An Assisted Living Development for People with Traumatic Brain Injuries

2005 Architecture Thesis

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AN ASSISTED LIVING DEVELOPMENT FOR PEOPLE WITH TRAUMATIC BRAIN INJURIES

A Design Thesis Submitted to the
Department of Architecture and Landscape Architecture
of North Dakota State University

By

Jill Bernhagen

In Partial Fulfillment of the Requirements
for the Degree of
Bachelor of Architecture

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May 2005
Fargo, North Dakota

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Introduction

An ethical society must provide care for citizens with traumatic brain injuries. Right now, there are not enough facilities in North Dakota to house them. They are put into ill-fitting residences until better ones open up. I am proposing an additional living facility in Bismarck, North Dakota that would assist victims of traumatic brain injury. It would be located in north Bismarck, on the northwest corner of 43rd and Ottawa. It would serve western North Dakota and overflow from the Open Door Center in Valley City, North Dakota.

My thesis project focuses on an assisted living facility for people with traumatic brain injuries. It incorporates a vocational area where residents can work and learn skills that will help them to live more independently. On site staff will provide direct care and supervision for those requiring it. There will also be recreational accommodations. The residents will be encouraged to live as independently as possible. They will be able to use public transportation to get to a shopping center, supermarket, and work. The facility will emphasize progress in their recovery and aim for the best possible living conditions.

There is currently only one long-term facility in North Dakota for traumatic brain injury victims. It is the Open Door Center in Valley City. The ODC is staffed seven days a week, 24 hours a day. The maximum capacity, however, is only 11 individuals. There is also a small overflow area at the North Dakota Developmental Center in Grafton, ND being used for people with traumatic brain injuries. Right now, there are 3 TBI victims living at the ND Developmental Center in Grafton because there is nowhere else for them to go.

I propose the design of an additional facility in northern Bismarck, North Dakota to specialize in assisted living facilities and work centers for people with traumatic brain injuries, incorporating the necessary support spaces. This facility would provide professional assistance to those who need it and help its clients learn valuable skills that would help them to live more independently. The State of North Dakota would be the client. The facility would be located on the northwest corner of 43rd and Ottawa.

The center would serve western North Dakota and overflow from the Open Door Center. Research will indicate what sort of environment will most benefit the residents, and which support spaces are needed.

The underlying premise of this design is that an ethical society must provide care for citizens with traumatic brain injuries, and might otherwise not be able to do so for themselves.

The typology used here is a combination of three existing typologies. These three are housing, assisted care, and vocational. The combination of these three typologies serves to take care of people with traumatic brain injuries. By implementing the right actions, this facility can provide the best level of care possible. This can be done by allowing people with traumatic brain injuries to lead as normal of a life as possible while still maintaining a great level of care.

Typology

Premise

The underlying premise of this project is to provide a safe home environment for people with traumatic brain injuries. Sometimes they cannot provide for themselves and an ethical society must provide care. Some people with traumatic brain injuries cannot even tell they have been affected, so they need as "normal" of a life as possible. It can also be very stressful for loved ones to take care of someone with a traumatic brain injury. This is where a facility like this helps them out. It allows family members and loved ones to maintain their life to some degree instead of having to drop everything.

Everyone will know someone in their lifetime with some type of disability. These disabilities can wreak havoc on family members and loved ones. With the right facility, people with traumatic brain injuries can continue their lives while getting the necessary care and family members and loved ones can also continue their lives.

Justification

An ethical society must provide care for citizens with traumatic brain injuries. Right now, there are not enough living facilities in North Dakota to house them. They are put into ill-fitting residences until better ones open up. I propose to create an additional living facility in North Dakota that would assist victims of traumatic brain injury.

User/Client Description

People with traumatic brain injuries (TBI) will be the primary users of this facility. It is a home for them, a place where their needs and pleasures come first. Some of the other users will include family, staff, and other support people. The staff will have their own quarters; an area for preparation of daily activities, such as eating and health care. The State of North Dakota will also be a client. They will have a direct association with the facility concerning the wellbeing of its clients.

The TBI victims will live there 24 hours a day and will need some staff during that time. There are many special individual needs and the staff will be on shifts to cover every hour of the day. Peak usage will be during the day. The TBI will not only live there, but work there if they are not independent enough to find outside work. The staff will need to give support for the work areas during the day. Parking requirements will include an above average amount of handicapped parking spaces. These will be used for various shuttle services to get the clients out into the community as much as possible.

Major Project Elements

The housing facility will include as many "normal" elements as possible to avoid seeming institutional. The clients should feel like they have a home, not a cell. However, many of the clients will need to have someone around for help, so the staff will have a separate area for them to work. Some of the major elements include:

- Main Entrance
- Living Areas
  - Assisted living units
  - Accessible bathroom
  - Kitchen
- Support Spaces
  - Administrative area
  - Kitchen/Dining room
  - Great room
  - Limited medical facilities
  - Vocational rooms
  - Recreation room

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Users/Clients

Users/Clients

About Traumatic Brain Injuries

Definition

Traumatic brain injury (TBI) is any injury to the brain caused by trauma to the head. If there is trauma to the brain but the skull is not broken, the TBI is known as a closed head injury. This could occur, for example, if a person in an automobile accident hits his head on the steering wheel but doesn't have a skull fracture. If an object such as a bullet penetrates the skull and injures the brain, the TBI is known as a penetrating head injury.

Symptoms

Symptoms of mild TBI include headache, confusion, light-headedness, dizziness, blurred vision or tired eyes, ringing in the ears, bad taste in the mouth, fatigue, a change in sleep patterns, mood changes, and trouble with memory, concentration, attention, or thinking. The injury may or may not result in a brief period of unconsciousness.

Symptoms of mild to moderate TBI may be similar to symptoms of mild TBI, but they may also include a headache that gets worse or does not go away, repeated vomiting or nausea, convulsions or seizures, inability to awaken from sleep, dilation of one or both pupils of the eyes, slurred speech, weakness or numbness in the arms or legs, loss of coordination, increased confusion, restlessness, or agitation.

Causes

Half of all TBIs are due to accidents involving automobiles, motorcycles, bicycles, and pedestrians. Motor vehicle accidents are the major cause of TBI in people under age 75. For those 75 and older, falls cause the majority of TBIs.

Approximately twenty percent of TBIs are due to violence, such as gunshots and child abuse. About three percent are due to sports injuries. Alcohol use is associated with half of all TBIs. Learn ways to prevent traumatic brain injuries.

Disabilities

"Cognition" describes the processes of thinking, reasoning, problem solving, information processing, and memory. Most patients with severe TBI, if they recover consciousness, suffer some cognitive disability. People with moderate to severe TBI have more problems with cognitive deficits than survivors with mild TBI, but a history of several mild TBIs (for example, a football player) may have a cumulative effect. Recovery from cognitive deficits is greatest within the first six months after the injury and is usually more gradual after that. Most improvements can be expected within two years of the injury.

The most common cognitive impairment among severely head-injured survivors is memory loss, characterized by some loss of older memories and the partial inability to retain new memories. Some of these patients may experience post-traumatic amnesia, which can involve the complete loss of memories either before or after the injury.

Many survivors with even mild to moderate head injuries who experience cognitive deficits become easily confused or distracted and have problems with concentration and attention.

Many individuals with a mild to moderate TBI also have problems with higher level, so-called "executive" functions, such as planning, organizing, abstract reasoning, problem solving, and making judgments. This disability may make it difficult to return to the same job or school setting the individual was in before the injury.

Language and communication are frequent problems for TBI survivors. Some individuals have trouble recalling words and speaking or writing in complete sentences (called non-fluent aphasia). They may speak in broken phrases and pause frequently. They are usually aware of what is happening and may become extremely frustrated.

Users/Clients

Other survivors may speak in complete sentences and use correct grammar but for the listener the speech is pure gibberish, full of invented or meaningless words (called fluent aphasia). TBI survivors with this problem are often unaware that they make little sense and become angry with others for not understanding them. Other survivors can think of the appropriate language but cannot easily speak the words because they are unable to use the muscles needed to form the words and produce the sounds (called dysarthria). Speech is slow, slurred, and garbled.

Many TBI survivors have problems with one of the five senses, especially vision. They may not register what they are seeing or may be slow to recognize objects. Some individuals develop tinnitus, a ringing or roaring in the ears. Others may develop a persistent bitter taste in the mouth or complain of a constant foul smell. Some TBI survivors feel persistent skin tingling, itching, or pain. Although rare, these conditions are hard to treat.

TBI survivors often have difficulty with hand-eye coordination. Because of this, they may be prone to bumping into or dropping objects or may seem generally unsteady. They may have difficulty driving a car, working complex machinery, or playing sports.

Most TBI survivors have some emotional or behavioral problems. Family members often find that personality changes and behavioral problems are the most difficult disabilities to deal with. Emotional problems can include depression, apathy, anxiety, irritability, anger, paranoia, confusion, frustration, agitation, difficulty sleeping, and mood swings. Problem behaviors may include aggression and violence, impulsiveness, loss of inhibitions, acting out, being uncooperative, emotional outbursts, childish behavior, impaired self-control, impaired self awareness, inability to take responsibility or accept criticism, being concerned only with oneself, inappropriate sexual activity, and alcohol or drug abuse. Sometimes TBI survivors stop maturing emotionally, socially, or psychologically after the trauma, which is a particularly serious problem for children and young adults. Many TBI survivors who show psychiatric or behavioral problems can be helped with medication and psychotherapy.

Long-Term Problems

AD is a degenerative disease in which the individual suffers progressive loss of memory and other cognitive abilities. Recent research suggests an association between head injury in early adulthood and the development of AD later in life; the more severe the head injury, the greater the risk of developing AD. Some evidence indicates that a head injury may interact with other factors to trigger the disease and may hasten the onset of the disease in individuals already at risk.

Parkinson's disease may develop years after TBI if the part of the brain called the basal ganglia was injured. Symptoms of Parkinson's disease include tremors, rigidity or stiffness, slow movement or inability to move, a shuffling walk, and stooped posture. Despite many scientific advances in recent years, no cure has yet been discovered and the disease progresses in severity.
Other movement disorders that may develop after TBI include tremor, uncoordinated muscle movements, and sudden contractions of muscles.

Information from www.tbirecoverycenter.org

Site

The site is located on the Northwest corner of 43rd and Ottawa in northern Bismarck, North Dakota. It is in a developing area, soon to be surrounded by residential houses. Being on the north side of 43rd, the Capital Area Transit (CAT), runs along the south side of the site. CAT is important for my project because many of the residents cannot drive, so this will help them be able to go grocery shopping, walk through the Gateway Mall, or even get a nearby job.

