
- 13) Print only on a solid background; overprinting on an image or textured surface is unreadable for the sight impaired.
- 14) Avoid distorting type: labels silkscreened onto acrylic labels should have another color screened directly onto the back; clear acrylic labels have letter shadows that make them unreadable.
- 15) Define labels with color or a raised surface; these elements serve as clues for finding the labels for people with low vision.
- 16) Mount wall labels at a height that is comfortable for both those seated and standing. Wall labels mounted between 48" and 67" are considered comfortable for both sitting and standing viewers. 54" is considered optimum. The top of rail labels should be 40" above the floor.
- 17) Provide sufficient light to read the labels, and avoid shadows

**B. Use Accessible Format for Civic Art Collection Identification Plaques:**

Identification plaques for new commissions or purchases of Artworks will use the following format:

- For large scale artwork:
  - Main text (artist's name and title of the artwork) will be 1/32" sans serif minimum 5/8" high.
  - Secondary text shall be 1/4" high.
  - Text shall be in upper and lower case characters
  - Text shall be justified left with ragged right margin.
  - Text and background shall be in highly contrasting colors, like black on silver.

- For smaller paintings, photos and prints:
  - Main text will be silkscreened 3/16".
  - Text and background will be in highly contrasting colors, like black on buff.
  - Text shall be in upper and lower case characters.
- Wall labels will be of a color that contrasts with the wall color; clear acrylic labels will be painted on the back with a solid color.
- Plaques must be sited at a location and height appropriate for individuals using wheelchairs and individuals who need to touch the surface. Mounting location must allow the person to approach within 3" of the signage without encountering protruding objects or standing with the swing of a door. **Mounting height should be 54" and 60" from the finish floor to the centerline of the sign.**
- Site conditions may prevent installing signage at the ideal height. In that case, free standing signage will be used. Identification plaques will not be installed in the ground or lower than 48."
- Descriptive text will be written in simple, direct language.
- Text will be designed for maximum legibility, using shorter line lengths of 45-50 characters for blocks of text.

**C. Identification Plaque Format Templates:**

The following are the standard formats for identification plaques for both large installations and smaller, 2-dimensional artworks like paintings, prints, photography and the like:

For small works:

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**Artist Name**

Nationality, b. year

***Title***, © date

Media listed

Collection of the City and County of San Francisco

Accession ID

*[Approx. 3.25" X 5.25" – 1/8" thick white acrylic, non-glare, with digitally printed and left adjusted black copy, 14.5 pt Helvetica, Helvetica Bold type, foam silicone adhesive mounting tape]*



Template for large installation works:



**Artist Name** [5/8" flat]

**Nationality, b. year** [1/4" flat]

**Artwork Title** [5/8" flat]

**© Date** [1/4" flat]

**Media** [1/4" flat]

**Artwork description.** [1/4" flat]

**Collection of the City and County of San Francisco**  
[1/4" flat]

*[Approx. 15" X 15" magnesium plate with brushed aluminum finish and centered flat printed  
black copy, Helvetica type, double spacing between text blocks]*

**D. Future plans for Accessible Signage for the Civic Art Collection:**

While the identification plaque guidelines above represent SFAC's current practice, there are many older public art and monument installations that have less accessible signage, or have no identification signage at all. Some historic signage is placed where disabled visitors would have difficulty reading it.

As opportunities arise for conservation and refurbishment of older artworks in the collection, we will replace identification plaques with our current accessible design. As these plaques can cost upward of \$1,500 each, funding will need to be identified for this work.

**5. Provide Information in Alternative Format:**

Providing alternative format information for artworks that are placed in the public realm has been challenging. Past experience with providing information in the form of audio tapes or large print and Braille notebooks have been unsuccessful. The artworks are typically placed in locations where there is no building or office to house the alternative format materials, or in the buildings of city departments whose mission and operations do not include providing information about art. The alternative format materials were never requested, and the materials were soon misplaced or lost. Therefore, the following action steps are most feasible for our program.

**A. Near-term:**

We rely on our accessible website to provide information about the artwork in the city's collection. A searchable database provides a listing and written description of most of the artworks commissioned or purchased as part of the public art program. Website users can also read descriptive press releases about recent projects. Finally, a pilot program for the artworks commissioned for Terminal 2 at SFO features audio information, including interviews with the commissioned artists, as well as written descriptions of the artwork. The audio tour is also available at the Airport through Guide by Cell. Finally, we are updating the signage for older artworks and monuments in the collection into our new, accessible format.

**B. Mid- term:**

New upgrades in the city's website system will provide the capacity to put the database for the entire Civic Art Collection on line. Much of this database already includes written descriptions of the artwork Additional funding will be required to hire an outside contractor to complete

written descriptions for all major works in the collection and to put the descriptions on the website.

**C. Long term:**

Expand audio access to the collection through phone apps, pod casts, or website access. In this way, users can access information at the site and are not dependent materials and equipment provided by the host site. Funding will be required to contract for this service. Additional funding will be needed not only to implement this goal, but also to promote it over time so that its use by the public justifies the investment in resources.

**6. Provide Assistance to Artists in Designing for Physical Access:**

SFAC actively assist artists in meeting accessible design requirements. The attached manual will be distributed to artists to assist them in designing for accessibility.

## Manual for the Most Frequently Encountered ADA Issues

The following codes and related examples represent some of the most common ADA issues artists are likely to encounter in the design and placement of their artwork. Please note the code requirements here by no means represent all ADA building code requirements. Most project designs, certainly those of greater complexity, should be reviewed by the Mayor's Office of Disability (MOD), Bureau of Architecture, or other ADA specialist to insure ADA code compliance.

The most frequently encountered code requirements that impact the design of public art projects are those that are covered under the headings below. The code requirements and illustrations are attached here as an addendum. They are reproduced from the publications of the following organizations and agencies:

- *Americans with Disability Act Accessibility Guidelines for Buildings and Facilities, Transportation Facilities and Transportation Vehicles* published by the U.S. Architectural and Transportation Barriers Compliance Board (U.S. A.T.B.C.B ; August, 1992).
- *Programmatic Accessibility Guidelines for National Park Service Interpretive Media*, published by the National Park Service, U.S. Department of the Interior
- *Smithsonian Guidelines for Accessible Exhibition Design*, published by the Smithsonian Accessibility Program, Office of the Provost.
- *Public Playground Safety Handbook*, published by the U.S. Consumer Product Safety Commission

**To access full ADA code requirements go to [www.ada.gov](http://www.ada.gov)**



## 1. Requirements for Operable Parts of Interactive Exhibits

(Courtesy of Programmatic Accessibility Guidelines for National Park Service Interpretive Media)

Operable parts of mechanical interactive exhibits shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds maximum. A person with a closed fist should be able to use the object or control.

Height: Operable parts shall be placed within one or more of the reach ranges specified side reach and/or forward reach limits (See A.T.B.C.B. Guidelines, Section 4.2, Space Allowance and Reach Ranges; Figures 4 and 5 attached)

### A. CASE STUDY: *Butterfly Wall* by Charles Sowers, commissioned for Terminal 2 at San Francisco International Airport.

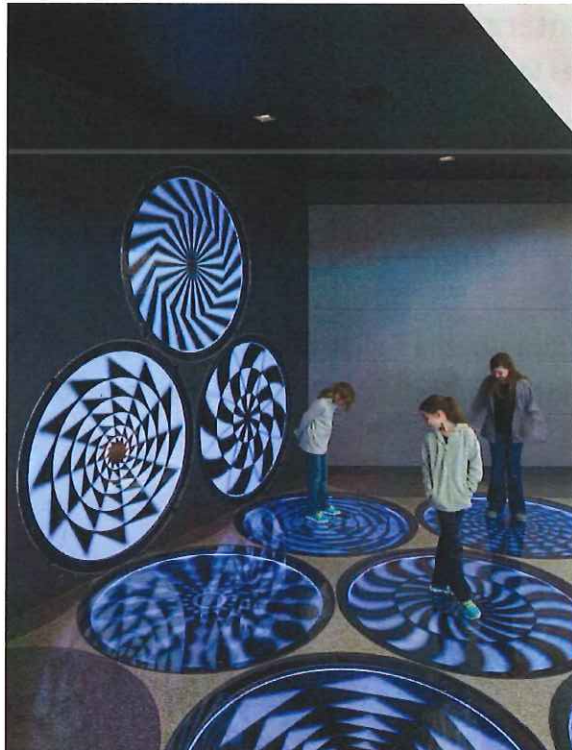
This project was commissioned for the Children's play area in Terminal 2. By turning a hand crank, polycarbonate "butterflies," attached to cables were cranked to the top of the cable and then were allowed to flutter down.

- 1) The hand cranks had to be designed so that they could be operated with one hand.
- 2) Cranks did not require any grasping, pinching, or twisting of the wrist to operate.
- 3) Cranks did not require any more than 5 lbs. of force to operate.
- 4) The cranks were located so that they meet both **Forward and Side Reach Range requirements** so can be operated by children and persons using a wheelchair.
- 5) The stainless steel rail at the bottom of the installation was required

because the hand cranks extended more than 4" from the vertical surface of the case, therefore making them an ADA hazard. See #4, requirements for **Protruding Objects**.



*Butterfly Wall* by Charles Sowers. Hand cranks require no more than 5 lbs. pressure to operate, and do not require grasping, pinching or twisting of the wrist to operate.



**B. Case Study: *Spyrogyrate*, by Eric Staller, at SFO in Boarding Area E.**

This installation features a series of sequenced moving discs with touch activated light sequences. Because the discs are activated by touch, they are accessible to all users. This is a good example of the principles of **Universal Design**.

*Spyrogyrate* by Eric Staller

## 2. Space Allowance:

In siting art installations, the artist must frequently consider adequate passage and turning and maneuvering space for wheelchair users. **See A.T.B.C.B. Section 4.2, *Space Allowance***, for illustrations depicting required wheelchair space allowance for various conditions.

## 3. Requirements for an Accessible Route; Ramps in an Accessible Route

See A.T.B.C.B. Section 4.3, *Accessible Route*; Section 4.3.8, *Changes in Level*. Any part of an accessible route with a slope greater than 1:20 shall be considered a ramp and is allowed a maximum slope of 1:12. See A.T.B.C.B. Section 4.3.7, *Slope*, and Section 4.8., *Ramps*.

An accessible route of travel is defined as *a continuous unobstructed path connecting all accessible elements and spaces of a building or facility*. Such routes meet all ADA access requirements. Accessible routes are required for all new constructions. However, for alterations, there is a “disproportionality” waiver in the code that allows that *alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall alteration when the cost exceeds 20% of the cost of the alteration to the primary function area*. ( Authority: 5 U.S.C.301; 28 U.S.C. 509, 510; 42 U.S.C. 12134 & 35.101)



**A. Case Study: *Philosopher's Way* by Peter Richards and Susan Schwartzberg at McLaren Park.**

For this project the artists used existing trails and newly constructed links to create a 2 ½ mile trail around the perimeter of McLaren Park. Along the way, the artists created 14 “musing stations” with the intent of encouraging personal thought and contemplation of the area’s ecology, geography, history.

A portion of the trail had to be accessible to persons using wheelchairs. The artists hired an ADA consultant to assist in identifying portions of the route that was *navigable*, that is able to be used with assistance by wheelchair users. Because this was an *alteration* to an existing park, the requirement for an accessible route was limited to access from the main parking lot across the street to the park and navigable trail loops. ADA accommodation included curb ramps with detectable warnings, and repaving broken or uneven pavement.



Details from *Philosopher's Way* by Peter Richards and Susan Schwartzberg.

In addition to providing accessible and navigable routes, the artists created one **wheelchair accessible viewing station**. The paved station provides an **accessible ground surface** for wheelchair users to see the markers and contemplate the view and provides adequate turning space.

**B. Case Study: *Passage of Remembrance*, by Susan Narduli, located at Memorial Court, San Francisco Veterans War Memorial and Performing Arts Complex.**

The walkway between the stone monuments in *Passage of Remembrance* accommodates a change of grade of 3 ft. between the entry and exit ends of the monument. Tight space constraint required careful orientation of the monument on the site so that the ramped walkway could accommodate the 1:12 grade change within the length prescribed by the design. The 1:12 slope requirement must be met with both the down and cross slope of the ramp. Entry and exit landings provided adequate wheelchair turning **space allowance**.



*Passage of Remembrance* by Susan Narduli. The pathway through the monument maintains a grade change no greater than 1:12.

**C. Case Study: *Split Mound*, by Jud Fine and Barbara McCarren, San Francisco Zoo.**

*Split Mound* is an environmental artwork consisting of three raised planting beds framing a three interior “rooms” that house a variety of art elements. Entry into *Split Mound* is from the main Zoo pathway. The original intent was for the viewer to enter at one end of the enclosure, and exit at the other. However, the slope from the entry on the upper portion of the path to the exit onto a lower portion of the pathway exceeded what could be accommodated within the 1:12 allowable slope without adding a step or a ramp. There was insufficient room for a ramp, and the Zoo’s ADA coordinator determined that a step would create unequal access for wheelchair users. Therefore, we were required to build a barrier wall at the end of the walkway



so that all users would enter and exit from the same location. The wall, which was 12" high on the interior of the artwork, could not exceed 18" in height from the downhill, pathway side. It was critical that the wall not exceed 18" on the downhill side of the site because otherwise a railing would have been required.

*Split Mound* by Jud Fine and Barbara McCarren; view of the barrier wall required at one end of the artwork so that all visitors used one accessible entry/exit point.



#### 4. Protruding Objects and Vertical Clearance:

See A.T.B.C.B. Sections 4.4 *Protruding Objects*; 4.4.2 *Head Room Clearance*; Figures 8a-8e.

The two most frequently encountered code requirements artists encounter when designing artwork for a public space are those pertaining to 1) protecting the visually impaired from protruding objects, and 2) providing enough vertical clearance so that a person can safely walk under the object without banging his/her head.

- 1) A person using a cane can detect objects from 0"-27" from the ground.
- 2) An object 80" from the ground is safely over people's heads.
- 3) Protruding Objects located between 27" and 80" from the ground cannot be detected with a cane, and therefore need a **detectable barrier** to prevent the visually impaired from running into them.
- 4) A protrusion from the wall of 4" is allowed without a detectable barrier because proper cane technique and service animal technique keep people away from the edge of a path or from walls. **Therefore, a slight overhang of no more than 4"** is allowed without a detectable barrier.
- 5) Note: A **detectable warning**, in the form of raised rubber cones is used to signal changes in grade in curb ramps. It **may not be substituted for a detectable barrier** required for protruding objects or an overhead obstruction.