Just to the east of Ottawa is State Highway 83, which is also known as State Street in town. This is a major north-south axis through Bismarck.

The site is currently a large open rolling field. It had buildings on it, but they have all been demolished. There are new houses to the south of the site across 43rd, and some small older farm houses scattered to the east on the other side of Ottawa.

The emphasis of this project will be placed on the best way to accommodate people with traumatic brain injuries. This will include:

Blending the facility into the residential neighborhood.

-This will help them feel more like they belong to the community. It will help maintain property value of local residences.

Creating a home environment.

-Many people with traumatic brain injuries may have a few impairments, but they are not necessarily blind to what is around them. They deserve just as good of home as anyone else.

-They need an environment that is the least restrictive.

Creating a safe and accessible environment for all of the clients.

-Accessibility is a major concern, since many people with traumatic brain injuries use wheelchairs. Accommodations must also be made for emergencies, such as tornados and fires.

Providing the best environment for recovery and treatment.

They need an environment that promotes recovery, instead of inhibiting it.

Creating a low cost, low impact structure.

-By keeping costs down on the structure and upkeep, more funds can be allotted to the residents for care and recovery, and to provide the best staff available.

-By using as many local products as possible, I can not only save money, but also be more responsible to the earth.

Emphasis

Elements

Entrance Area

This area needs to be open and welcoming, not institutionalized. It will be where individuals and guests enter the houses.

Living room

This is where individuals can relax during the day. It should appear as "normal" as possible, while still being accessible to everyone. It should contain enough seating for everyone in the house.

Medicine Administration

There needs to be a secure place where medications are held and can be distributed from. It can be a room or a locked cabinet, as long as it is secure.

Staff Room

The staff room is where the staff can keep their files, and perhaps medication. It should have an area accessible to the individuals that live there, but also a place where they cannot see or get to for staff privacy. It needs to big large enough for tables and cabinets.

Staff Storage

This is where extras are kept. Things like board games, walkers, and equipment. It should not be accessible to the individuals that live there.

Kitchen

This area would serve as the kitchen to the whole house. It is where staff could help the individuals prepare their own meals. It should contain all the normal kitchen appliances.

Dining Room

This room should be large enough to accommodate all the residents of the house and staff members.

Bedrooms

There should be four units in each house. All of them should be universally designed. They should look like normal bedrooms, not institutional rooms.

Bathrooms

They need to be universally designed. There needs to be one bathroom for two rooms, plus a bathroom outside the rooms for general use, in each house.

Recreation/Vocational Rooms

These need to be multi-purpose rooms situated throughout the complex. They will serve as places for recreation and work. They should be able to accommodate movies, puzzles, board games, etc. They should be easily accessible from the houses.

Parking

Most of the individuals living here will not be able to drive, so minimal parking is required. The parking spaces that are there need to be handicap accessible though. They also must have access to the houses without any physical barriers.

Research

Before the design process is started, I need to research traumatic brain injuries and understand the full array of how it can affect people. I will also need to research accessible design. While not all people with TBI need wheelchairs or walkers, this is a necessary component in order to be able to accommodate everyone.

The other main focus of research needs to be flexibility in design. Since people with traumatic brain injuries can sometimes recover to a point where they don't need to live in a facility, resident turnover rate could be quite high. This facility needs to be able to feel like home to several different people, which needs it needs to adapt to them. Flexibility in design is also needed in the recreation/vocation rooms. They need to be able to accommodate several different activities in order to function properly.

By using the information that I've learned while also getting my Psychology degree, I intend to use the physical processes of the human senses to drive my design. Through sensation and perception, I plan on creating an environment that is not too overwhelming for people with traumatic brain injuries.

For my design methodology, I will employ architecture, sociology, and psychology features. In order to create the best possible living place for traumatic brain injury victims, I will combine all aspects of these and blend them together to produce a home-like environment that will contain all of the special needs of these people.

I will use mostly individual accounts and reference books to find out what aspects I need to utilize to create the least restrictive environment for them and keep them safe.

Methodology

Documentation

I will place all materials that I discover into a three ring bounder, sorted by type. There will be sections for codes, maps, case studies, etc. that will allow for timely retrieval when the information is needed.

Any information discovered electronically will be kept in a folder on my desktop and saved to a disk once a week. This will be a good safety measure in case my laptop crashes.

27 Aug.....1st draft of Thesis Statement of Intent due
02 Sept..... Thesis SOI returned
09 Sept.....Revised SOI due
04 Oct.....Interview at ND Developmental Center. Grafton, ND.
07 Oct.....Thesis Proposal due
14 Oct.....Return critic preference slips to main office
21 Oct.....Primary and Secondary Critics Announced
November.....Case Studies. Interviews.
24 Nov.....Draft Thesis Program due to Primary Critic
09 Dec.....Final Thesis Program due to Primary Critic
January..... Concepts and preliminary design
February..... Work out details of the design
March.....Finalize design
07-11 Mar.....Mid-semester Thesis reviews
April..... Work on presentation
25 Apr.....Thesis projects due at 4:30 in the Memorial Union Ballroom
26-27 Apr..... Annual Thesis Exhibit
28 Apr-05 May.....Final Thesis Reviews
12 May .....Final Thesis project due at 4:30 in the Dept. Office
13 May..... Commencement at 4pm at the Fargodome

Schedule

Experience

Second Year (2001-2002)

Instructor: Vince Hatlen

Projects:

Museum – using additive and subtractive properties to create shapes and environments.

Nativity Elementary School Library

Instructor: Philippe D'Anjou

Projects:

Place for Living

Ground Zero – WTC Redevelopment

Pedestrian bridge charrette – Lachine Canal, Canada

Third Year (2002-2003)

Instructor: Carol Prafke

Projects:

Ronald McDonald House – Fargo, ND

Material Investigation – Heavy timber

Implement dealership – Honda dealership in Fargo, ND

Instructor: Mohamed Elnahas

Projects:

Experimental Performing Arts Center – Chattanooga, TN

Masonry Competition – Bank. Fargo, ND

Fourth Year (2003-2004)

Instructor: Mark Barnhouse, Cindy Urness, Josh Walter

Projects:

Urban Renewal – Downtown Fargo, ND

Instructor: Don Faulkner

Projects:

Medium Housing Density – Moorhead, MN

Skyscraper – San Francisco

Kite – Design-Build exercise

Fifth Year (2004-2005)

Instructor: Vince Hatlen

Projects:

NDSU Downtown Addition – Fargo, ND

Primary Critic: Mohamed Elnahas

Projects:

Thesis – Bismarck, ND

Entrance

Function:
To greet and welcome individuals and guests into the house. Also a place to store coats, shoes, and other outside accessories.

Area: 100 sq. ft.

Electrical:
Outlets

Mechanical:
Heating
Air Conditioning

Lighting:
Warm, welcome lighting

Materials:
Gypsum Board
Tile Flooring

Remarks:
Needs to have closet space.

Function:
To serve as a meeting place for people. Can be used for relaxing or entertainment purposes.

Area: 500 sq. ft.

Electrical:
Outlets
Telephone

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm Incandescent
Task Lighting

Materials:
Gypsum Board
Carpet flooring

Remarks:
Should have enough seating for everyone in the unit. Everyone should have access to television.

Living room

Meds Admin.

Function:
A place to store and administer medications to individuals.

Area: 10 sq. ft.

Electrical:
Outlet

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Task lighting

Materials:
Gypsum Board
Carpet flooring

Remarks:
Needs to be able to be locked. Can be located in staff area.

Function:
A place for staff members to work. It should contain a place for individuals' files.

Area: 300-500 sq. ft.

Electrical:
Outlets
Audio
Telephone

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent
Task Lighting

Materials:
Gypsum Board
Carpet Flooring

Remarks:
May also contain storage and medicine administration. Some parts of it need to be visually private from living area.

Staff Room

Staff Storage

Function:
To store extras such as board games, walkers, and other equipment.

Area: 100 sq. ft.

Electrical:
Outlets

Mechanical:
Ventilation

Lighting:
Cool incandescent

Materials:
Gypsum Board
Carpet flooring

Remarks:
Should be accessible only to staff. Can be located in staff room.

Function:
A place for food preparation and storage.

Area: 150 sq. ft.

Electrical:
Outlets
Telephone

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent
Task lighting

Materials:
Gypsum Board
Tile Flooring

Remarks:
Needs large appliances to accomodate everyone. Should have an island or peninsula to allow more people to work in it.

Kitchen

Dining room

Function:
A place for individuals to eat. Table space can also be used for activities.

Area: 300 sq. ft.

Electrical:
Outlets

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent

Materials:
Gypsum Board
Tile Flooring

Remarks:
Table needs to be able to accommodate all residents and guests.

Function:
To serve as the personalized living space for each resident.

Area: 200 sq. ft.

Electrical:
Outlets
Visual
Telephone

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent
Task lighting

Materials:
Gypsum Board
Carpet flooring

Remarks:
Needs to have space for storage units. Should not look institutionalized.

Bedrooms

Bathrooms

Function:
Serves as either a bathroom to 1-2 residents, or as the main/guest bathroom.

Area: 150 sq. ft.

Electrical:
Outlets

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent
Warm fluorescent

Materials:
Gypsum Board
Tile Flooring

Remarks:
Should have enough storage space for each person.

Function:
For staff and guests to park their vehicles.

Area: Four spaces per house

Electrical:
Outlets

Mechanical:
Ventilation

Lighting:
Incandescent

Materials:
Gypsum Board
Concrete flooring

Remarks:
Some can be in street. Garage spaces can double as storage spaces. Should be accessible.

Parking

Rec. Building

Function:
Serve as multi-function rooms.

Area: 10,000 sq. ft.

Electrical:
Outlets
Visual
Audio
Telephone

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent

Materials:
Gypsum Board
Tile flooring
Carpet flooring

Remarks:
Needs to be very adaptable.
Should have high ceilings.

Function:
Serve as a multi-function building for working, classes, tests, etc.

Area:6,000 sq. ft.

Electrical:
Outlets
Visual
Audio
Telephone

Mechanical:
Heating
Air Conditioning
Ventilation

Lighting:
Warm incandescent

Materials:
Gypsum Board
Tile flooring
Carpet flooring

Remarks:
Needs to be very adaptable. Should also be able to serve as a recreation building if needed.

Voc. Building

Spatial Req.

Entrance Area..... 100 sq. ft.

Living Room..... 1,000 sq. ft.

Medicine Administration..... 10 sq. ft.

Staff Room..... 300 sq. ft.

Staff Storage..... 200 sq. ft.

Kitchen..... 100 sq. ft.

Dining Room..... 500 sq. ft.

Bedrooms..... 200 sq. ft.

Bathrooms..... 150 sq. ft.

Recreation/Vocational Rooms..... 1,000 sq. ft.

Parking..... Four spaces for each house.

Since this development will service people with a broad range of traumatic brain injuries, the staff hours will have to be based upon the individual residents. People with severe injuries will need care 24 hours a day, 7 days a week. Residents with mild injuries may only need help during certain times, such as leaving or returning from work, bathing, medication administration, or preparing meals.

Because some of the areas may not be staffed 24 hours a day, it is necessary for the staff area to be able to be closed and locked.

Staff Hours

History

The Site

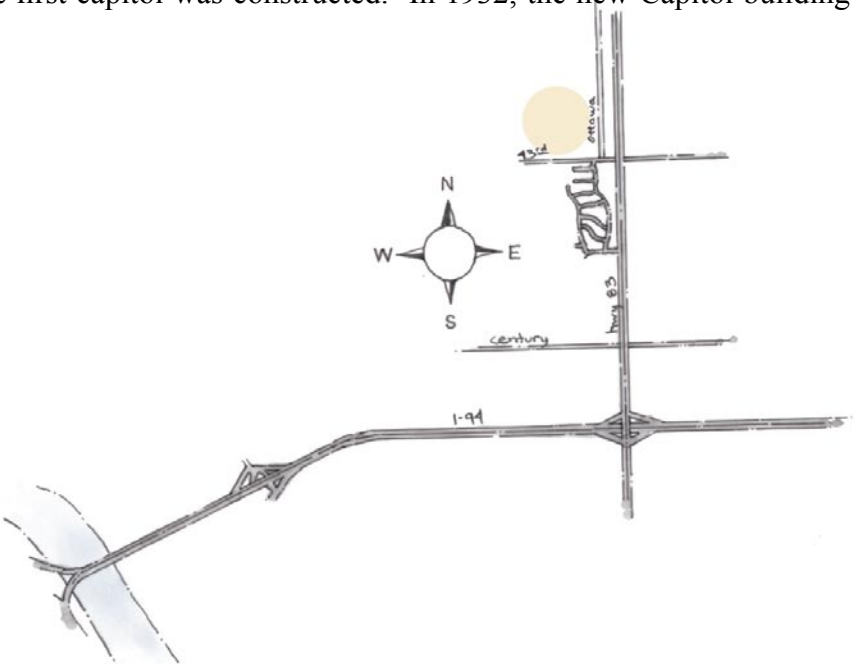
The site is on the northwest corner of 43rd and Ottawa, in northeastern Bismarck, North Dakota. This site is situated along the Bismarck bus like (CAT), so that the more independent clients will be able to get into town for shopping, working, and recreation. It is on the northern edge of an expanding residential area. It will fit into any future residential plans for the area without sticking out as an assisted living facility.

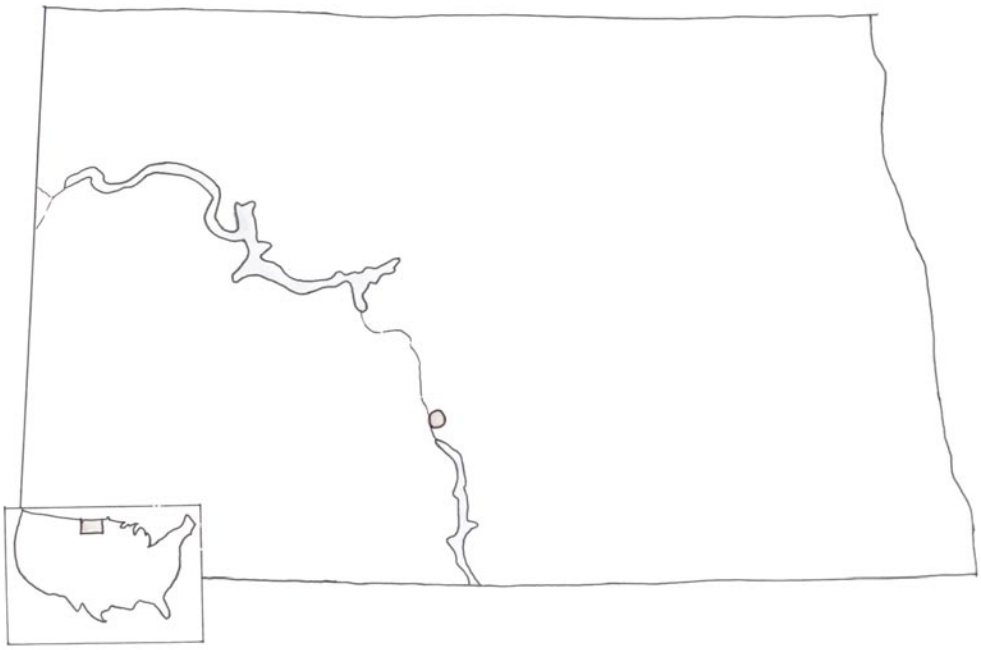
Economic Base and Economics

With taxable sales and purchases on a rise, Bismarck continues to grow. Since 1994, Bismarck's population has gone steadily upwards from 52,592 to 57, 530 in 2003. The median age is mid-thirties, and the unemployment rate is fairly steady around 3%, sometimes dipping down to around 2%. The average per capita income has also continued to rise, from just over $33,000 in 1994 to over $43,000 in 2003.

History

In 1804 and 1806, Lewis and Clark entered North Dakota and set up a temporary post called Fort Mandan. Bismarck's first paper was published July 11, 1873, and in 1883, the territory capital was moved from Yankton to Bismarck. This is when the first capitol was constructed. In 1932, the new Capitol building was dedicated.





Landmarks

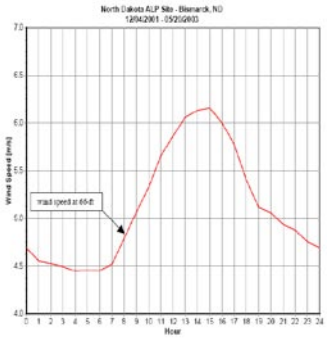
The major landmark in Bismarck is the Capitol building at 241' 8" tall. Some other landmarks include the North Dakota Heritage Center Museum, the North Dakota Residence, and several statues and memorials.

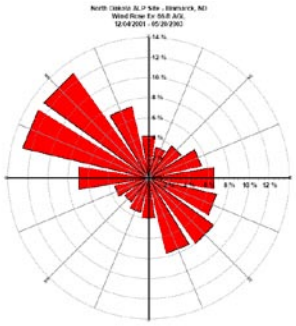
Topography

Currently, the site area and to the north and west is rolling agricultural hills. There is a small patch of trees directly to the west of the site. The rest of the site is open.

Wind

As the wind rose shows, the prevailing wind is generally from the WNW and NW. It is strongest around 3pm.





Analysis

Temperature

The maximum normal temperatures reach about 85 degrees Fahrenheit in the summer and 20 in the winter. The minimum normal temperatures reach about 56 degrees in the summer and -1 in the winter.

Soil

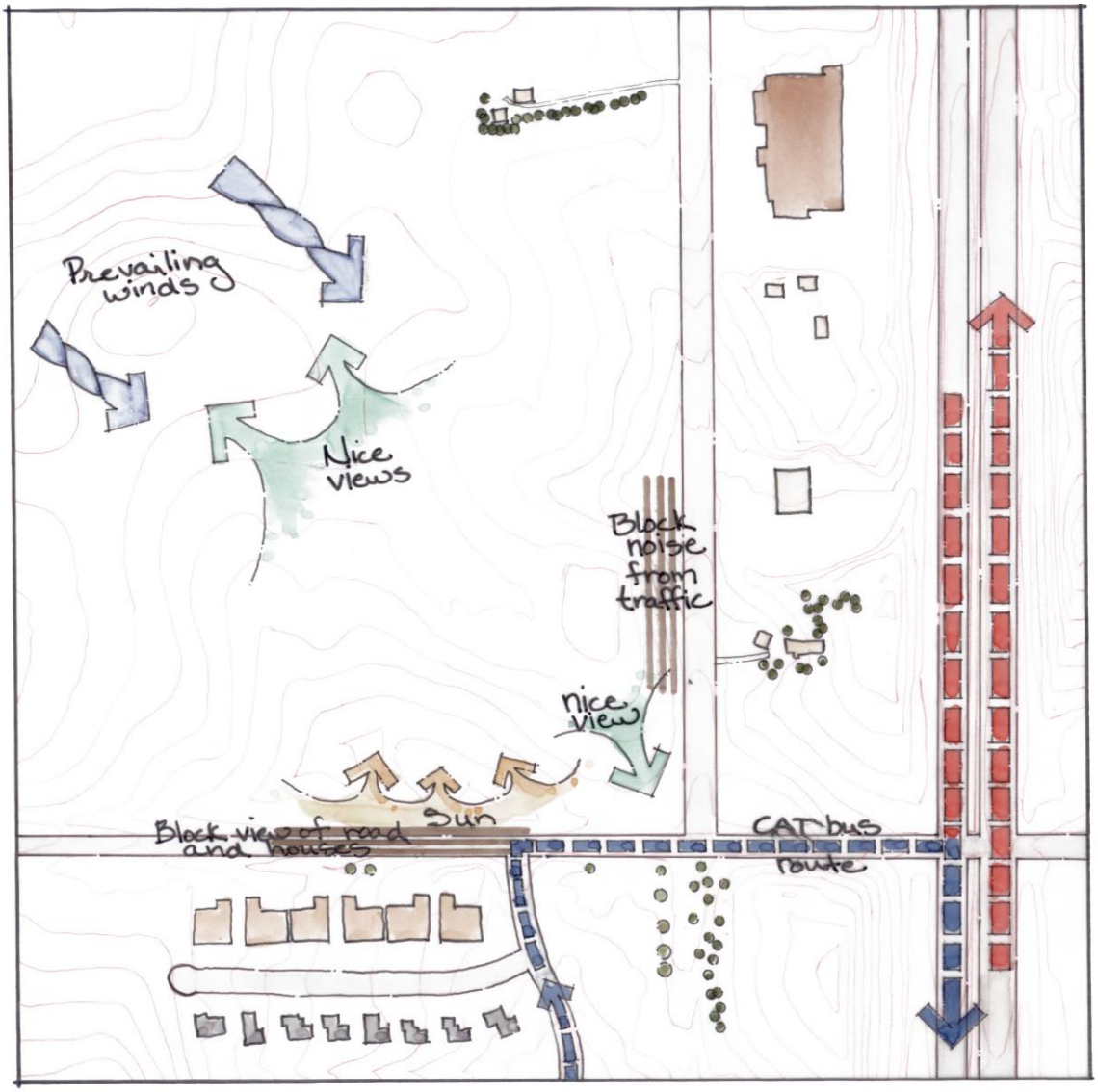
The soil on the site is Williams loam. It consists of deep and moderately deep, well-drained, sloping and rolling soils. These soils have a surface layer of silt loam or loam that is more than 18 percent clay. The subsoil ranges from silt loam to clay. The slope gradient is from 6 to 9 percent. Available water capacity is moderate to high. Permeability is moderate or moderately slow. Fertility is medium to high, and the organic-matter content is moderate or high. These soils have a deep or moderately deep root zone and are readily permeable to roots, air, and moisture. They are easily tilled.