**A. Case Study: *Functional Fantasy Stair*, by Alice Aycock at San Francisco Public Library, Main Branch**

Alice Aycock's sculpture, which included a functional staircase, is an example of a typical vertical clearance problem. The underside of the staircase is less than 80" from the floor and presents a "head banging" hazard. A platform under that staircase provided a detectable barrier.

The cone and fanned shaped sculptural elements of the artwork are protruding objects. The sculpture leans out of the vertical plane to create a hazard for the

blind. Detectable barriers, in the form of platforms and curbs, were installed to correct this problem.

To determine where and how large to make the barriers, data points, 80" from the floor, were established on the sculpture and a plumb line was dropped to the floor to mark the outside footprint. Note that the rise on the platforms and curbs used for the barriers is a contrasting color from the floor for better visibility.







The suspended stairway and the sculptural elements of Alice Aycock's *Functional Fantasy Stair* required detectable barriers to make them ADA compliant.

**B. Case Study: *Three Heads Six Arms*, by Zhang Huan; temporary installation in Civic Center Plaza**

As a temporary installation in Civic Center Plaza, *Three Heads Six Arms* by Zhang Huan provided many challenges because the extended arms of the sculpture and leaning torso created many areas of overhead clearance danger. The first solution was to create a **detectable barrier** in the form of a 4" high rail surrounding the sculpture. However, the rail proved to be a serious tripping hazard. The solution was to place inexpensive hay wattles directly underneath the areas where the height of the sculptural element was greater than 27" but less than 80".



*Three Heads Six Arms* by Zhuang Huan.

**C. Case Study: *You Were in Heaven*, by Ann Preston, San Francisco International Airport, International Terminal**

This wall relief by Ann Preston does not protrude from the wall more than 4" at any location. The addition of a 4" deep curb below the relief provides a detectable barrier, but is not required by code because the relief does not exceed the 4" maximum protrusion allowed.



*You Were in Heaven* by Ann Preston. This sculptural relief did not project off the wall more than 4", so did not require a detectable barrier.



**D. Case Study: Painting installation at San Francisco International Airport, Terminal 2**

The Plexiglas cases for paintings installed at Terminal 2 exceeded 4" in depth. A detectable barrier, in the form of a railing, was installed below the cases to meet ADA requirements. A more elegant solution was employed in Boarding Area E at SFO. Here the wall was niched so that the paintings and their cases did not protrude into walking space, eliminating the need for a detectable barrier in front of the cases.



*Above Bolinas* by Willard Dixon. A detectable barrier in the form of a rail was installed around the painting.

*San Francisco Nova*, by Robert Bechtle; *18<sup>th</sup> St. Downgrade*, by Wayne Thiebaud; *Behind Ted McMann's Garage*, by James Torlakson. A niched wall allows the paintings to be recessed from the path of travel. Therefore, no detectable barrier was required.

## 5. Accessible Floor and Ground Surfaces

See A.T.B.C.B. Section 4.5; *Ground and Floor Surfaces*

SFAC's Public Art Program's policy is that art installations shall be sited on an accessible floor or ground surface so that they are approachable by all. Additionally, artists often design floor or paving treatments that must be accessible. The U.S. Architectural and Transportation Barriers Compliance Board (A.T.B.C.B.) guidelines call for surfaces that are hard, stable and regular. SFAC staff have received varying interpretations over the years as to what constitutes an accessible floor/ground surface and further consultation with the Mayor's Office of Disabilities (MOD) or Bureau of Architecture ADA coordinator may be required.

Walking surfaces must also have static slip coefficient of 0.5, with 0.6 recommended for accessible routes and 0.8 for ramps. SFAC staff should make sure to get the manufacture's technical specifications on any paving material to make sure it meets these requirements. Paving or flooring materials not rated by the manufacturer may be sent to a testing lab to make sure the material meets these requirements.

Additionally, MOD cautions against use of grouted pavers where there is unevenness between the paver and the grout. Differences in settling between the pavers and the grout may increase relative levelness of the surface. Even when unevenness between paver and grout is within code tolerance, the irregularity in grouted pavers can be jarring and painful to many wheelchair users. To reduce this disparity, DPW ADA coordinators have allowed less than 1/2" grout width. SFAC staff must consult with MOD when paving is being contemplated.

### **A. Case Study: *Sheriff's Star Plaza*, by Vicki Scuri, Sheriff's Facility**

The pavers used for this plaza were specialty pavers not typically used in outdoor public spaces. They were not rated and had to be tested. Even though they were rated with a 5.0 slip coefficient, there were a number of complaints that the outdoor pavers were too slippery when wet. Concerns about public safety convinced the Arts Commission to sandblast the pavers to ensure they would not be too slippery when wet.

### **B. Case Study: *First Responders Plaza*, by Paul Kos, Public Safety Building**

The complex paving pattern of this project made the grout width tolerance of 1/2" very difficult to maintain. However, the pavers were set on a concrete base so the pavers are more stable and less subject to settling (and thereby creating a more uneven surface). For that reason, the Bureau of Architecture's ADA coordinator allowed greater tolerance for the grout width.

## 6. Detectable Warnings

See A.T.B.C.B. Section 4.29.2, *Detectable Warnings on Walking Surfaces*

Detectable warnings, in the form of raised truncated domes are required for certain instances of changes in grade, as in Curb Ramps (Section 4.7.) **Detectable warnings may not substitute for detectable barriers required for protruding objects or overhead obstructions.**



Example of truncated domes used for detectable warning used to signal a grade change at the curb cuts necessary to create an accessible route for *Philosopher's Way* at McLaren Park.

## 7. Benches

See Section 903 of U.S. Access Board

Artists often design special seating. There are code requirements for height and depth of seat, seat backing, and clear circulation space. Please see U.S. Access Board Code Section 903 in this document for these measurements. Note that **5%** of the seating must meet ADA requirements. These are:

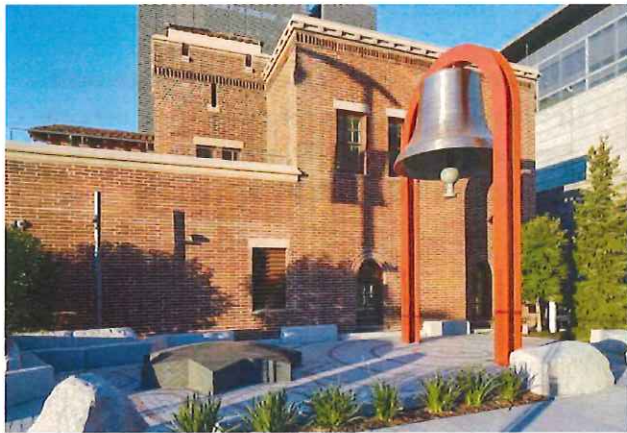
- Seats must provide seat backs.
- Seats must also provide clearance for a wheel chair user to either sit 1) side-by-side or facing a companion seated on the bench and 2) be able to transfer to the bench.

Availability of other, non-artist designed seating in the area does not satisfy the ADA seating requirement as wheelchair users must have equal access to the artist-designed seating.



**A. Case Study: Paul Kos, *First Responders Plaza* seating, Public Safety Building**

Paul Kos created from carved granite boulders for *First Responders Plaza*. Note that 5% of these benches include backs, and provide adequate space for a wheelchair user to sit next to a companion seated on the bench.



*First Responders' Plaza* by Paul Kos. Artist designed granite benches provide backs on 5% of the benches. Granite seats near the building allow for side by side seating for wheelchair and bench users.

*First Responders' Plaza* is also a good example of the Principles of Universal Design. Not only is it physically accessible, it also provides elements that engage other senses besides sight, from the daily ringing of the sonorous "All's Well" bell to the boulder and star forms and texture that can be explored by touch.



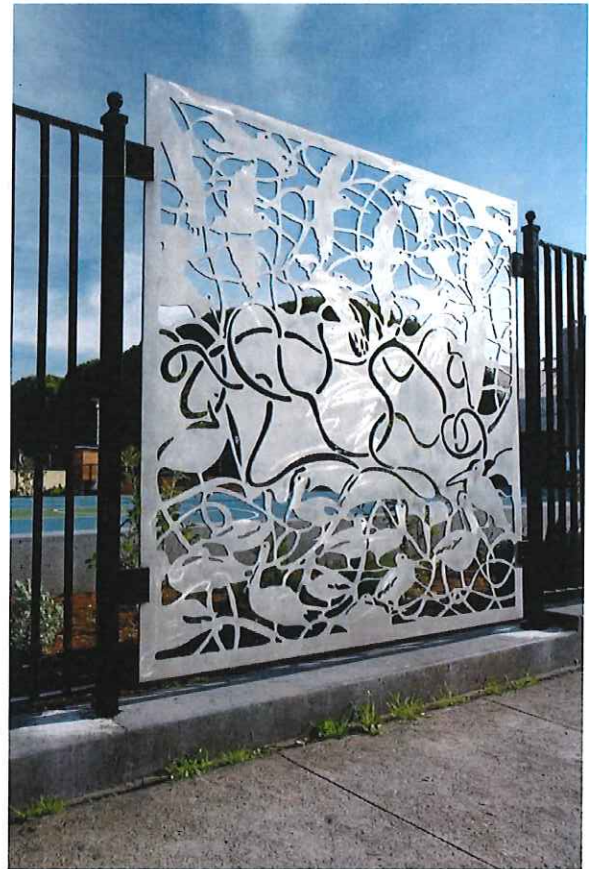
## 8. Other Safety Concerns:

See *Public Playground Safety Handbook*, Sections 3.2, Entanglement and Impalement; 3.3.1, Head Entrapment, and 3.4, Sharp Points, Corners and Edges.

In addition to ADA requirements, other building codes and best practices address issues of general safety. We have attached an excerpt from the *Public Playground Safety Handbook*, published by the U.S. Consumer Product Safety Commission, which addresses issues in the design of safe playgrounds that are also pertinent to the design of public art projects. The most commonly encountered situations are: Entanglement and Impalement; Head Entrapment; Sharp Points; Corners and Edges.

### A. Case Study: *Untitled*, by Irene Pjoan, Victoria Manala Draves Park

Fencing has often provided a good opportunity for artists. Here, Irene Pjoan's fence panel design provides playful images of land and sea creatures. While the design was still in the cartoon stage, each opening was carefully measured to make sure it did not exceed 3.5" round. Sharp edges were rounded during fabrication.



*Untitled* (detail), by Irene Pjoan shows a water-cut design that allows no opening exceed 3.5" in diameter.

## Addendum

### 1. Other Resources

#### A. Selected Resources on Physical Accessibility

- ADA Accessibility Guidelines (ADAAG) (<http://www.access-board.gov/adaag/html/adaag.htm>); (Washington, DC: Architectural and Transportation Barriers Compliance Board). \*\*
- Uniform Federal Accessibility Standards (Washington, DC: Architectural and Transportation Barriers Compliance Board). \*\*

\*\*Both these publications describe the current minimum standards for design, construction and alteration of buildings to make them accessible to people with disabilities.

- To locate state accessibility codes at: (<http://www.access-board.gov/links/state:codes.htm>)
- CalDAAG – California Disabled Accessibility Guidelines
- Design Guide for Universal Access to Outdoor Recreation; (Washington, DC: USDA Forest Service, 1993).

#### B. Selected Resources on Accessibility for Museums and Exhibitions

- Accessible Exhibition Design (San Francisco: SF International Airport Bureau of Exhibitions, Museums and Cultural Exchange, 1996).
- The Accessible Museum: Model Programs of Accessibility for Disabled and Older People
- (Washington, DC: American Association of Museums, 1992).

- Smithsonian Guidelines for Accessible Exhibition Design (Washington, DC: Smithsonian Institution, 1996).
- Design for Accessibility: An Arts Administrators Guide; (Washington, DC: National Assembly of State Arts Agencies, updated 2000).
- The Art and 504: A Handbook for Accessible Arts Programming; (Washington, DC: National Endowment for the Arts, 1992).
- Programmatic Accessibility for National Park Service Interpretive Media: Version 2.1 February 2012. Prepared by the Harpers Ferry Center.
- <http://www.access-board.gov>
- <http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/ada-standards/chapter-7-communication-elements-and-features>
- <http://www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-ada-standards/ada-standards>
- [http://www.ncsu.edu/ncsu/design/cud/about\\_ud/udprinciples.htm](http://www.ncsu.edu/ncsu/design/cud/about_ud/udprinciples.htm)

**C. Copies of Code Requirements and Other Guidelines:**

Attached are the code requirements and illustrations for the most frequently encountered ADA issues confronting the design and installation of public art projects:

**1.) Excerpts from the U.S. Architectural and Transportation Barriers Compliance Board**

**(A.T.B.C.B.) Accessibility Guidelines:**

- a. 4.2 Space Allowance and Reach Ranges
- b. 4.3 Accessible Route
- c. 4.4 Protruding Objects
- d. 4.4.2 Head Room
- e. 4.5 Accessible Floor and Ground Surfaces/Changes in Level
- f. 4.7 Curb Ramps
- g. 4.8 Ramps
- h. 4.29 Detectable Warnings
- i. Copy of revision to ADA regulations for path of travel; disproportionality clause (4iii)

**2.) From Mayor's Office of Disability, excerpts from *ADA and ABA Accessibility Guidelines for Buildings and Facilities*:**

- a. Section 903, Benches
- b. SFAC Staff Summary from ADA bench requirement

**3.) Excerpts from *Public Playground Safety Handbook*, published by the U.S. Consumer Product Safety Commission**

- a. 3.2 Entanglement and Impalement
- b. 3.3.1 Head Entrapment
- c. 3.4 Sharp Points, Corners and Edges



## 4.2 Space Allowance and Reach Ranges

(b) Alterations to Qualified Historic Buildings and Facilities Not Subject to Section 106 of the National Historic Preservation Act. Where alterations are undertaken to a qualified historic building or facility that is not subject to section 106 of the National Historic Preservation Act, if the entity undertaking the alterations believes that compliance with the requirements for accessible routes (exterior and interior), ramps, entrances, or toilets would threaten or destroy the historic significance of the building or facility and that the alternative requirements in 4.1.7(3) should be used for the feature, the entity should consult with the State Historic Preservation Officer. If the State Historic Preservation Officer agrees that compliance with the accessibility requirements for accessible routes (exterior and interior), ramps, entrances or toilets would threaten or destroy the historical significance of the building or facility, the alternative requirements in 4.1.7(3) may be used.

(c) Consultation With Interested Persons. Interested persons should be invited to participate in the consultation process, including State or local accessibility officials, individuals with disabilities, and organizations representing individuals with disabilities.

(d) Certified Local Government Historic Preservation Programs. Where the State Historic Preservation Officer has delegated the consultation responsibility for purposes of this section to a local government historic preservation program that has been certified in accordance with section 101(c) of the National Historic Preservation Act of 1966 (16 U.S.C. 470a (c)) and implementing regulations (36 CFR 61.5), the responsibility may be carried out by the appropriate local government body or official.