Transportation

The Capital Area Transit (CAT) bus system has a route that goes down 43rd right past Ottawa. It then goes down Highway 83, also known as State St., to the Gateway Mall on Century. This route also goes right by Dan's Supermarket. This will allow clients to go shopping and to work when they otherwise might not be able to if they can't drive.

Views

Views from the site include new residential to the south and agricultural to the north. However, the agricultural is becoming residential to accommodate Bismarck's growing population.


Prevailing winds
Nice views
Block noise from traffic
nice view
Sun
Block view of road and houses
CAT bus route

Analysis

Images

Pictures of the Site

Pictures from the Site

Images

Case Study

#1 No Shades of Gray

September 1997

Contemporary Long Term Care

- In 1997, on average, fewer than 11 in 100 residents in nursing homes are under 65, while over 73% are 75 or above.

- In 1990, the federal Medicaid Home and Community-Based Services waiver program expanded to allow states to redirect nursing home funds to home and community-based services.

- There are many things to consider when planning activities for all different ages: movies, food, work environments.

- It's hard for people who are going to be staying there long-term, because they live almost exclusively with people in their frailest, oldest years.

- Sometimes, like at the Rehabilitation Institution of Chicago, special precautions need to be taken to prevent visitors that could potentially be harmful.

- According to the Brain Injury Association, only about 5% of young people have adequate funding for long term care.

- Most young people wind up on Medicaid, and nursing facilities are their only option.

- Specialized facilities generally have long waiting lists, so chances are they'll end up in a home with a geriatric focus.

- "With the aid of personal care attendants… many younger residents might fare well at home, in independent apartments, or in small residential settings."

- Assisted Living Concepts out of Portland, Oregon is seeking out non-elderly clients.

Case Study

#2 Amsterdam House

August 1998

Contemporary Long Term Care

- 409 beds in 178,000 square feet.
- This building was upgraded and expanded while still operating.
- It uses a traditional two-story masonry base and borrows colors, materials, and details from surrounding buildings.
- It contains very selective materials and furnishings to create a very home-like ambiance.
- Furniture in the rooms is recessed into alcoves to provide a sense of spaciousness and more generous walking areas.
- Each floor is an individual, self-contained neighborhood.

Conclusions

- Borrowing surrounding details helps the building fit into its context and not appear like an assisted living facility.

- Creating individual neighborhoods in a larger setting makes the environments more personal and homey.

#1 NDDC

North Dakota Developmental Center

Grafton, North Dakota

October 4th, 2004

Hosted By:

Rick Blair, B.S.
Dr. Paul Kolstoe
Laurie Orvedal, M.S.

Current Conditions

They have long ramps to the basement for emergencies. There is not always enough room to get everyone in wheelchairs into elevators or down the stairs in time.

Their kitchens have an island, which is ideal for allowing more people to work and help prepare meals.

They have brackets along beams in the ceiling which can help them move individuals around by connecting to them.

They have 1.3 miles of underground tunnels. These tunnels connect every building on the campus.

They have curtains in the rooms for privacy.

Approximately 30% of their financing comes from the state, while around 70% comes from federal financing.

They have about two books per person to keep track of their personal files. These need to be kept in a secure location.

They have about 1 staff per 3 clients.

Suggestions

One of the biggest things stressed was storage space. Many individuals need to keep all of their belongings in their rooms because they do not have all the storage space one would normally have in a house. Along with standard dressers, cabinets and storage in the facia should be used for additional storage.

An outdoor patio would be a good idea to get people outside. This would help them engage in conversation with others and help them get fresh air.

Incorporate appropriate windows. Sometimes people can get out of control and windows that are easily breakable aren't good ideas.

Sidewalk and floor heaters were suggested for comfort. Sidewalk heaters would also serve a safety function in the winter. They would melt ice and snow and make it safer for individuals to get around outside without the threat of falling.

A hopper sink is useful for cleaning soiled sheets and clothing.

Workshops can be used for engaging individuals in learning environments. They help them learn important skills that can be used in other aspects of their lives.

Have one staff member for three individuals.

Make use of door alarms to ensure safety of all individuals.

#2 Open Door Center

Open Door Center

Hi Soaring Eagle Ranch

Valley City, North Dakota

November 16th, 2004

Hosted By:
Mary Simonson

Current Conditions

There is a close, not direct, living connection between the individual and his or her family.

They use the second floor for staff, since it isn't as accessible as the first floor.

They have a common hallway that is good for socialization.

Ten to twenty percent on the individuals move to their own facility.

Most individuals are on fairly intensive drugs.

Ques in the environment are helpful reminders of routine activities.

For work, the individuals help run a bookstore and assist in a workshop.

They volunteer at jobs such as setting tables for senior citizens, stocking the pantry, cleaning, organizing the library, and doing leisure time activities with seniors.

There is little to no security.

One staff per three individuals is okay, two per four individuals is better.

Suggestions

Make available a place to smoke, as many patients do smoke.

Make use of multiple social rooms, since movies can be distracting to people working on a puzzle or playing pool.

Find local volunteer jobs for them to do.

Most clinical tests should be done generically at a clinic and do not require a special room at the facility.

Have accessible showers with seating available.

Use fencing for privacy, not to keep people in.

She encouraged a place for pets.

Process

Pictures around the site

Houses around Bismarck

Process

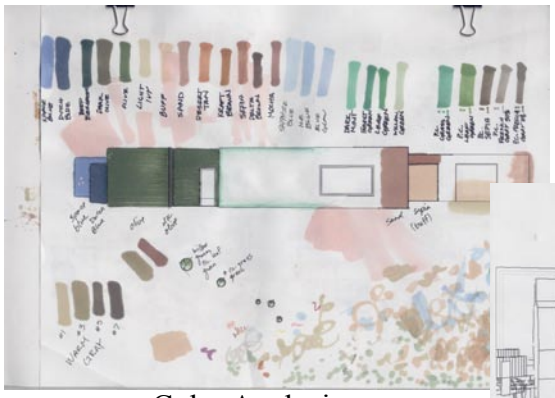
Process

Site Design

I started my site design by viewing aerial pictures of my site. Then I drove around the site and surrounding areas and took notes on the pictures.

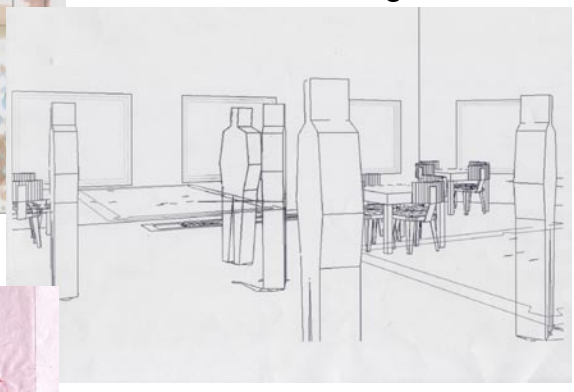
Using Photoshop, I tried several different site layouts, printed them out, and made lists of pros and cons for each design.

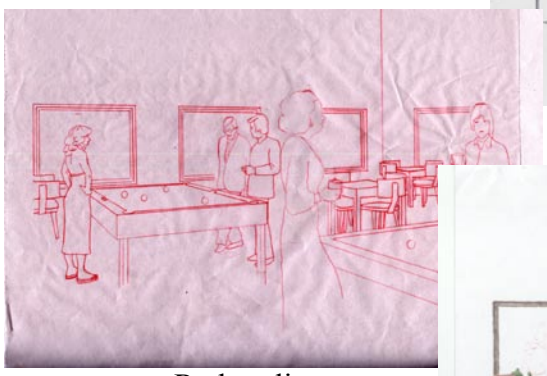
After receiving topography maps, I used the contour lines in the layout of my site. Then I laid out approximately where each house would be located, along with the recreation and vocational buildings.



Color Analysis

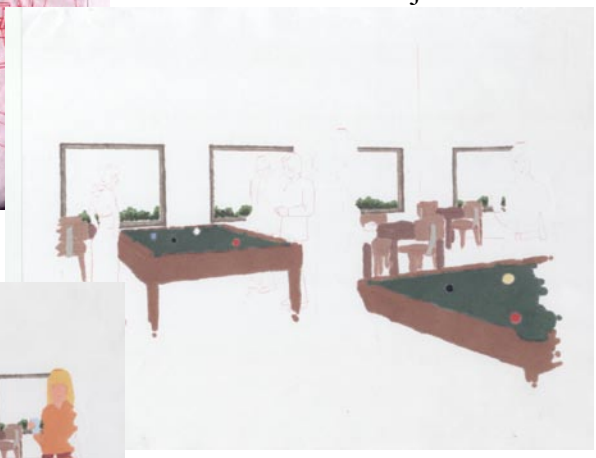
Pre-rendering





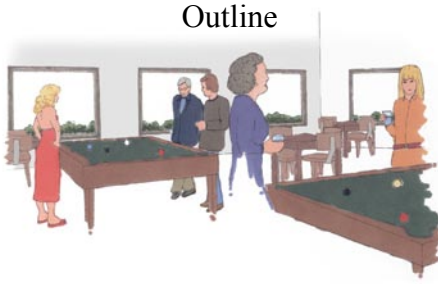
Red outline

Color objects



Color people

Outline

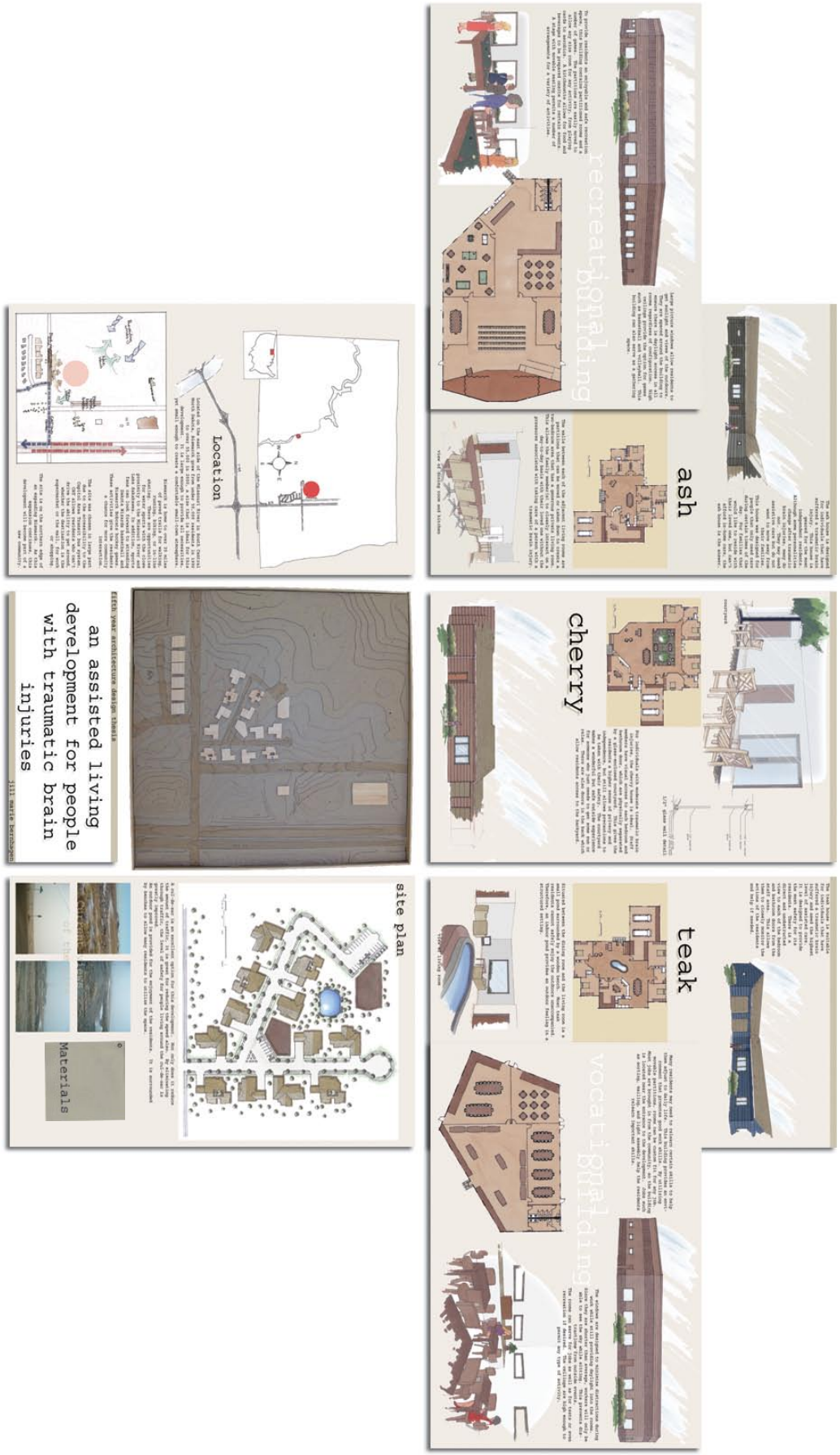


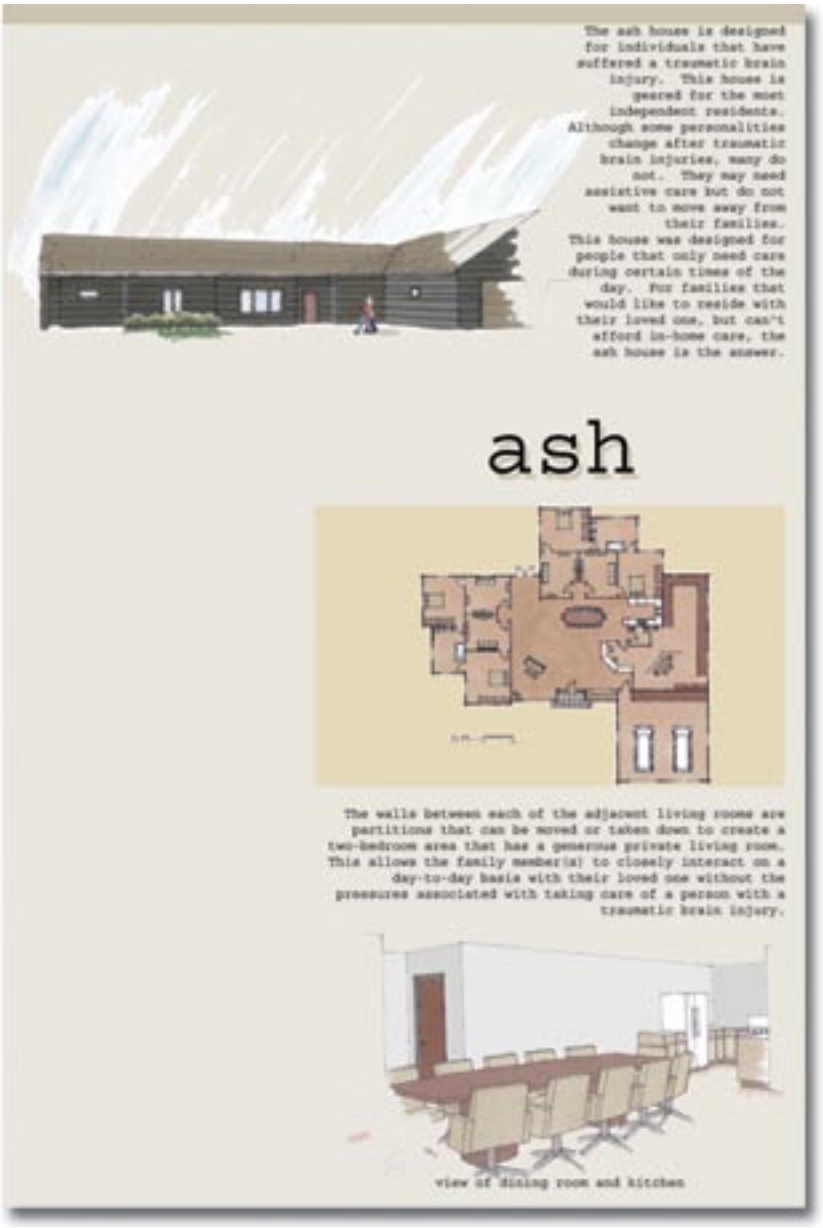
Rendering Process

Process

Solution

Layout



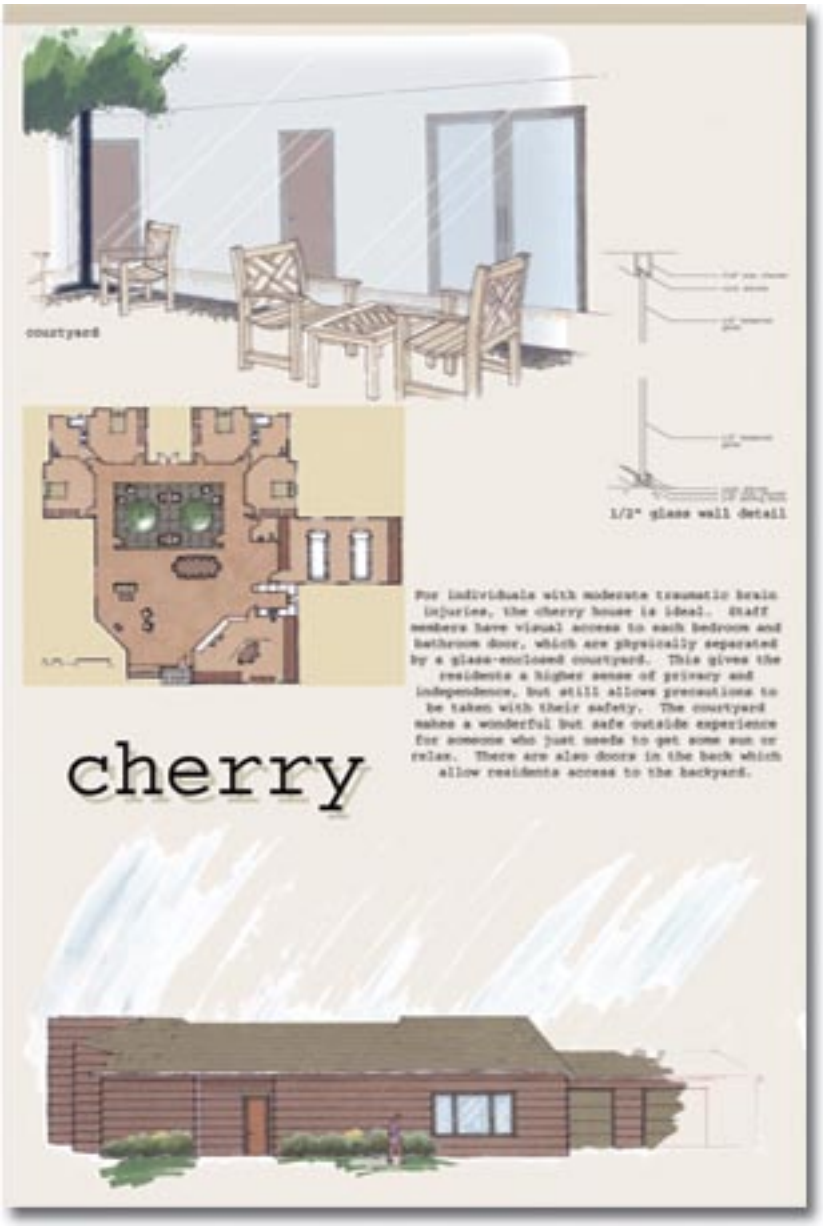


Ash House

Solution

Solution

Cherry House

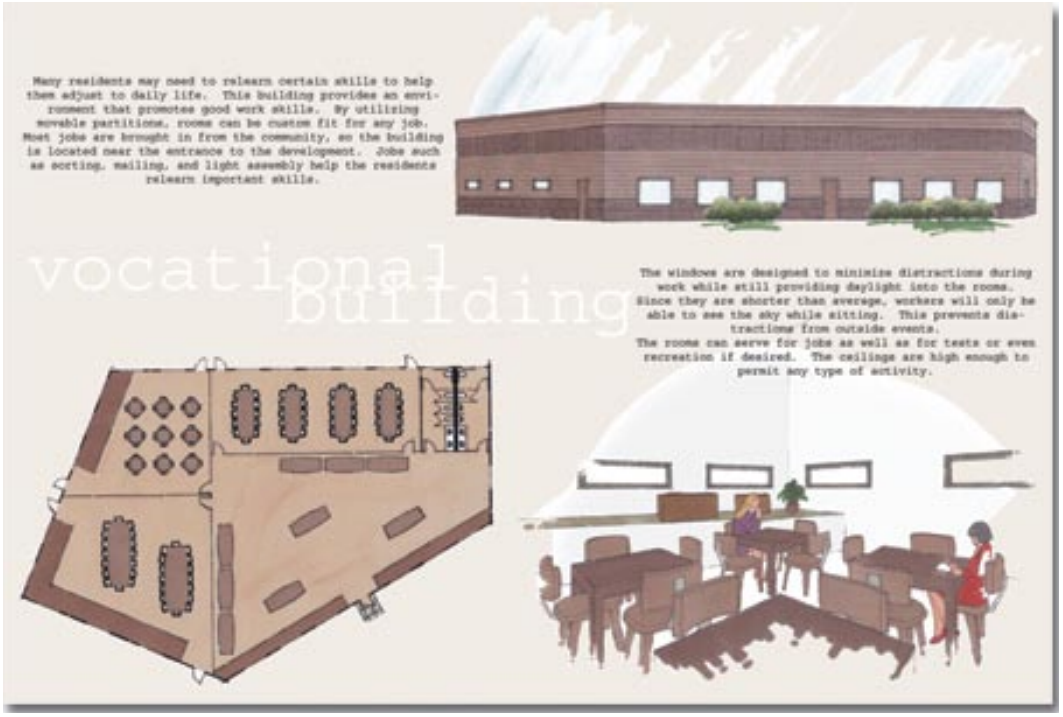


Teak House

Solution

Solution

Recreational Building



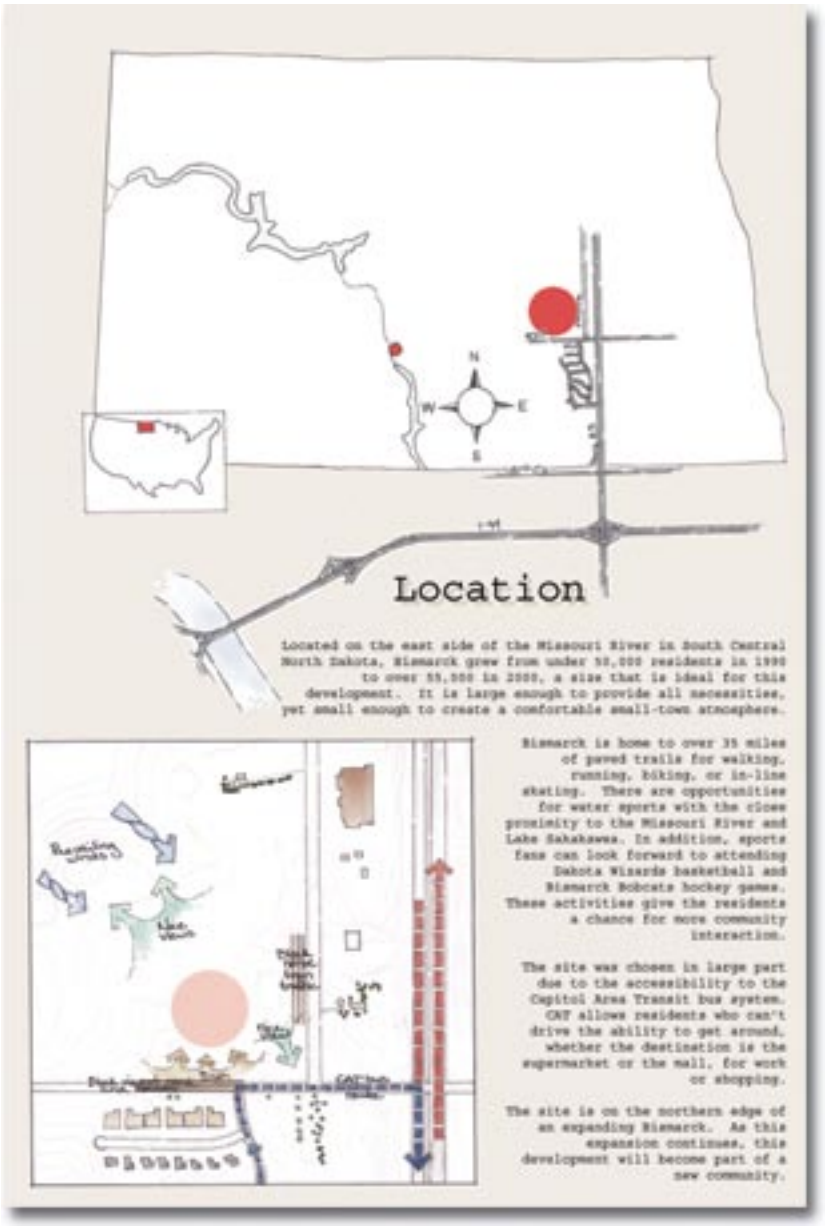
Vocational Building

Design Thesis

Solution

Solution

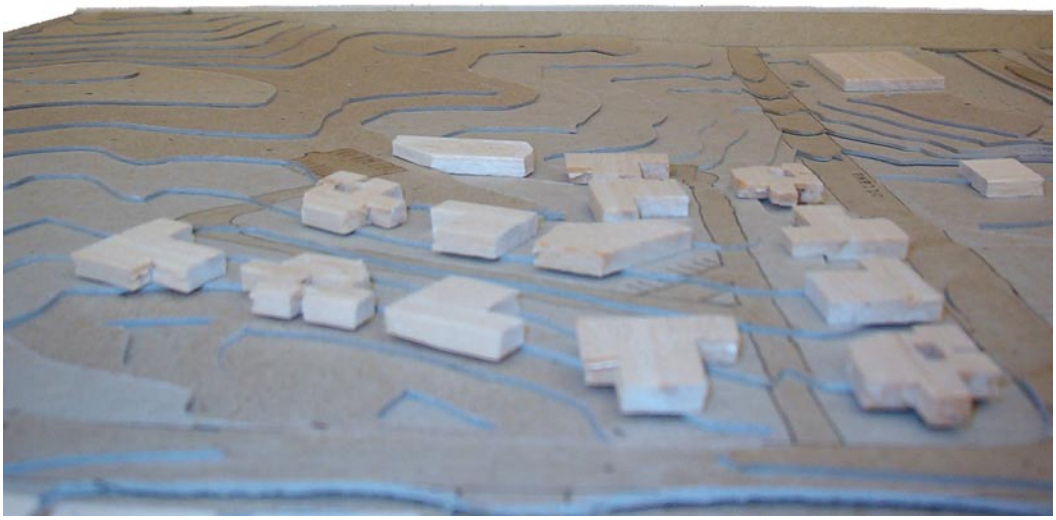
Site



Site

Solution

Model



Design Thesis

Model

Notes

Materials

The houses will be typical wood-frame construction. They will have gyp. board and siding to blend in with many of the houses already in Bismarck.

Storage

Throughout all of the houses, the garages can be used for storage when needed. This is done because many of the residents will not be life-long residents, and will need somewhere to store their belongings.

Colors

The color scheme is kept very natural so as not to excite the residents. All of the houses blend well with each other and the surrounding environment.

Partitions

Partitions will be used in both the recreational and vocational buildings, along with the teak ash house. In the ash house it will be used inbetween the personal livingrooms. This is done so that if family members would like to live with the resident, they can take down that partition and have a small, two-bedroom area with a decent sized living room. In the recreational and vocational buildings, it is a must to have the partitions. They allow the spaces to be modified for any purpose desired.

Staff Hours

The number of staff members per house will really depend on the individual residents of the house. Sometimes residents may only need help during certain times of the day. Below is an example of what the staff schedule might look like:

	Ash	Cherry	Teak
12am	0	0	2
6am	1	1	2
5pm	1	2	2
8pm	0	1	2
10pm	0	0	2

This schedule allows for residents of the teak house to have staff there in the morning when they're getting ready and through the end of the day after they're done eating. The Cherry house has staff there in the morning also, but they would have more help in the evening, and they could stay until after the residents go to bed. Members of the Teak house should always have two staff members present. This allows for an extra in case extra help is needed in the house, or if help is needed in an adjacent house while it is unstaffed.