(3) Historic Preservation: Minimum Requirements:

(a) At least one accessible route complying with 4.3 from a site access point to an accessible entrance shall be provided.

**EXCEPTION:** A ramp with a slope no greater than 1:6 for a run not to exceed 2 ft (610 mm) may be used as part of an accessible route to an entrance.

(b) At least one accessible entrance complying with 4.14 which is used by the public shall be provided.

**EXCEPTION:** If it is determined that no entrance used by the public can comply with 4.14, then access at any entrance not used by the general public but open (unlocked) with directional signage at the primary entrance may be used. The accessible entrance shall also have a notification system. Where security is a problem, remote monitoring may be used.

(c) If toilets are provided, then at least one toilet facility complying with 4.22 and 4.1.6 shall be provided along an accessible route that complies with 4.3. Such toilet facility may be unisex in design.

(d) Accessible routes from an accessible entrance to all publicly used spaces on at least the level of the accessible entrance shall be provided. Access shall be provided to all levels of a building or facility in compliance with 4.1 whenever practical.

(e) Displays and written information, documents, etc., should be located where they can be seen by a seated person. Exhibits and signage displayed horizontally (e.g., open books), should be no higher than 44 in (1120 mm) above the floor surface.

**NOTE:** The technical provisions of sections 4.2 through 4.35 are the same as those of the American National Standard Institute's document A117.1-1980, except as noted in the text.

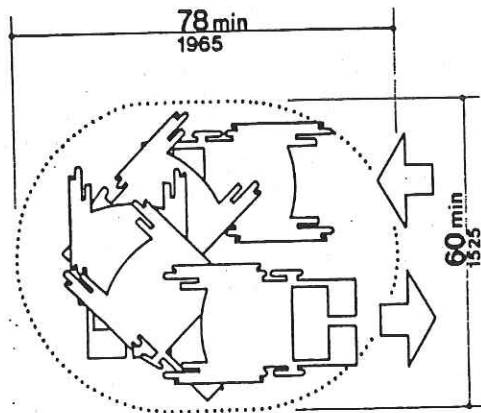
### 4.2 Space Allowance and Reach Ranges.

**4.2.1\* Wheelchair Passage Width.** The minimum clear width for single wheelchair passage shall be 32 in (815 mm) at a point and 36 in (915 mm) continuously (see Fig. 1 and 24(e)).

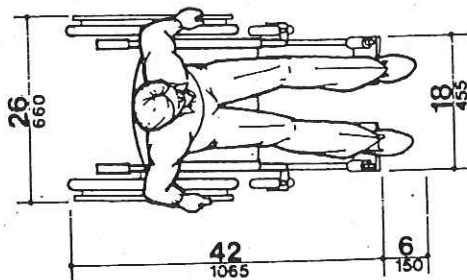
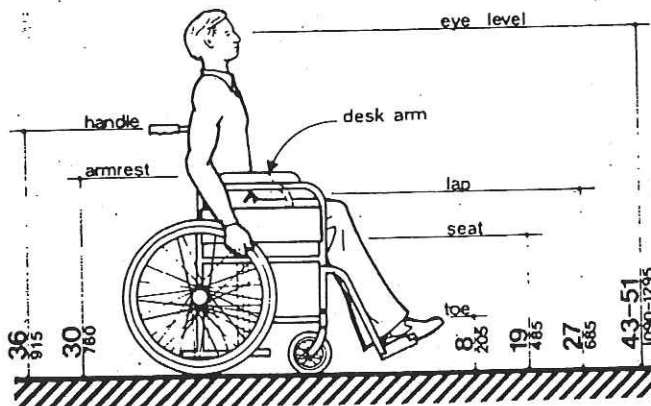
**4.2.2 Width for Wheelchair Passing.** The minimum width for two wheelchairs to pass is 60 in (1525 mm) (see Fig. 2).

**4.2.3\* Wheelchair Turning Space.** The space required for a wheelchair to make a 180-degree turn is a clear space of 60 in (1525 mm)





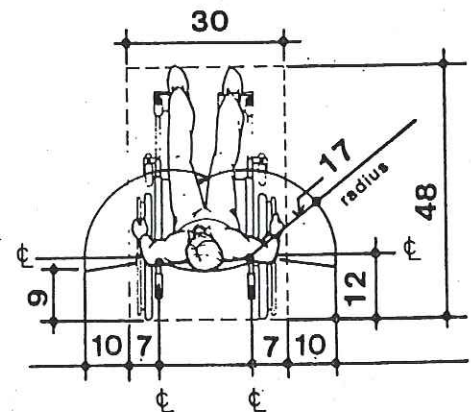
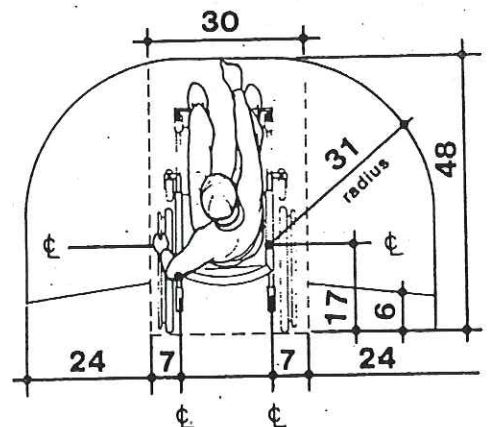
**Fig. A2**  
Space Needed for Smooth U-Turn in a Wheelchair



NOTE: Footrests may extend further for tall people

**Fig. A3**  
Dimensions of Adult-Sized Wheelchairs

straight ahead with arms swinging, need 32 in (815 mm) of width, which includes 2 in (50 mm) on either side for sway, and another 1 in (25 mm) tolerance on either side for clearing nearby objects or other pedestrians. Almost all wheelchair users and those who use walking aids can also manage within this 32 in (815 mm) width for short distances. Thus, two streams of traffic can pass in 64 in (1625 mm) in a comfortable flow. Sixty inches (1525 mm) provides a minimum width for a somewhat more restricted flow. If the clear width is less than 60 in (1525 mm), two wheelchair users will not be able to pass but will have to seek a wider place for passing. Forty-eight inches (1220 mm) is the minimum width needed for an ambulatory person to pass a nonambulatory or semi-ambulatory person. Within this 48 in (1220 mm) width, the ambulatory person will have to twist to pass a wheelchair user, a person with a *service animal*, or a



**Fig. A3 (a)**

## 4.2.4\* Clear Floor or Ground Space for Wheelchairs

diameter (see Fig. 3(a)) or a T-shaped space (see Fig. 3(b)).

### 4.2.4\* Clear Floor or Ground Space for Wheelchairs.

**4.2.4.1 Size and Approach.** The minimum clear floor or ground space required to accommodate a single, stationary wheelchair and occupant is 30 in by 48 in (760 mm by 1220 mm) (see Fig. 4(a)). The minimum clear floor or ground space for wheelchairs may be positioned for forward or parallel approach to an object (see Fig. 4(b) and (c)). Clear floor or ground space for wheelchairs may be part of the knee space required under some objects.

**4.2.4.2 Relationship of Maneuvering Clearance to Wheelchair Spaces.** One full unobstructed side of the clear floor or ground space for a wheelchair shall adjoin or overlap an accessible route or adjoin another wheelchair clear floor space. If a clear floor space is located in an alcove or otherwise confined on all or part of three sides, additional maneuvering clearances shall be provided as shown in Fig. 4(d) and (e).

**4.2.4.3 Surfaces for Wheelchair Spaces.** Clear floor or ground spaces for wheelchairs shall comply with 4.5.

**4.2.5\* Forward Reach.** If the clear floor space only allows forward approach to an object, the maximum high forward reach allowed shall be 48 in (1220 mm) (see Fig. 5(a)). *The minimum low forward reach is 15 in (380 mm).* If the high forward reach is over an obstruction, reach and clearances shall be as shown in Fig. 5(b).

**4.2.6\* Side Reach.** If the clear floor space allows parallel approach by a person in a wheelchair, the maximum high side reach allowed shall be 54 in (1370 mm) and the low side reach shall be no less than 9 in (230 mm) above the floor (Fig. 6(a) and (b)). If the side reach is over an obstruction, the reach and clearances shall be as shown in Fig. 6(c).

### 4.3 Accessible Route.

**4.3.1\* General.** All walks, halls, corridors, aisles, skywalks, tunnels, and other spaces

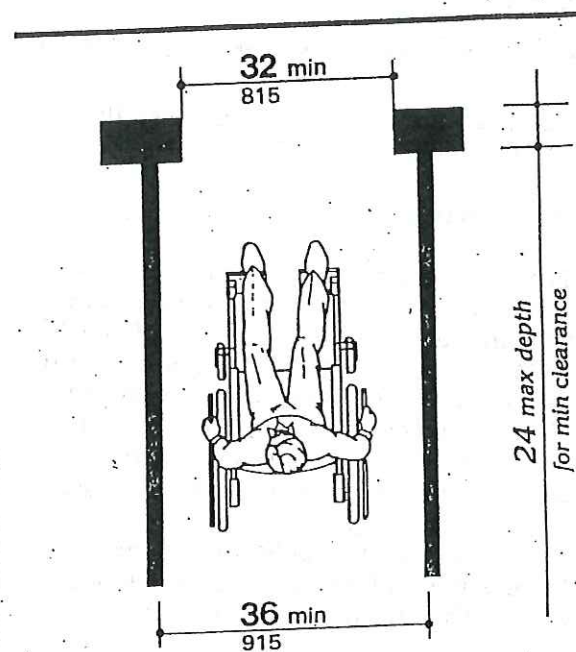


Fig. 1  
Minimum Clear Width  
for Single Wheelchair

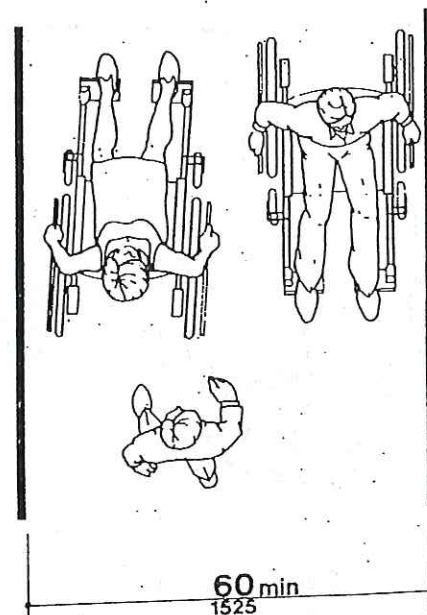


Fig. 2  
Minimum Clear Width  
for Two Wheelchairs



## 4.3 Accessible Route

that are part of an accessible route shall comply with 4.3.

### 4.3.2 Location.

(1) At least one accessible route *within the boundary of the site* shall be provided from public transportation stops, accessible parking, and accessible passenger loading zones, and public streets or sidewalks to the accessible building entrance they serve. *The accessible route shall, to the maximum extent feasible, coincide with the route for the general public.*

(2) At least one accessible route shall connect accessible buildings, facilities, elements, and spaces that are on the same site.

(3) At least one accessible route shall connect accessible building or facility entrances with all accessible spaces and elements and with all accessible dwelling units within the building or facility.

(4) An accessible route shall connect at least one accessible entrance of each accessible

dwelling unit with those exterior and interior spaces and facilities that serve the accessible dwelling unit.

**4.3.3 Width.** The minimum clear width of an accessible route shall be 36 in (915 mm) except at doors (see 4.13.5 and 4.13.6). If a person in a wheelchair must make a turn around an obstruction, the minimum clear width of the accessible route shall be as shown in Fig. 7(a) and (b).

**4.3.4 Passing Space.** If an accessible route has less than 60 in (1525 mm) clear width, then passing spaces at least 60 in by 60 in (1525 mm by 1525 mm) shall be located at reasonable intervals not to exceed 200 ft (61 m). A T-intersection of two corridors or walks is an acceptable passing place.