Notes

ADA

Appendix A

ACCESS LAWS AND REGULATIONS

Designing a barrier-free environment may be easier than understanding the laws and regulations that attempt to define what is needed to ensure accessibility for persons with disabilities. Four federal laws, two federal standards, a consensus standard, model codes, state codes, and even local codes and ordinances can all have jurisdiction, depending upon the type and location of a project.

AMERICANS WITH DISABILITIES ACT OF 1990 (ADA)

The ADA makes it a civil rights violation to fail to provide barrier-free access in state and local government projects and in commercial facilities and public accommodations by private entities. The ADA has five titles or sections that prohibit discrimination on the basis of disability in employment, public services (including transportation), state and local governments, public accommodations and commercial facilities operated by private entities, and telecommunications. Title II of the ADA applies to state and local government (public) entities, while title III applies to public accommodations and commercial facilities. The Department of Justice's regulations under titles II and III and the Department of Transportation's (DOT) regulations under title II establish standards for accessible design that must be followed in new construction and alteration projects. The title III standards for accessible design that apply to public accommodations and commercial facilities are the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG). Under title II, state and local governments must use DOT's regulations, which include ADAAG with Section 10—Transportation Facilities. For other facilities, entities may choose between ADAAG (without the elevator exemption) and the Uniform Federal Accessibility Standards (UFAS) for facilities.

FAIR HOUSING AMENDMENTS ACT OF 1988 (FHAA)

Multifamily projects consisting of four or more dwelling units must be accessible in common areas and adaptable in dwelling units based on Fair Housing Accessibility Guidelines (FHAG).