**4.3.5 Head Room.** Accessible routes shall comply with 4.4.2.

**4.3.6 Surface Textures.** The surface of an accessible route shall comply with 4.5.

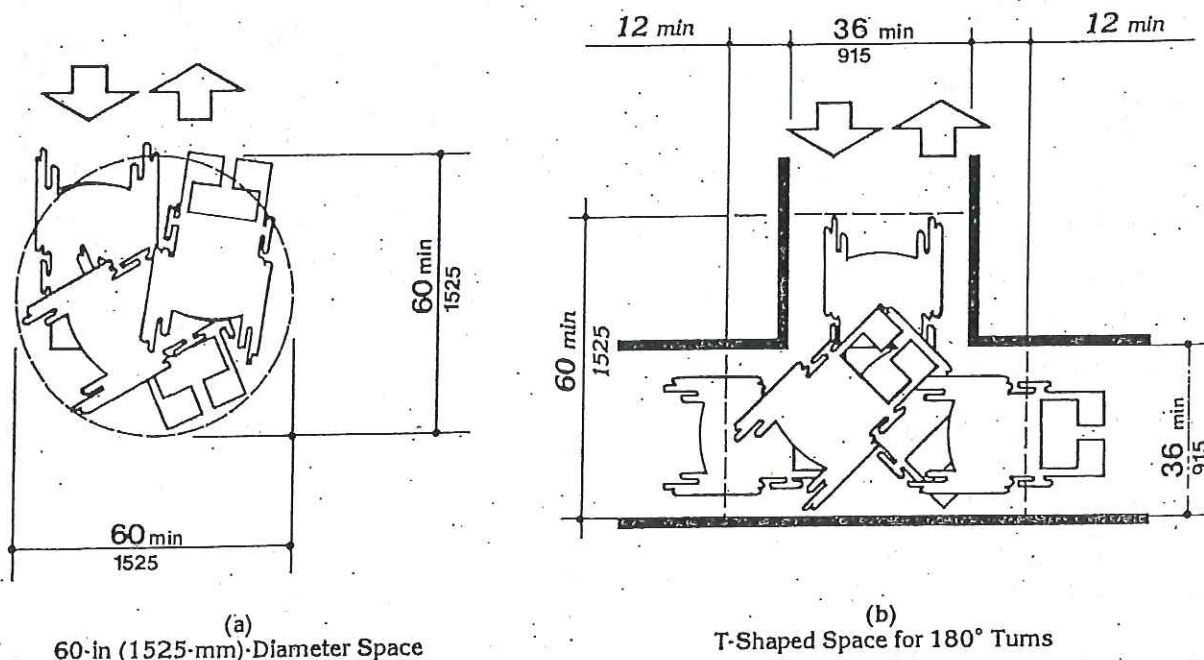


Fig. 3  
Wheelchair Turning Space

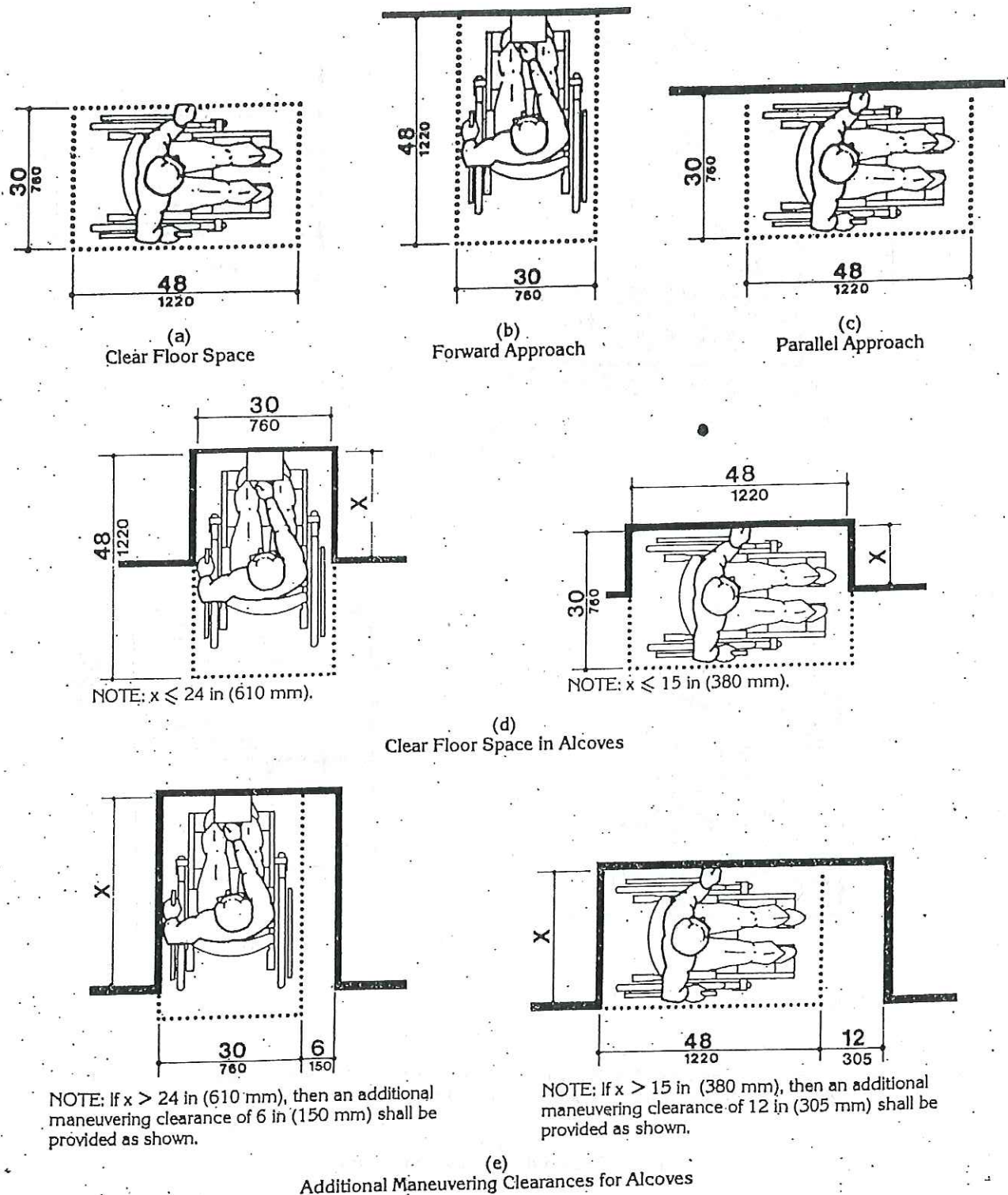
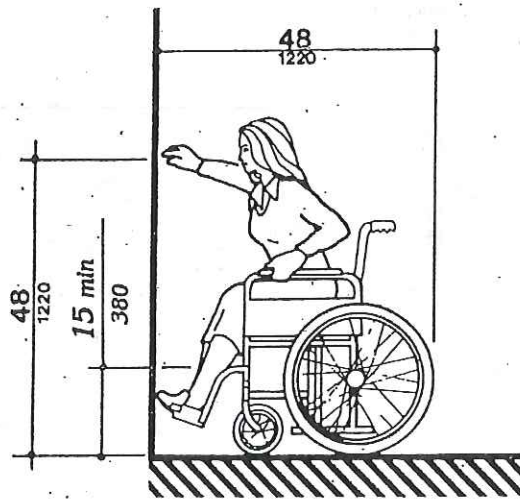


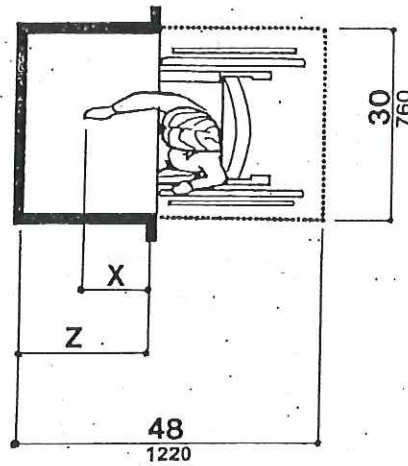
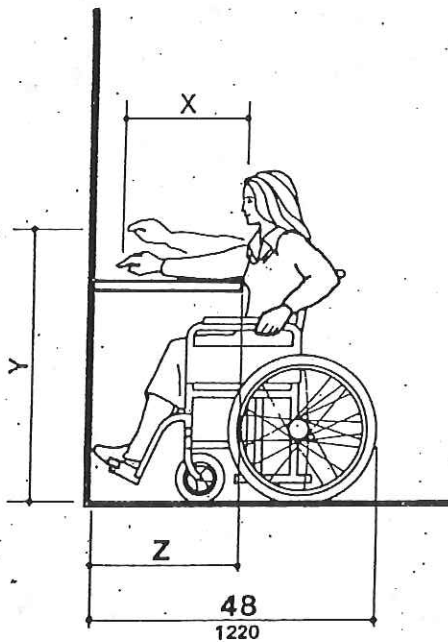
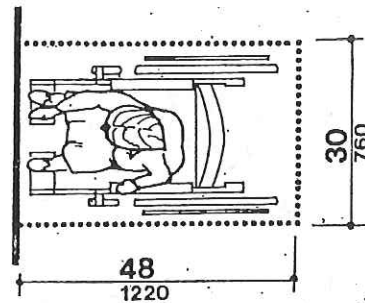
Fig. 4  
Minimum Clear Floor Space for Wheelchairs



### 4.3 Accessible Route



(a)  
High Forward Reach Limit



NOTE: x shall be  $\leq 25$  in (635 mm); z shall be  $\geq x$ . When  $x < 20$  in (510 mm), then y shall be 48 in (1220 mm) maximum. When x is 20 to 25 in (510 to 635 mm), then y shall be 44 in (1120 mm) maximum.

(b)  
Maximum Forward Reach over an Obstruction

Fig. 5  
Forward Reach



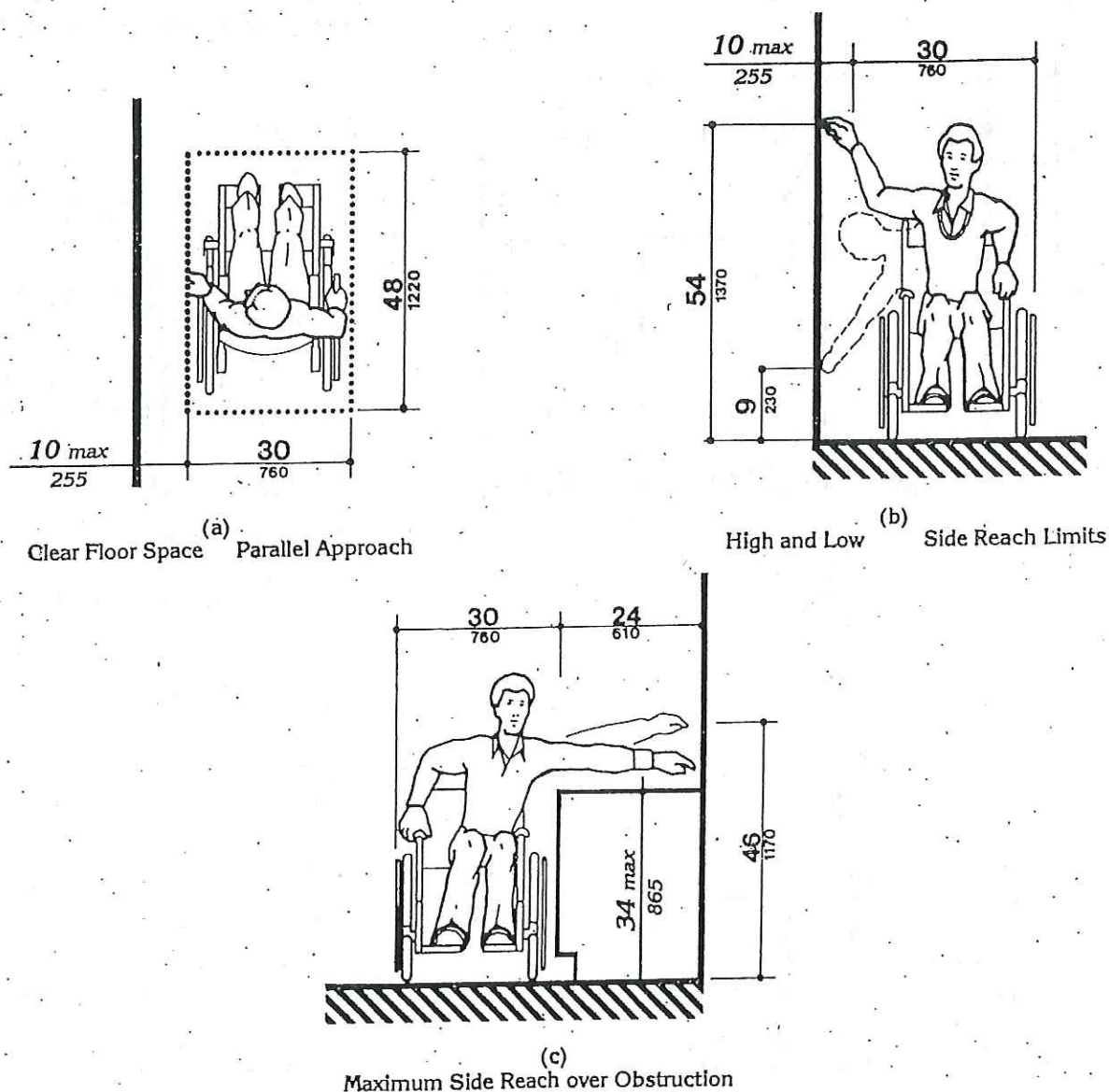


Fig. 6  
Side Reach

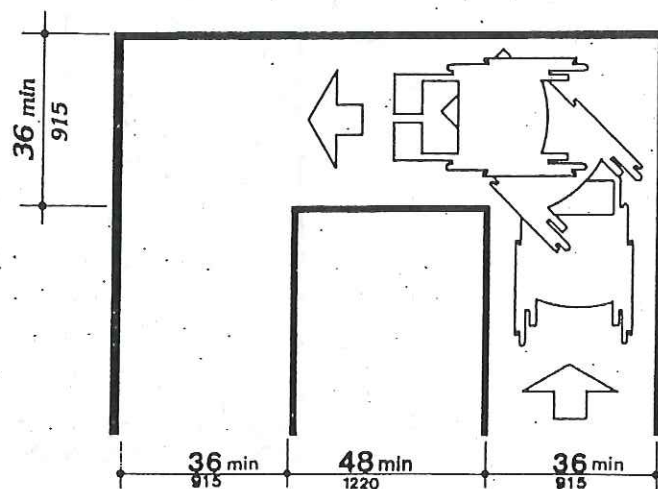
★ **4.3.7 Slope.** An accessible route with a running slope greater than 1:20 is a ramp and shall comply with 4.8. Nowhere shall the cross slope of an accessible route exceed 1:50.

★ **4.3.8 Changes in Levels.** Changes in levels along an accessible route shall comply with 4.5.2. If an accessible route has changes in level greater than 1/2 in (13 mm), then a curb

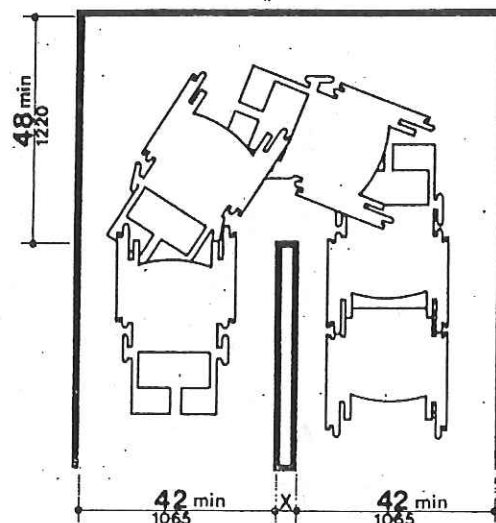
ramp, ramp, elevator, or platform lift (as permitted in 4.1.3 and 4.1.6) shall be provided that complies with 4.7, 4.8, 4.10, or 4.11, respectively. An accessible route does not include stairs, steps, or escalators. See definition of "egress, means of" in 3.5.

**4.3.9 Doors.** Doors along an accessible route shall comply with 4.13.

### 4.3.10\* Egress

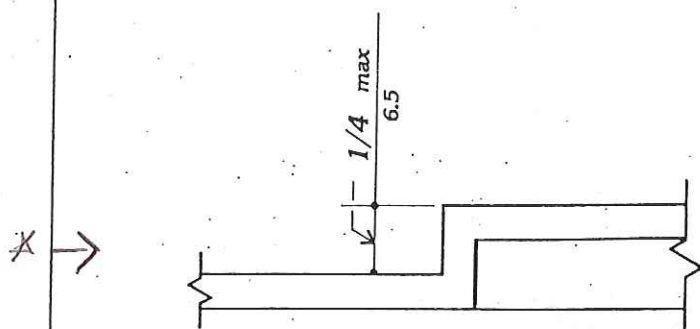


(a)  
90° Turn

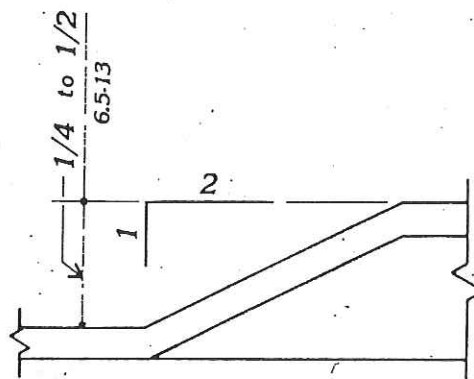


NOTE: Dimensions shown apply when  $x < 48$  in (1220 mm).