THE ARCHITECTURAL BARRIERS ACT OF 1968 (ABA)

All facilities that are designed, constructed, altered, or leased by or on behalf of the government and certain other facilities that are financed with federal funds must comply with the Architectural Barriers Act of 1968. Under the ABA, four federal agencies set the standards: the Department of Housing and Urban Development sets requirements for housing; Department of Defense sets requirements for defense facilities; U.S. Postal Service sets requirements for postal facilities; and the General Services Administration (GSA) sets requirements for all other facilities that fall under the act. Since 1984 the standard used by the four agencies for design, construction, and alterations has been UFAS.

THE REHABILITATION ACT OF 1973 (SECTION 504)

Programs and activities that receive federal financial assistance may not discriminate on the basis of disability in providing benefits and services. New construction and alteration projects must be accessible and comply with standards referenced by funding agencies in their section 504 regulations. Under almost all section 504 regulations, UFAS is the operant standard. Entities that do not comply face the loss of federal funds.

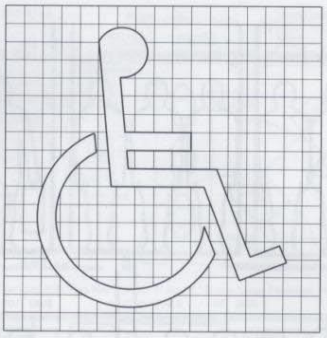
ACCESSIBILITY GUIDELINES FOR BUILDINGS AND FACILITIES (ADAAG)

Standards for accessible design that apply to new construction and alteration projects (including historic properties) of public accommodations and commercial facilities under title III of the ADA. Under title II, ADAAG is the standard for design, construction, and alteration of transportation facilities of state and local government entities. State and local governments may choose to use ADAAG (without the elevator exemption) or UFAS for other buildings and facilities. ADAAG will be modified and adopted to cover all title II facilities (see Resources, below).

UNIFORM FEDERAL ACCESSIBILITY STANDARDS (UFAS)

The accessibility standard that applies to new construction and alteration of all federal buildings, most federally funded projects, and those of most programs and activities that receive federal financial assistance. UFAS may also be used by state and local governments under the ADA for facilities other than transit facilities which must follow ADAAG (see Resources, below).

John A. Raeber, AIA, FCSI; San Francisco, California
Ruth Hall Lusher; Washington, D.C.



INTERNATIONAL SYMBOL OF ACCESSIBILITY

AMERICAN NATIONAL STANDARD INSTITUTE (ANSI)

ANSI A117.1 has been a national consensus standard providing guidance for barrier-free design for over thirty years. The ADAAG, FHAA guidelines, UFAS, and model codes access requirements, although they contain differences, are all based on ANSI A117 in one way or another.

MODEL CODES

(Uniform, National, and Standard)

When a state or local government adopts a model code, it becomes an applicable regulation. At this writing all three model codes reference ANSI A117.1-1986 as the basis for technical conformance but include their own scoping requirements.

STATE CODES

During the last twenty years more than a dozen states have developed their own special regulations defining what constitutes a barrier-free environment.

LOCAL CODES AND ORDINANCES

Although most local jurisdictions have adopted one of the model codes, some larger jurisdictions have either adopted special ordinances or provided written interpretations relating to barrier-free design.

DESIGNING FOR PEOPLE WITH DISABILITIES

Passage of the Americans with Disabilities Act emphasizes the importance of design professionals understanding the needs of persons with disabilities. The act's full effect on design will not be known for many years as a variety of needs are identified and standards are developed.

Understanding the specific needs of persons with mobility impairments, both ambulatory and nonambulatory, has been growing. The needs of persons with visual and hearing impairments have also been given special attention.

Under the definition of persons with disabilities, the ADA includes those who are physically and mentally impaired and those regarded or treated as physically or mentally impaired.

At present there are no standards for designing an environment for persons with mental disabilities. And, though the disabilities that develop with age often fall into one of the other categories, the specific needs of elderly persons may prove to be more comprehensive than presently suggested. New understanding will lead to new regulations. Creating a barrier-free environment will require a continuing educational process for the design professional.

Further, the ADA regulations allow for "equivalent facilitation": the use of alternative designs and technology as long as equivalent or greater accessibility is provided. With understanding of the basis for requirements in the standards, architects will be able to take advantage of this provision.

REGULATION APPLICABILITY EXAMPLES

The ADA, as well as regulations issued under the act, build on the requirements that have applied to federal facilities and federally assisted programs and activities for many years. The ADA does not replace existing federal, state, or local accessibility requirements. It does, however, bring under coverage of federal accessibility standards state and local government entities, some of which were not previously covered by Section 504, as well as privately owned public accommodations and commercial facilities. To determine whether a privately owned facility houses a place of public accommodation or is considered a commercial facility, use the following list.

PUBLIC ACCOMMODATIONS

- Places of lodging
- Establishments serving food or drink
- Places of exhibition or entertainment
- Places of public gathering
- Sales or rental establishments
- Service establishments
- Stations used for specified public transportation
- Places of public display or collection
- Places of recreation
- Places of education
- Social service center establishments
- Places of exercise or recreation

COMMERCIAL FACILITIES

- Facilities whose operations will affect commerce such as factories, warehouses, industrial facilities, and office buildings.

Where more than one set of regulations applies, the most restrictive must be used unless otherwise stipulated in one of the regulations.

1. U.S. POST OFFICE IN A SHOPPING CENTER: When a government agency leases space, the UFAS is used in conjunction with other applicable laws and regulations. In this case, any alterations would be subject to state and local regulations and ADA, as well as UFAS.
2. STATE LIBRARY: The ADA allows use of either the ADAAG without the elevator exemption or the UFAS for determining compliance. In addition, any state regulations would apply.
3. SHOPPING CENTER: In addition to applicable state and local regulations, ADA's ADAAG would apply.
4. CONDOMINIUMS: In addition to applicable state and local regulations, FHAA's FHAG applies where four or more dwelling units are built.
5. HOTEL: In addition to applicable state and local regulations, the ADAAG applies. If a portion of the hotel is used as long-term lodging such as a residential hotel, the FHAG would apply to that portion.
6. MULTI-USE FACILITY: Each part of the facility must comply with the regulations applicable to that particular part. Common use facilities have to comply with the most restrictive applicable regulations.

PROJECT CONSIDERATIONS

It is appropriate to begin each project with the assumption that everything being designed should be barrier free. Work areas must be on an accessible path, and maneuvering space and clearances must be provided at doors to work areas. Workstations, however, are not required to be usable by a person with a disability unless they are assigned to such persons. Dwelling units within complexes covered by the FHAA require common areas to be fully accessible, but the dwelling units themselves are only required to be adaptable for accessibility.

FEDERAL PROJECTS

Federal projects must comply with UFAS. UFAS scoping and occupancy classifications, together with the technical provisions, define what areas are required to be accessible.

STATE AND LOCAL GOVERNMENT PROJECTS

Under ADA new construction, additions, and alterations require barrier-free design. For transportation facilities, public entities must follow DOT's rule which includes ADAAG with Section 10—Transportation Facilities. For other facilities, design may be based on either the UFAS or ADAAG, although the elevator exception in ADAAG does not apply.

Although many provisions in ADAAG and UFAS are the same or similar, there are major differences, particularly in the alteration provisions of each. The Justice Department's ADA Technical Assistance Manual for title II provides an overview of the differences (see Resources, below).

Since many facility types such as public housing and prisons are not covered in ADAAG 1991, public entities are advised to use UFAS provisions for such facilities.

PRIVATE ENTITY PROJECTS

The ADA has different requirements for commercial facilities and public accommodations. New construction and alteration projects for both public accommodations and commercial facilities must comply with accessibility requirements in the Justice Department's title III rule, which incorporates ADAAG. Only public accommodations must comply with the requirements for barrier removal.

1. New construction: Two exemptions allow certain smaller buildings to not provide an elevator. There is also an exception for structural impracticability based on site constraints. Neither exception is intended to have broad application, and access is required to the extent possible. Thus a two-story building without an elevator would still require accessible toilet compartments with grab bars in the second floor bathrooms.
2. Additions and alterations: Modifications to existing facilities are required to be barrier free. Where a primary functional area is modified, the path of travel, which includes toilet rooms, drinking fountains, and telephones servicing the altered area, is also required to be made barrier free. The costs for the path of travel work can be limited to 20% of the original project cost.
3. Barrier removal: The ADA requires removal of existing barriers in public accommodations, where readily achievable, even where no alterations are planned. "Readily achievable" means able to be carried out without much difficulty or expense.

Projects undertaken strictly for barrier removal are not considered alterations, and path-of-travel requirements do not apply. Such modifications must comply with the technical provisions for alterations contained in ADAAG if compliance is readily achievable.

HISTORIC PRESERVATION PROJECTS

Alteration of existing historically significant public and private facilities requires barrier-free access. However, where barrier-free design would threaten the historic significance of the facility, alternative methods of providing access are permitted and are in some cases defined in the title II and title III regulations of ADAAG and UFAS.

1. Barrier removal: Privately owned public accommodations of historic significance must comply with requirements for removal of existing barriers.
2. Public entities, state and local governments, and federal assisted programs must comply with program accessibility requirements.

RESIDENTIAL PROJECTS

New complexes with four or more dwelling units are required to have common areas fully accessible and dwelling units on the ground floor and on accessible levels adaptable for accessibility (capable of being easily modified).

1. In complexes without elevators, site impracticability due to terrain or unusual characteristics may allow the number of adaptable units to be limited to 20% of the total units provided.
2. Townhouses in buildings without elevators are exempt from the FHAA adaptability requirements; however, in buildings with elevators, the dwelling unit spaces on the level with an elevator would have to comply.
3. Residential buildings, including single-family units, that include public accommodations such as a rental office are required to comply with ADAAG in areas used as a public accommodation, including the building entrance and sanitary facilities made available to customers or clients.
4. New public housing projects must also comply with the requirement for 5% fully accessible units and other requirements contained in UFAS and in regulations issued by the Department of Housing and Urban Development under Section 504 (see Resources, below).