(b)  
Turns around an Obstruction



(c)  
Changes in level



(d)  
Changes in level

Fig. 7  
Accessible Route

**4.3.10\* Egress.** Accessible routes serving any accessible space or element shall also serve as a means of egress for emergencies or connect to an accessible area of rescue assistance.

#### 4.3.11 Areas of Rescue Assistance.

**4.3.11.1 Location and Construction.** An area of rescue assistance shall be one of the following:

(1) A portion of a stairway landing within a smokeproof enclosure (complying with local requirements).

(2) A portion of an exterior exit balcony located immediately adjacent to an exit stairway when the balcony complies with local requirements for exterior exit balconies. Openings to the interior of the building located within 20 feet (6 m) of the



area of rescue assistance shall be protected with fire assemblies having a three-fourths hour fire protection rating.

(3) A portion of a one-hour fire-resistive corridor (complying with local requirements for fire-resistive construction and for openings) located immediately adjacent to an exit enclosure.

(4) A vestibule located immediately adjacent to an exit enclosure and constructed to the same fire-resistive standards as required for corridors and openings.

(5) A portion of a stairway landing within an exit enclosure which is vented to the exterior and is separated from the interior of the building with not less than one-hour fire-resistive doors.

(6) When approved by the appropriate local authority, an area or a room which is separated from other portions of the building by a smoke barrier. Smoke barriers shall have a fire-resistive rating of not less than one hour and shall completely enclose the area or room. Doors in the smoke barrier shall be tight-fitting smoke- and draft-control assemblies having a fire-protection rating of not less than 20 minutes and shall be self-closing or automatic closing. The area or room shall be provided with an exit directly to an exit enclosure. Where the room or area exits into an exit enclosure which is required to be of more than one-hour fire-resistive construction, the room or area shall have the same fire-resistive construction, including the same opening protection, as required for the adjacent exit enclosure.

(7) An elevator lobby when elevator shafts and adjacent lobbies are pressurized as required for smokeproof enclosures by local regulations and when complying with requirements herein for size, communication, and signage. Such pressurization system shall be activated by smoke detectors on each floor located in a manner approved by the appropriate local authority. Pressurization equipment and its duct work within the building shall be separated from other portions of the building by a minimum two-hour fire-resistive construction.

**4.3.11.2 Size.** Each area of rescue assistance shall provide at least two accessible areas each being not less than 30 inches by 48 inches (760 mm by 1220 mm). The area of rescue

assistance shall not encroach on any required exit width. The total number of such 30-inch by 48-inch (760 mm by 1220 mm) areas per story shall be not less than one for every 200 persons of calculated occupant load served by the area of rescue assistance.

**EXCEPTION:** The appropriate local authority may reduce the minimum number of 30-inch by 48-inch (760 mm by 1220 mm) areas to one for each area of rescue assistance on floors where the occupant load is less than 200.

**4.3.11.3\* Stairway Width.** Each stairway adjacent to an area of rescue assistance shall have a minimum clear width of 48 inches between handrails.

**4.3.11.4\* Two-way Communication.** A method of two-way communication, with both visible and audible signals, shall be provided between each area of rescue assistance and the primary entry. The fire department or appropriate local authority may approve a location other than the primary entry.

**4.3.11.5 Identification.** Each area of rescue assistance shall be identified by a sign which states "AREA OF RESCUE ASSISTANCE" and displays the international symbol of accessibility. The sign shall be illuminated when exit sign illumination is required. Signage shall also be installed at all inaccessible exits and where otherwise necessary to clearly indicate the direction to areas of rescue assistance. In each area of rescue assistance, instructions on the use of the area under emergency conditions shall be posted adjoining the two-way communication system.

## \*4.4 Protruding Objects.

**4.4.1\* General.** Objects projecting from walls (for example, telephones) with their leading edges between 27 in and 80 in (685 mm and 2030 mm) above the finished floor shall protrude no more than 4 in (100 mm) into walks, halls, corridors, passageways, or aisles (see Fig. 8(a)). Objects mounted with their leading edges at or below 27 in (685 mm) above the finished floor may protrude any amount (see Fig. 8(a) and (b)). Free-standing objects mounted on posts or pylons may overhang 12 in (305 mm) maximum from 27 in to 80 in (685 mm to 2030 mm) above the ground or



## 4.4 Protruding Objects

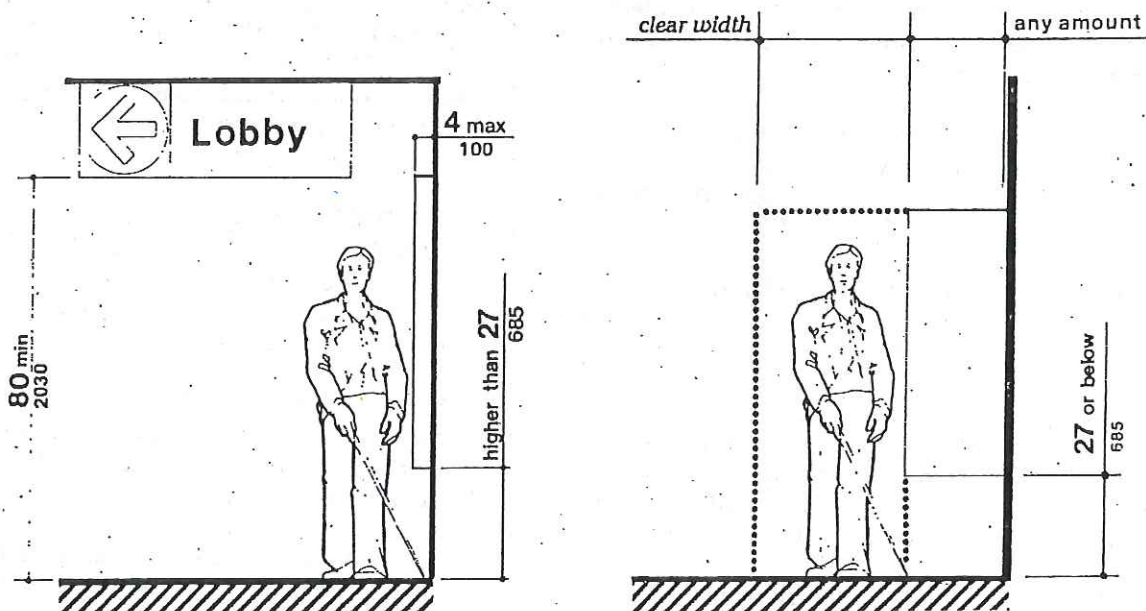


Fig. 8 (a)  
Walking Parallel to a Wall

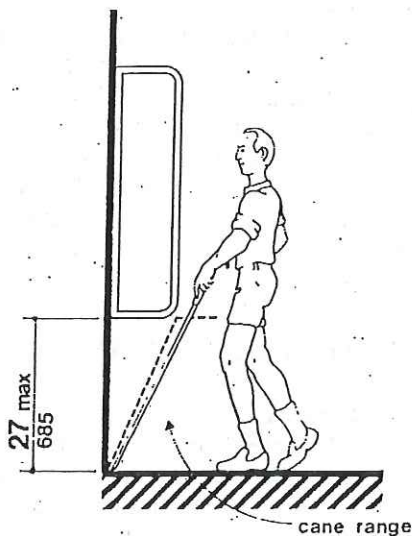


Fig. 8 (b)  
Walking Perpendicular to a Wall

Fig. 8  
Protruding Objects

finished floor (see Fig. 8(c) and (d)). Protruding objects shall not reduce the clear width of an accessible route or maneuvering space (see Fig. 8(e)).

**4.4.2 Head Room.** Walks, halls, corridors, passageways, aisles, or other circulation spaces shall have 80 in (2030 mm) minimum clear head room (see Fig. 8(a)). If vertical clearance of an area adjoining an accessible route is reduced to less than 80 in (nominal dimension), a barrier to warn blind or visually-impaired persons shall be provided (see Fig. 8(c-1)).

## 4.5 Ground and Floor Surfaces.

**4.5.1\* General.** Ground and floor surfaces along accessible routes and in accessible rooms and spaces including floors, walks, ramps, stairs, and curb ramps, shall be stable, firm, slip-resistant, and shall comply with 4.5.

**4.5.2 Changes in Level.** Changes in level up to 1/4 in (6 mm) may be vertical and without edge treatment (see Fig. 7(c)). Changes in level between 1/4 in and 1/2 in (6 mm and 13 mm)

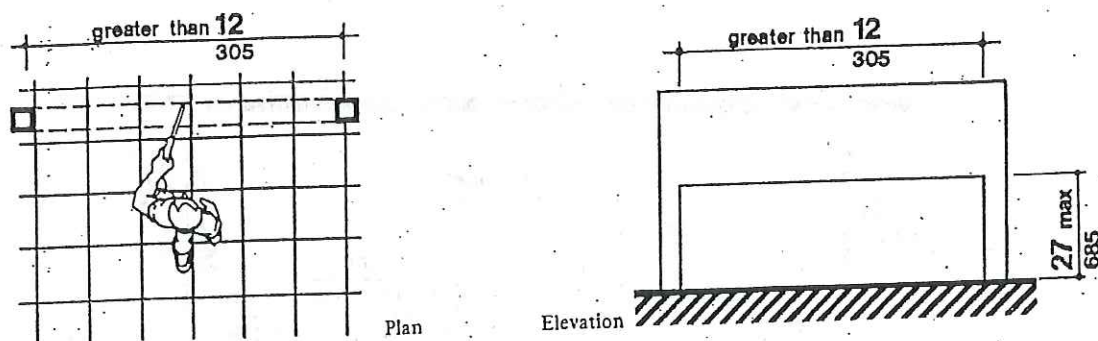


Fig. 8 (c) Free-Standing Overhanging Objects

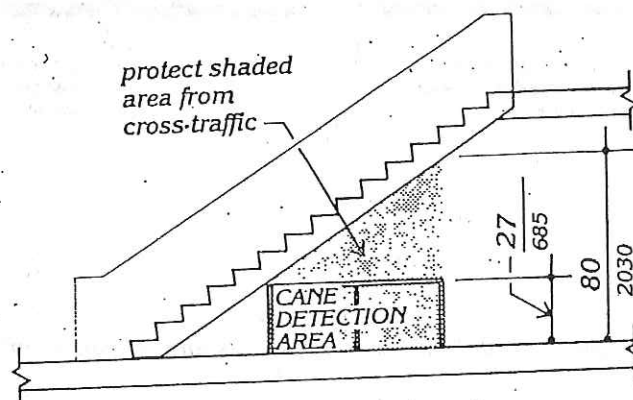


Fig. 8 (c-1) Overhead Hazards

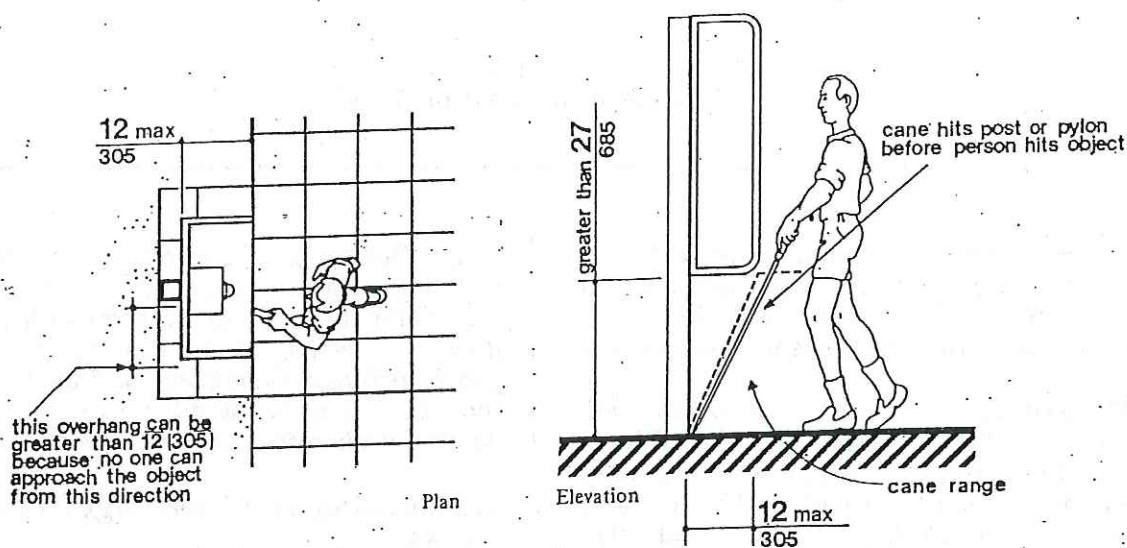


Fig. 8 (d)  
Objects Mounted on Posts or Pylons

Fig. 8  
Protruding Objects (Continued)



## 4.5 Ground and Floor Surfaces

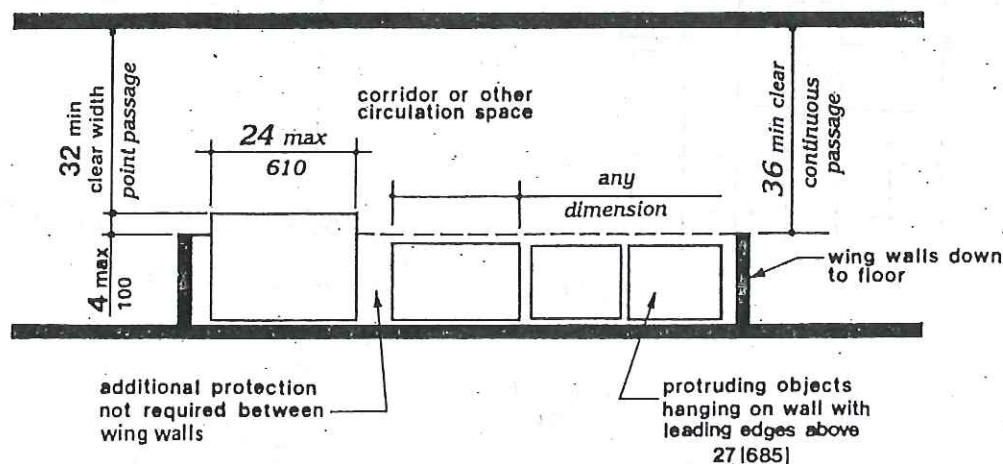


Fig. 8 (e)

Example of Protection around Wall-Mounted Objects and Measurements of Clear Widths

Fig. 8

Protruding Objects (Continued)

shall be beveled with a slope no greater than 1:2 (see Fig. 7(d)). Changes in level greater than 1/2 in (13 mm) shall be accomplished by means of a ramp that complies with 4.7 or 4.8.

**4.5.3\* Carpet.** If carpet or carpet tile is used on a ground or floor surface, then it shall be securely attached; have a firm cushion, pad, or backing, or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. The maximum pile thickness shall be 1/2 in (13 mm) (see Fig. 8(f)). Exposed edges of carpet shall be fastened to floor surfaces and have trim along the entire length of the exposed edge. Carpet edge trim shall comply with 4.5.2.

**4.5.4 Gratings.** If gratings are located in walking surfaces, then they shall have spaces no greater than 1/2 in (13 mm) wide in one direction (see Fig. 8(g)). If gratings have elongated openings, then they shall be placed so that the long dimension is perpendicular to the dominant direction of travel (see Fig. 8(h)).

## 4.6 Parking and Passenger Loading Zones.

**4.6.1 Minimum Number.** Parking spaces required to be accessible by 4.1 shall comply with 4.6.2 through 4.6.5. Passenger loading zones required to be accessible by 4.1 shall comply with 4.6.5 and 4.6.6.



## 4.7 Curb Ramps

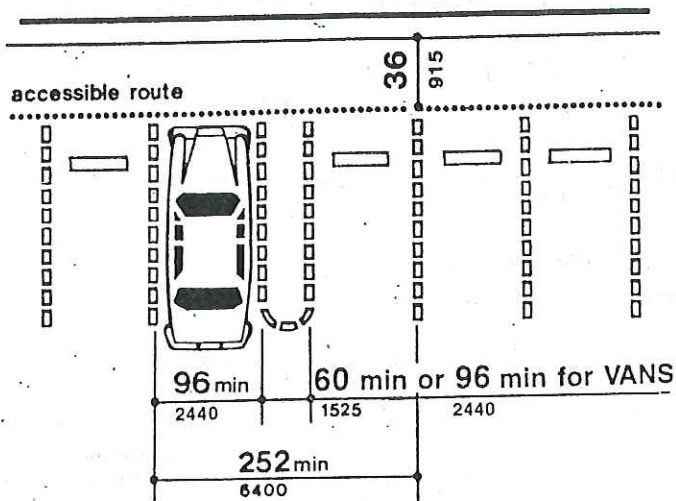


Fig. 9  
Dimensions of Parking Spaces

surface slopes not exceeding 1:50 (2%) in all directions.

### \* 4.7 Curb Ramps.

**4.7.1 Location.** Curb ramps complying with 4.7 shall be provided wherever an accessible route crosses a curb.

**4.7.2 Slope.** Slopes of curb ramps shall comply with 4.8.2. The slope shall be measured as shown in Fig. 11. *Transitions from ramps to walks, gutters, or streets shall be flush and free of abrupt changes. Maximum slopes of adjoining gutters, road surface immediately adjacent to the curb ramp, or accessible route shall not exceed 1:20.*

**4.7.3 Width.** The minimum width of a curb ramp shall be 36 in (915 mm), exclusive of flared sides.

**4.7.4 Surface.** Surfaces of curb ramps shall comply with 4.5.

**4.7.5 Sides of Curb Ramps.** If a curb ramp is located where pedestrians must walk across the ramp, or where it is not protected by handrails or guardrails, it shall have flared sides; the maximum slope of the flare shall be 1:10 (see Fig. 12(a)). Curb ramps with returned curbs

may be used where pedestrians would not normally walk across the ramp (see Fig. 12(b)).

**4.7.6 Built-up Curb Ramps.** Built-up curb ramps shall be located so that they do not project into vehicular traffic lanes (see Fig. 13).

**4.7.7 Detectable Warnings.** A curb ramp shall have a *detectable* warning complying with 4.29.2. The *detectable* warning shall extend the full width and depth of the curb ramp.

**4.7.8 Obstructions.** Curb ramps shall be located or protected to prevent their obstruction by parked vehicles.

**4.7.9 Location at Marked Crossings.** Curb ramps at marked crossings shall be wholly contained within the markings, excluding any flared sides (see Fig. 15).

**4.7.10 Diagonal Curb Ramps.** If diagonal (or corner type) curb ramps have returned curbs or other well-defined edges, such edges shall be parallel to the direction of pedestrian flow. The bottom of diagonal curb ramps shall have 48 in (1220 mm) minimum clear space as shown in Fig. 15(c) and (d). If diagonal curb ramps are provided at marked crossings, the 48 in (1220 mm) clear space shall be within the markings (see Fig. 15(c) and (d)). If diagonal curb ramps have flared sides, they shall also have at least a 24 in (610 mm) long segment of straight curb located on each side of the curb ramp and within the marked crossing (see Fig. 15(c)).

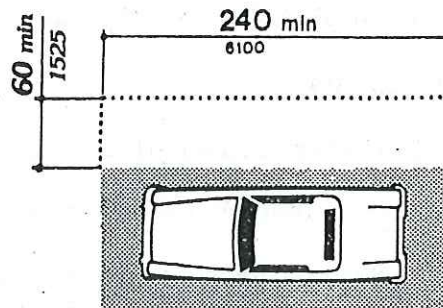


Fig. 10  
Access Aisle at Passenger Loading Zones

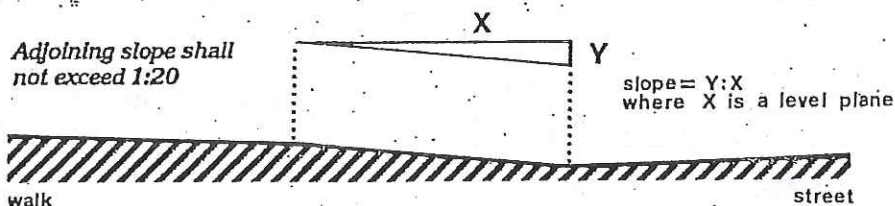


Fig. 11  
Measurement of Curb Ramp Slopes.

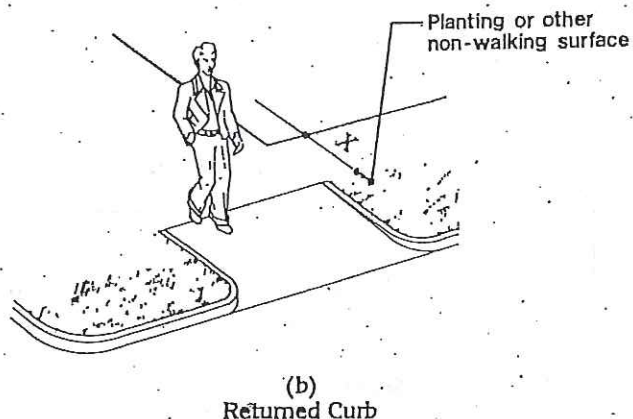
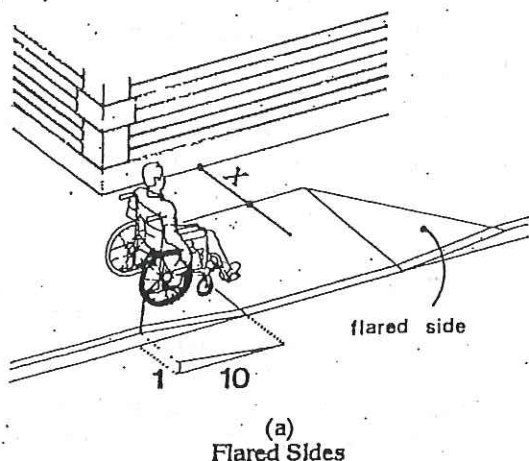


Fig. 12  
Sides of Curb Ramps

**4.7.11 Islands.** Any raised islands in crossings shall be cut through level with the street or have curb ramps at both sides and a level area at least 48 in (1220 mm) long between the curb ramps in the part of the island intersected by the crossings (see Fig. 15(a) and (b)).

#### 4.8 Ramps.

**4.8.1\* General.** Any part of an accessible route with a slope greater than 1:20 shall be considered a ramp and shall comply with 4.8.

**4.8.2\* Slope and Rise.** The least possible slope shall be used for any ramp. The maximum slope of a ramp in new construction shall be 1:12. The maximum rise for any run shall be 30 in (760 mm) (see Fig. 16). Curb ramps

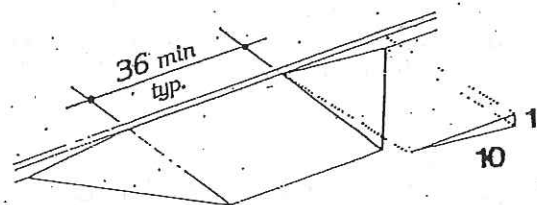
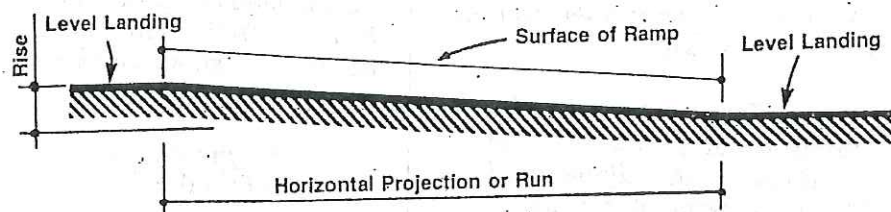


Fig. 13  
Built-Up Curb Ramp

and ramps to be constructed on existing sites or in existing buildings or facilities may have slopes and rises as *allowed in 4.1.6(3)(a)* if space limitations prohibit the use of a 1:12 slope or less.





Slope	Maximum Rise		Maximum Horizontal Projection	
	in	mm	ft	m
1:12 to < 1:16	30	760	30	9
1:16 to < 1:20	30	760	40	12

Fig. 16  
Components of a Single Ramp Run and Sample Ramp Dimensions

**4.8.3 Clear Width.** The minimum clear width of a ramp shall be 36 in (915 mm).

**4.8.4\* Landings.** Ramps shall have level landings at bottom and top of *each ramp* and *each ramp run*. Landings shall have the following features:

- (1) The landing shall be at least as wide as the ramp run leading to it.
- (2) The landing length shall be a minimum of 60 in (1525 mm) clear.
- (3) If ramps change direction at landings, the minimum landing size shall be 60 in by 60 in (1525 mm by 1525 mm).
- (4) If a doorway is located at a landing, then the area in front of the doorway shall comply with 4.13.6.

**4.8.5\* Handrails.** If a ramp run has a rise greater than 6 in (150 mm) or a horizontal projection greater than 72 in (1830 mm), then it shall have handrails on both sides. Handrails are not required on curb ramps or *adjacent to seating in assembly areas*. Handrails shall comply with 4.26 and shall have the following features:

(1) Handrails shall be provided along both sides of ramp segments. The inside handrail on switchback or dogleg ramps shall always be continuous.

(2) If handrails are not continuous, they shall extend at least 12 in (305 mm) beyond the top and bottom of the ramp segment and shall be parallel with the floor or ground surface (see Fig. 17).

(3) The clear space between the handrail and the wall shall be 1 - 1/2 in (38 mm).

(4) Gripping surfaces shall be continuous.

(5) Top of handrail gripping surfaces shall be mounted between 34 in and 38 in (865 mm and 965 mm) above ramp surfaces.

(6) Ends of handrails shall be either rounded or returned smoothly to floor, wall, or post.

(7) Handrails shall not rotate within their fittings.

**4.8.6 Cross Slope and Surfaces.** The cross slope of ramp surfaces shall be no greater than 1:50. Ramp surfaces shall comply with 4.5.



## ★ 4.29 Detectable Warnings.

**4.29.1 General.** Detectable warnings required by 4.1 and 4.7 shall comply with 4.29.

**4.29.2\* Detectable Warnings on Walking Surfaces.** Detectable warnings shall consist of raised truncated domes with a diameter of nominal 0.9 in (23 mm), a height of nominal 0.2 in (5 mm) and a center-to-center spacing of nominal 2.35 in (60 mm) and shall contrast visually with adjoining surfaces, either light-on-dark, or dark-on-light.

The material used to provide contrast shall be an integral part of the walking surface. Detectable warnings used on interior surfaces shall differ from adjoining walking surfaces in resiliency or sound-on-cane contact.

**4.29.3 Detectable Warnings on Doors To Hazardous Areas.** (Reserved).

**4.29.4 Detectable Warnings at Stairs.** (Reserved).

**4.29.5 Detectable Warnings at Hazardous Vehicular Areas.** If a walk crosses or adjoins a vehicular way, and the walking surfaces are not separated by curbs, railings, or other elements between the pedestrian areas and vehicular areas, the boundary between the areas shall be defined by a continuous detectable warning which is 36 in (915 mm) wide, complying with 4.29.2.

**4.29.6 Detectable Warnings at Reflecting Pools.** The edges of reflecting pools shall be protected by railings, walls, curbs, or detectable warnings complying with 4.29.2.

**4.29.7 Standardization.** (Reserved).

## 4.30 Signage.

**4.30.1\* General.** Signage required to be accessible by 4.1 shall comply with the applicable provisions of 4.30.

**4.30.2\* Character Proportion.** Letters and numbers on signs shall have a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10.

**4.30.3 Character Height.** Characters and numbers on signs shall be sized according to the viewing distance from which they are to be read. The minimum height is measured using an upper case X. Lower case characters are permitted.

Height Above Finished Floor	Minimum Character Height
Suspended or Projected Overhead in compliance with 4.4.2	3 in. (75 mm) minimum

## 4.30.4\* Raised and Brailled Characters and Pictorial Symbol Signs (Pictograms).

Letters and numerals shall be raised 1/32 in (0.8 mm) minimum, upper case, sans serif or simple serif type and shall be accompanied with Grade 2 Braille. Raised characters shall be at least 5/8 in (16 mm) high, but no higher than 2 in (50 mm). Pictograms shall be accompanied by the equivalent verbal description placed directly below the pictogram. The border dimension of the pictogram shall be 6 in (152 mm) minimum in height.

**4.30.5\* Finish and Contrast.** The characters and background of signs shall be eggshell, matte, or other non-glare finish. Characters and symbols shall contrast with their background — either light characters on a dark background or dark characters on a light background.

**4.30.6 Mounting Location and Height.** Where permanent identification is provided for rooms and spaces, signs shall be installed on the wall adjacent to the latch side of the door. Where there is no wall space to the latch side of the door, including at double leaf doors, signs shall be placed on the nearest adjacent wall. Mounting height shall be 60 in (1525 mm) above the finish floor to the centerline of the sign. Mounting location for such signage shall be so that a person may approach within 3 in (76 mm) of signage without encountering protruding objects or standing within the swing of a door.

## 4.30.7\* Symbols of Accessibility.

(1) Facilities and elements required to be identified as accessible by 4.1 shall use the international symbol of accessibility. The





This is an unofficial version of the revised ADA regulations. The official text will be published in the Federal Register.

Authority: 5 U.S.C. 301; 28 U.S.C. 509, 510; 42 U.S.C. 12134. § 35.101

## Subpart A -- General

### §35.101 Purpose.

The purpose of this part is to effectuate subtitle A of title II of the Americans with Disabilities Act of 1990, which prohibits discrimination on the basis of disability by public entities.

(b) *Alteration.* (1) Each facility or part of a facility altered by, on behalf of, or for the use of a public entity in a manner that affects or could affect the usability of the facility or part of the facility shall, to the maximum extent feasible, be altered in such manner that the altered portion of the facility is readily accessible to and usable by individuals with disabilities, if the alteration was commenced after January 26, 1992.

(2) The path of travel requirements of § 35.151(b)(4) shall apply only to alterations undertaken solely for purposes other than to meet the program accessibility requirements of § 35.150.

(3) (i) Alterations to historic properties shall comply, to the maximum extent feasible, with the provisions applicable to historic properties in the design standards specified in § 35.151(c).

(ii) If it is not feasible to provide physical access to an historic property in a manner that will not threaten or destroy the historic significance of the building or facility, alternative methods of access shall be provided pursuant to the requirements of § 35.150.

(4) Path of travel. An alteration that affects or could affect the usability of or access to an area of a facility that contains a primary function shall be made so as to ensure that, to the maximum extent feasible, the path of travel to the altered area and the restrooms, telephones, and drinking fountains serving the altered area, are readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs, unless the cost and scope of such alterations is disproportionate to the cost of the overall alteration.

(i) Primary function. A "primary function" is a major activity for which the facility is intended. Areas that contain a primary function include, but are not limited to, the dining area of a cafeteria, the meeting rooms in a conference center, as well as offices and other work areas in which the activities of the public entity, using the facility are carried out.

(A) Mechanical rooms, boiler rooms, supply storage rooms, employee lounges or locker rooms, janitorial closets, entrances, and corridors are not areas containing a primary function. Restrooms are not areas containing a primary function unless the provision of restrooms is a primary purpose of the area, e.g., in highway rest stops.

(B) For the purposes of this section, alterations to windows, hardware, controls, electrical outlets, and signage shall not be deemed to be alterations that affect the usability of or access to an area containing a primary function.

(ii) A "path of travel" includes a continuous, unobstructed way of pedestrian passage by means of which the altered area may be approached, entered, and exited, and which connects the altered area with an exterior approach (including sidewalks, streets, and parking areas), an entrance to the facility, and other parts of the facility.

(A) An accessible path of travel may consist of walks and sidewalks, curb ramps and other interior or exterior pedestrian ramps; clear floor paths through lobbies, corridors, rooms, and other improved areas; parking access aisles; elevators and lifts; or a combination of these elements.

(B) For the purposes of this section, the term "path of travel" also includes the restrooms, telephones, and drinking fountains serving the altered area.

(C) Safe harbor. If a public entity has constructed or altered required elements of a path of travel in accordance with the specifications in either the 1991 Standards or the Uniform Federal Accessibility Standards before [INSERT DATE 18 MONTHS AFTER THE DATE OF PUBLICATION OF THE FINAL RULE IN FEDERAL REGISTER], the public entity is not required to retrofit such elements to reflect incremental changes in the 2010 Standards solely because of an alteration to a primary function area served by that path of travel.

(iii) Disproportionality. (A) Alterations made to provide an accessible path of travel to the altered area will be deemed disproportionate to the overall alteration when the cost exceeds 20 % of the cost of the alteration to the primary function area.

(B) Costs that may be counted as expenditures required to provide an accessible path of travel may include:

(1) Costs associated with providing an accessible entrance and an accessible route to the altered area, for example, the cost of widening doorways or installing ramps;

(2) Costs associated with making restrooms accessible, such as installing grab bars, enlarging toilet stalls, insulating pipes, or installing accessible faucet controls;

(3) Costs associated with providing accessible telephones, such as relocating the telephone to an accessible height, installing amplification devices, or installing a text telephone (TTY); and

(4) Costs associated with relocating an inaccessible drinking fountain.



## **Summary of ADA Requirements for Seating**

**An accessible bench is made of two parts - the accessible bench and an adjacent space for a companion in a wheelchair.**

- 5% of the total seating is to be an accessible bench and wheelchair clear floor area in each functional area.
- Where there is bench- type or bleacher seating, assume the seating count to be 18" to 24" of bench equals one seat. Otherwise use the actual seating count, like in an auditorium.
- If more than one accessible bench/wheelchair space is to be provided, then they should be disbursed - so that wheelchair users and companions have some seating options.

### **Minimum bench requirements:**

- 42" long minimum seat, (not necessarily a straight bench seat - it could be curved, angled)
- 20" min. to 24" max. deep seat
- Back support must be 42" min. long and 18" min. high.
- If there is a gap between the seat and the back rest - the gap should not be larger than 2" high or 2 1/2" deep (i.e. not pass a ball larger than 2 1/2")

### **The adjacent clear floor or ground area** (required only on one side of the accessible bench)

- 30" min. wide by 48" min. deep
- The clear space is starts 12" behind the bench's backrest so that the wheelchair user and person on bench are shoulder aligned.
- The clear floor area is on some form of pavement, firm and stable surface.

### **Arm Rests:**

No arm rests are required, and they are not preferable. Arm rests can block a person transferring onto the bench from a wheelchair or other mobility aid.



## 903 Benches

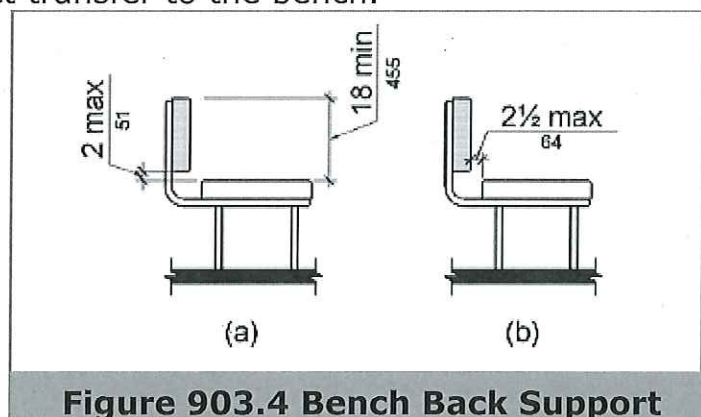
**903.1 General.** Benches shall comply with 903.

**903.2 Clear Floor or Ground Space.** Clear floor or ground space complying with 305 shall be provided and shall be positioned at the end of the bench seat and parallel to the short axis of the bench.

**903.3 Size.** Benches shall have seats that are 42 inches (1065 mm) long minimum and 20 inches (510 mm) deep minimum and 24 inches (610 mm) deep maximum.

**903.4 Back Support.** The bench shall provide for back support or shall be affixed to a wall. Back support shall be 42 inches (1065 mm) long minimum and shall extend from a point 2 inches (51 mm) maximum above the seat surface to a point 18 inches (455 mm) minimum above the seat surface. Back support shall be 2 1/2 inches (64 mm) maximum from the rear edge of the seat measured horizontally.

**Advisory 903.4 Back Support.** To assist in transferring to the bench, consider providing grab bars on a wall adjacent to the bench, but not on the seat back. If provided, grab bars cannot obstruct transfer to the bench.



**903.5 Height.** The top of the bench seat surface shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum above the finish floor or ground.



**903.6 Structural Strength.** Allowable stresses shall not be exceeded for materials used when a vertical or horizontal force of 250 pounds (1112 N) is applied at any point on the seat, fastener, mounting device, or supporting structure.

**903.7 Wet Locations.** Where installed in wet locations, the surface of the seat shall be slip resistant and shall not accumulate water.

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### 3. PLAYGROUND HAZARDS

This section provides a broad overview of general hazards that should be avoided on playgrounds. It is intended to raise awareness of the risks posed by each of these hazards. Many of these hazards have technical specifications and tests for compliance with ASTM F1487 and F2373. Some of these tests are also detailed in Appendix B.

#### 3.1 Crush and Shearing Points

Anything that could crush or shear limbs should not be accessible to children on a playground. Crush and shear points can be caused by parts moving relative to each other or to a fixed part during a normal use cycle, such as a seesaw.

To determine if there is a possible crush or shear point, consider:

- The likelihood a child could get a body part inside the point, and
- The closing force around the point.

Potential crush/shear hazards specific to certain pieces of equipment are identified in §5.3 Major Types of Playground Equipment.



#### 3.2 Entanglement and Impalement

Projections on playground equipment should not be able to entangle children's clothing nor should they be large enough to impale. To avoid this risk:

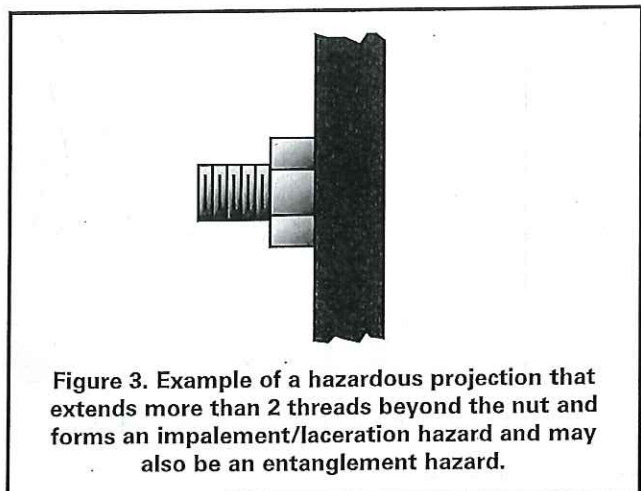
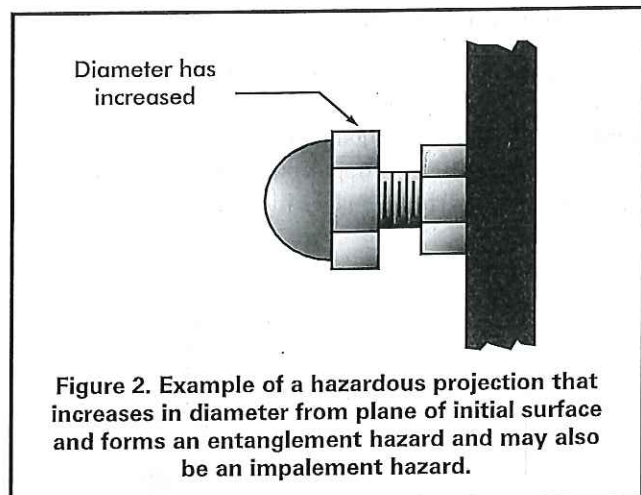
- The diameter of a projection should not increase in the direction away from the surrounding surface toward the exposed end (see Figure 2).
- Bolts should not expose more than two threads beyond the end of the nut (see Figure 3).
- All hooks, such as S-hooks and C-hooks, should be closed (see also §5.3.8.1). A hook is considered closed if there is no gap or space greater than 0.04 inches, about the thickness of a dime.
  - Any connecting device containing an in-fill that completely fills the interior space preventing entry of clothing items into the interior of the device is exempt from this requirement.

- Swings and slides have additional recommendations for projections detailed in §5.3.
- See Appendix B for testing recommendations.

##### 3.2.1 Strings and ropes

Drawstrings on the hoods of jackets, sweatshirts, and other upper body clothing can become entangled in playground equipment, and can cause death by strangulation. To avoid this risk:

- Children should not wear jewelry, jackets or sweatshirts with drawstring hoods, mittens connected by strings through the arms, or other upper body clothing with drawstrings.
- Remove any ropes, dog leashes, or similar objects that have been attached to playground equipment. Children can become entangled in them and strangle to death.





- Avoid equipment with ropes that are not secured at both ends.
- The following label, or a similar sign or label, can be placed on or near slides or other equipment where potential entanglements may occur.



### 3.3 Entrapment

#### ★ 3.3.1 Head entrapment

Head entrapment is a serious concern on playgrounds, since it could lead to strangulation and death. A child's head may become entrapped if the child enters an opening either feet first or head first. Head entrapment by head-first entry generally occurs when children place their heads through an

opening in one orientation, turn their heads to a different orientation, then are unable to get themselves out. Head entrapment by feet first entry involves children who generally sit or lie down and slide their feet into an opening that is large enough to permit their bodies to go through but is not large enough to permit their heads to go through. A part or a group of parts should not form openings that could trap a child's head. Also, children should not wear their bicycle helmets while on playground equipment. There have been recent head entrapment incidents in which children wearing their bicycle helmets became entrapped in spaces that would not normally be considered a head entrapment.

Certain openings could present an entrapment hazard if the distance between any interior opposing surfaces is greater than 3.5 inches and less than 9 inches. These spaces should be tested as recommended in Appendix B. When one dimension of an opening is within this range, all dimensions of the opening should be considered together to evaluate the possibility of entrapment. Even openings that are low enough for children's feet to touch the ground can present a risk of strangulation for an entrapped child. (See Figure 4). Younger children may not have the necessary intellectual ability or motor skills to reverse the process that caused their heads to become trapped, especially if they become scared or panicked.

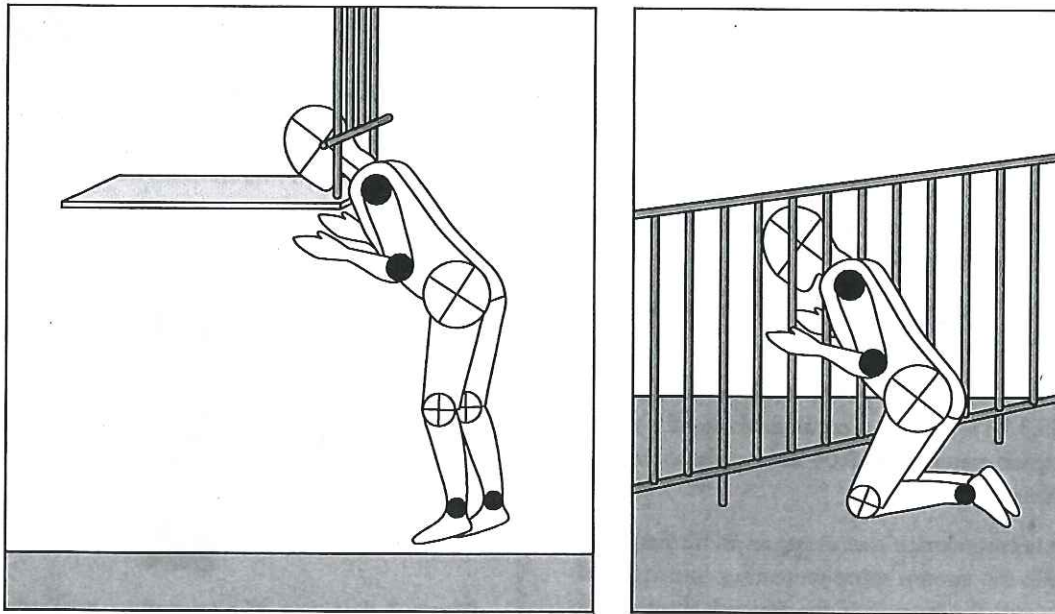
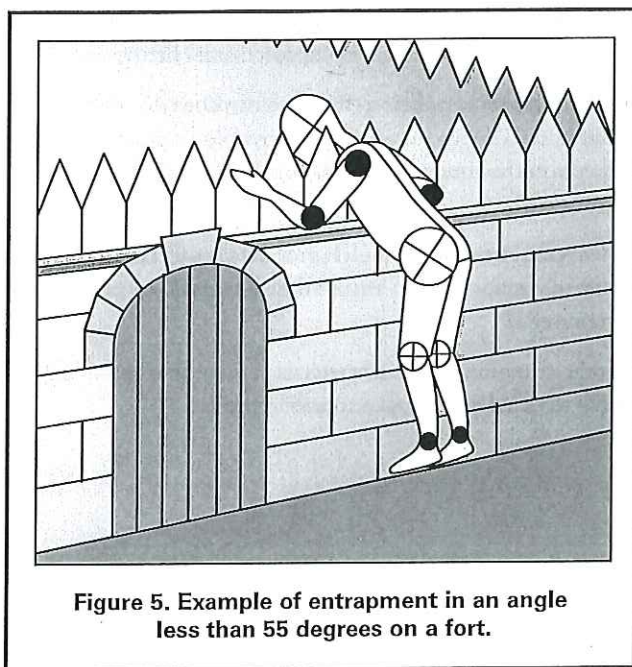


Figure 4. Examples of entrapment below a barrier and between the vertical bars of a barrier.



**Figure 5. Example of entrapment in an angle less than 55 degrees on a fort.**

### 3.3.2 Partially bound openings and angles

Children can become entrapped by partially bound openings, such as those formed by two or more playground parts.

- Angles formed by two accessible adjacent parts should be greater than 55 degrees unless the lowest leg is horizontal or below horizontal.
- Use the partially-bound opening test in Appendix B to identify hazardous angles and other partially-bound openings.



### 3.4 Sharp Points, Corners, and Edges

Sharp points, corners, or edges on any part of the playground or playground equipment may cut or puncture a child's skin. Sharp edges can cause serious lacerations if protective measures are not taken. To avoid the risk of injury from sharp points, corners and edges:

- Exposed open ends of all tubing not resting on the ground or otherwise covered should be covered by caps or plugs that cannot be removed without the use of tools.
- Wood parts should be smooth and free from splinters.
- All corners, metal and wood, should be rounded.
- All metal edges should be rolled or have rounded capping.

- There should be no sharp edges on slides. Pay special attention to metal edges of slides along the sides and at the exit (see also §5.3.6.4).
- If steel-belted radials are used as playground equipment, they should be closely examined regularly to ensure that there are no exposed steel belts/wires.
- Conduct frequent inspections to help prevent injuries caused by splintered wood, sharp points, corners, or edges that may develop as a result of wear and tear on the equipment.

### 3.5 Suspended Hazards

Children using a playground may be injured if they run into or trip over suspended components (such as cables, wires, ropes, or other flexible parts) connected from one piece of the playground equipment to another or hanging to the ground. These suspended components can become hazards when they are within 45 degrees of horizontal and are less than 7 feet above the protective surfacing. To avoid a suspended hazard, suspended components:

- Should be located away from high traffic areas.
- Should either be brightly colored or contrast with the surrounding equipment and surfacing.
- Should not be able to be looped back on themselves or other ropes, cables, or chains to create a circle with a 5 inch or greater perimeter.
- Should be fastened at both ends unless they are 7 inches or less long or attached to a swing seat.

These recommendations do not apply to swings, climbing nets, or if the suspended component is more than 7 feet above the protective surfacing and is a minimum of one inch at its widest cross-section dimension.

### 3.6 Tripping Hazards

Play areas should be free of tripping hazards (i.e., sudden change in elevations) to children who are using a playground. Two common causes of tripping are anchoring devices for playground equipment and containment walls for loose-fill surfacing materials.

- All anchoring devices for playground equipment, such as concrete footings or horizontal bars at the bottom of flexible climbers, should be installed below ground level



and beneath the base of the protective surfacing material. This will also prevent children from sustaining additional injuries from impact if they fall on exposed footings.

- Contrasting the color of the surfacing with the equipment color can contribute to better visibility.
- Surfacing containment walls should be highly visible.
- Any change of elevation should be obvious.
- Contrasting the color of the containment barrier with the surfacing color can contribute to better visibility.

### **3.7 Used Tires**

Used automobile and truck tires are often recycled as playground equipment, such as tire swings or flexible climbers, or as a safety product such as cushioning under a seesaw or shredded as protective surfacing. When recycling tires for playground use:

- Steel-belted radials should be closely examined regularly to ensure that there are no exposed steel belts/wires.
- Care should be taken so that the tire does not collect water and debris; for example, providing drainage holes on the underside of the tire would reduce water collection.
- Recycled tire rubber mulch products should be inspected before installation to ensure that all metal has been removed.

In some situations, plastic materials can be used as an alternative to simulate actual automobile tires.



## APPENDIX B

### Entrapment Recommendations and Test Methods

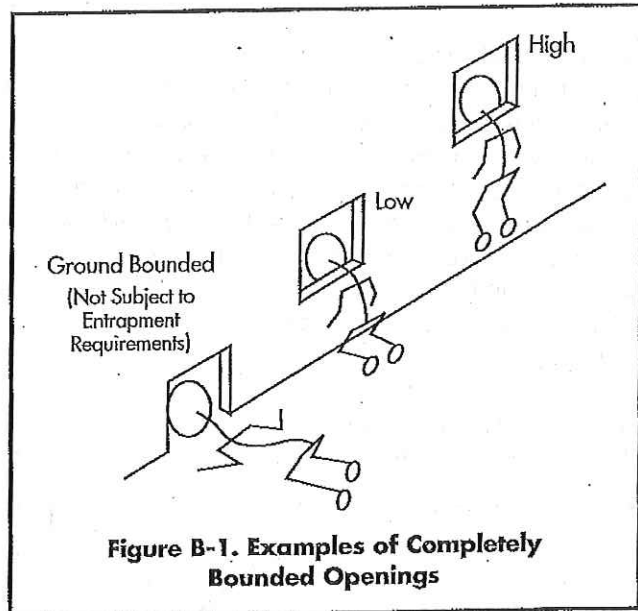
**B1. GENERAL** — Any completely-bounded opening (see Figure B-1) may be a potential head entrapment hazard and should conform to the recommendations in this appendix. One exception to these recommendations is an opening where the ground serves as the lower boundary. Openings in both horizontal and vertical planes present a risk of entrapment. Even those openings which are low enough to permit a child's feet to touch the ground present a risk of strangulation to an entrapped child, because younger children may not have the necessary cognitive ability and motor skills to withdraw their heads, especially if scared or panicked.

An opening may present an entrapment hazard if the distance between any interior opposing surfaces is greater than 3.5 inches or less than 9 inches; when one dimension of an opening is within this potentially hazardous range, all dimensions of the opening should be considered together to fully evaluate the possibility of entrapment. The most appropriate method to determine whether an opening is hazardous is to test it using the following fixtures, methods, and performance criteria.

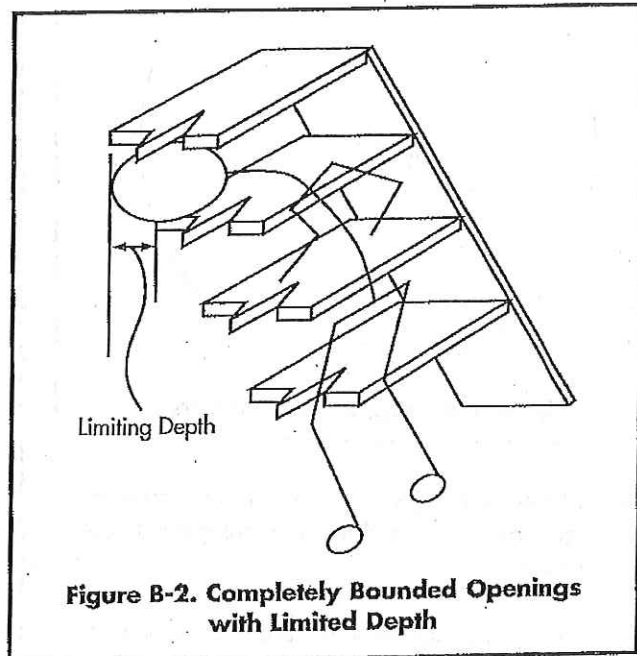
These recommendations apply to all playground equipment, both for preschool-age and school-age children; fixed equipment as well as moving equipment (in its stationary position) should be tested for entrapment hazards. There are two special cases for which separate procedures are given: completely-bounded openings where depth of penetration is a critical issue (see Figure B-2); and openings formed by non-rigid climbing components.

**B2. TEST FIXTURES** — Two templates are required to determine if completely bounded openings in rigid structures present an entrapment hazard.

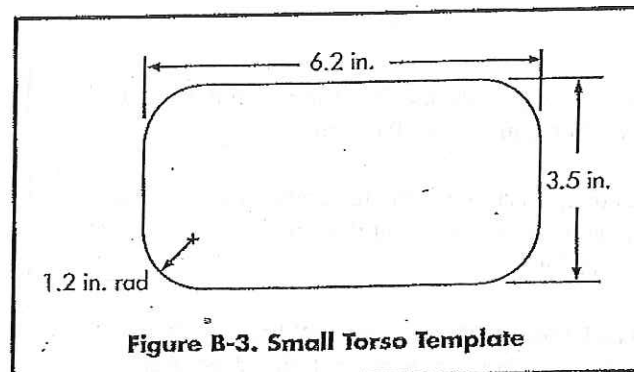
**B2.1 Small Torso Template** — The dimensions (see Figure B-3) of this template are based on the size of the torso of the smallest user at risk, (5th percentile 2-year-old child). If an opening is too small to admit the template, it is also too small to permit feet first entry by a child. Because children's heads are larger than their torsos, an opening that does not admit the small torso probe will also prevent head first entry into an opening by a child.



**Figure B-1. Examples of Completely Bounded Openings**



**Figure B-2. Completely Bounded Openings with Limited Depth**



**Figure B-3. Small Torso Template**

**B2.2 Large Head Template** — The dimensions (see Figure B-4) of this template are based on the largest dimension on the head of the largest child at risk (95th percentile 5-year-old child). If an opening is large enough to permit free passage of the template, it is large enough to permit free passage of the head of the largest child at risk in any orientation. In addition, openings large enough to permit free passage of the Large Head Template also will not entrap the chest of the largest child at risk.

These templates can easily be fabricated from cardboard, plywood or sheet metal.

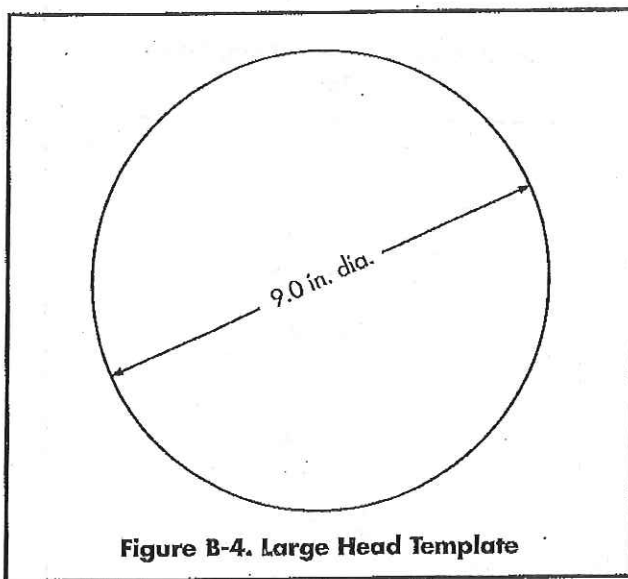


Figure B-4. Large Head Template

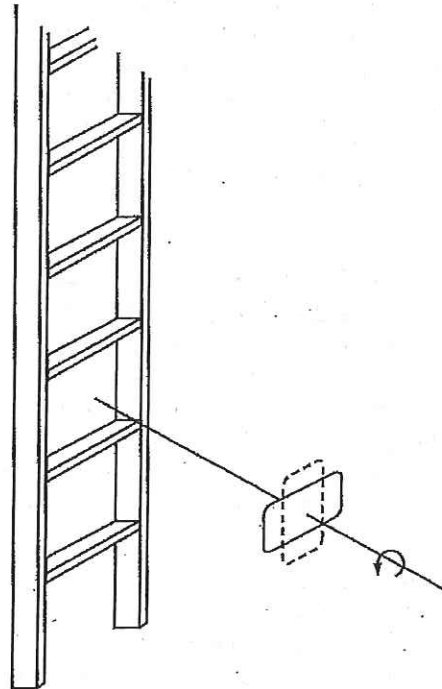
**B3. RECOMMENDATION** — When tested in accordance with the procedure in B4. below, an opening meets the recommendation if:

- (1) the opening does not admit the Small Torso Template,
- or
- (2) the opening admits the Small Torso Template and also admits the Large Head Template.

An opening fails to meet the recommendation if it admits the Small Torso Template but does not admit the Large Head Template.

**B4. TEST PROCEDURE** — Attempt to place the Small Torso Template in the opening with the plane of the template parallel to the plane of the opening. While

keeping it parallel to the plane of the opening, the template should be rotated to its most adverse orientation i.e., major axis of template oriented parallel to the major axis of the opening. If the Small Torso Template can be freely inserted through the opening, place the Large Head Template in the opening, again with the plane of the template parallel to the plane of the opening, and attempt to freely insert it through the opening. The test procedure is illustrated in Figure B-5.



**Test procedures and performance criteria for completely-bounded openings.**

Place the Small Torso Template in the opening with the plane of the template parallel to the plane of the opening. Rotate the template while keeping it parallel to the opening.

If the Small Torso Template can be inserted into the opening, place the Large Head Template into the opening so its plane is parallel to the plane of the opening.

An opening can pass this test when tested in accordance with the above procedures in one of two ways: 1) the opening does not admit the Small Torso Template when it is rotated to any orientation about its own axis, or 2) the opening admits the Small Torso Template and also admits the Large Head Template. An opening fails the test under the following conditions: the opening admits the Small Torso Template but does not admit the Large Head Template.

Figure B-5. Entrapment Test for Completely-Bounded Openings