CONSIDERATIONS FOR VISUALLY IMPAIRED PERSONS

1. Protruding objects along circulation paths.
   a. Objects in path: keep lower than 27 in. for cane detectability
   b. Protrusions: maximum 4 in. if bottom edge is over 27 in.
2. Minimum height clearance: 80 in.
3. Emergency signals: both audible and visual
4. Raised character and Braille signs
5. Visual signage requirements
6. Audible elevator signals

CONSIDERATIONS FOR HEARING IMPAIRED PERSONS

1. Assistive listening systems in assembly areas with fixed seating
2. Visual alarms in public and common use area
3. Telephone requirements (see below)
4. Visual notification devices required in transient housing, hotels, and motels
5. Hall lanterns and other visual elevator indicators

ACCESSIBLE ROUTE

An accessible route must connect an accessible building entrance to public transportation stops, accessible parking, accessible passenger loading zones, and public streets and sidewalks. An accessible route must connect the accessible building entrance to rooms, spaces, and accessible elements in the facility.

PLATFORM (WHEELCHAIR) LIFTS

ADA limits use of lifts for access in new construction to very specific applications to achieve access goals and in alterations and additions projects where no other method of access is available.

DRINKING FOUNTAINS

Both high and low fountains are required, no fewer than 50% wheelchair accessible; others are to be located at a standard height convenient to those with difficulty stooping. Hi-low fountains are required when only one fountain is provided.

TELEPHONES

Requirements are for public pay telephones, public closed circuit telephones (such as apartment entry phones and hotel house phones), and other public telephones.

VOLUME CONTROL TELEPHONES

Provide magnetic field receivers; volume control required for accessible telephones and for at least 25% of all other telephones.

TEXT TELEPHONES

One required where four or more public pay telephones are provided in a facility or on the exterior, where at least one is provided in interior location. Also required in specific facility types and areas (e.g., hospitals, convention centers, transit facilities).

ACCESSIBLE EXITS AND AREAS OF RESCUE ASSISTANCE

1. Accessible routes shall also serve as accessible means of egress.
2. Provide areas of rescue assistance in new buildings with occupiable levels above and below grade without exit directly to grade; except where buildings have a supervised automatic sprinkler system
3. Number per floor: same as required by applicable code for exits, typical minimum 2
4. Area of rescue assistance size: provide space for at least two wheelchairs
5. Stairway width: minimum 48 in. clear between handrails

ADDITIONAL PROVISIONS UNIQUE TO ADAAG:

1. Dressing rooms: One dressing room in each cluster for each type of use must be accessible, including bench and mirror.
2. Hotels, motels, and other transient housing: Roll-in/transfer showers must be provided in some wheelchair accessible rooms, and visual alarms, visual notification devices, and accommodations for TDD use by individuals with hearing impairments must also be provided.
3. Auditorium seating: In addition to accessible wheelchair seating, transfer seats with movable aisle armrests must be provided.
4. Automated teller machines: Must be accessible to persons with visual, hearing, and mobility impairments.
5. Special facility types: Detailed provisions are provided in special sections for restaurants and cafeterias, medical care facilities, libraries, accessible transient lodging, and transportation facilities.

RESOURCES

Public Access Section
Civil Rights Division
U.S. Department of Justice
P.O. Box 66738
Washington, D.C. 20035-6738

ADA Information Line operates from 1:00 p.m. to 5:00 p.m. EST, Monday - Friday, except holidays.
(202) 514 - 0301 (V)
(202) 514 - 0383 (TDD)

PUBLICATIONS

Title II ADA Regulations (28 CFR Part 35), Nondiscrimination on the Basis of Disability in State and Local Government Services

Title III ADA Regulations (28 CFR Part 36), Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities, including ADAAG as the Standards for Accessible Design

ADA Title II and ADA Title III Technical Assistance Manuals

ADA Handbook: contains title I, title II, and title III rules, including ADAAG and UFAS.

U.S. Architectural and Transportation
Barriers Compliance Board
1331 F Street, N.W.
Suite 1000
Washington, D.C. 20004-1111

ADA Information Line operates from 9:00 a.m. to 5:00 p.m. EST, Monday - Friday, except holidays.
(800) 872 - 2253 (V)
(202) 272 - 5434 (V)
(202) 272 - 5449 (TDD)

PUBLICATIONS

Uniform Federal Accessibility Standards (UFAS).

UFAS Accessibility Checklist

ADA Guidelines Accessibility Checklist for Buildings and Facilities

Accessible Design Bulletins" on a growing list of topics related to ADAAG requirements, including no. 1, "Detectable Warnings"; no. 2, "Visual Alarms"; no. 3, "Text Telephones"; no. 4, "Entrances/Exits"; no. 5, "Using ADA Regulations and the ADA Accessibility Guidelines for Buildings and Facilities."

Fair Housing Information Clearinghouse
P.O. Box 6091
Rockville, Maryland 20850
(800) 343 - 3442 (V)
(800) 877 - 8339 (TDD)

PUBLICATIONS

24 CFR, chapter 1, Final Fair Housing Accessibility Guidelines.

24 CFR, part 14, et al. Implementation of the Fair Housing Amendments Act of 1988.

Section 504 Rule (24 CFR Part 8), Nondiscrimination Based on Handicap in Federally Assisted Programs and Activities of the Department of Housing and Urban Development.

U.S. Department of Transportation
400 Seventh Street, S.W.
Room 10424
Washington, D.C. 20590
(202) 366 - 9305 (V)
(202) 755 - 7687 (TDD)

PUBLICATIONS

ADA Regulations (49 CFR Parts 27, 37, and 38), Transportation for Individuals with Disabilities; Final Rule.

ADA

10 Mobility Aids and Vehicles

CANES

1. Provide support while walking.
2. Assist balance, relieve pain in extremities.
3. Assist seeing-impaired and blind.
4. Canes are adjustable or nonadjustable, and are made with a variety of handgrips.
   a. Ortho-cane: 27 to 42 in. high.
   b. Quad cane: four legs for a wider base of support. Height adjusts from 26 1/2 to 36 1/2 in. Wide base is 9 x 13 in., narrow is 5 x 7 in.
   c. Long cane: used by the blind, 36 to 48 in.

CRUTCHES

1. Reduce stress of weight on lower extremities.
2. User must have good shoulder muscles and good balance.
3. User must be able to maintain hand functions while standing.
4. Because crutches are angled away from the body, wider doors and corridors may be necessary.
   a. Axillary crutches have an underarm support piece to transmit forces to the shoulder.
   b. Nonaxillary crutches have handgrips and a forearm or upper arm cuff and distribute weight to the forearm.

WALKERS

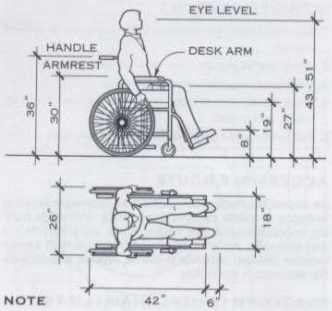
1. Aid balance and decrease stress on joints and muscles.
2. Require wider doors and additional maneuvering space.
3. Generally made of aluminum, and may have wheels or a seat for resting.

WHEELCHAIRS

1. Come in many models and sizes and have a variety of removable accessories, such as footrests and armrests.
2. The U.S. model is the most popular, with large, rear drive wheels, and smaller, front caster wheels.
3. Frames are usually aluminum and may be collapsible.

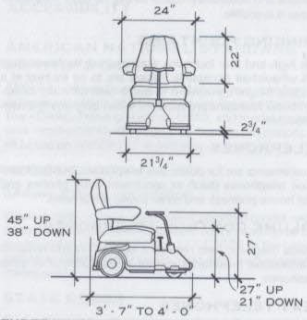
MOTORIZED WHEELCHAIRS

1. Driven by electric motors powered by storage batteries below the seat.
2. Controlled by a hand mechanism on the chair arm (more clearance is needed under tables, desks, etc.).



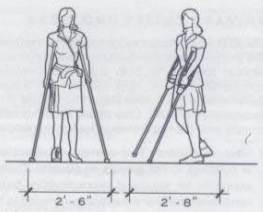
NOTE
Footrest may extend further for tall people.

STANDARD WHEELCHAIR DIMENSIONS

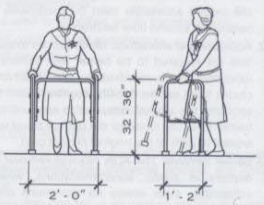


THREE-WHEELED ELECTRIC WHEELCHAIR

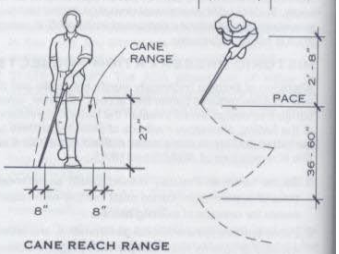
NOTES
1. Steers like a bicycle.
2. Maneuvering clearances similar to conventional chairs.



AUXILLARY CRUTCH DIMENSIONS

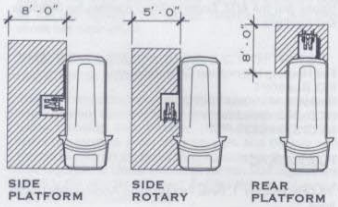


WALKER DIMENSIONS

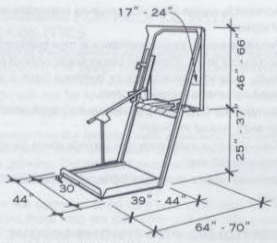


CANE REACH RANGE

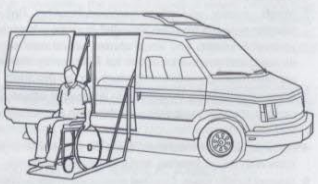
MOBILITY AIDS



NOTES
1. Three types of lifts are available to allow users to enter and exit vans:
   SIDE AND REAR PLATFORM LIFTS: Platform lifts are stowed in a vertical position. To board, the operator opens the vehicle's door and activates the platform to unfold to a horizontal position, flush with the floor of the van. The lift is then lowered to ground level. When passenger boards, lift is raised to van floor level and stored.
   SIDE ROTARY LIFTS: Rotary lifts and lowers passenger vertically, parallel to the van. This type of lift requires the smallest aisle.
2. Each lift requires different clearances at parking spaces and passenger loading zones. For each lift, the access aisle should include a clear path to the operating controls, usually located in the passenger-side rear quarter-panel.
3. Lifts can be attached to most standard vans.



PLATFORM LIFT DIMENSIONS



PLATFORM LIFT

MODIFIED VAN DIMENSIONS (IN.)

Wheelbase	112 – 120
Overall length	175 – 191
Overall width	69 – 72
Overall height	66 – 70
Interior height	58 – 62
Interior width	65 – 76
Ramp length	54 – 54

NOTES
1. Entire van is modified by manufacturer to include a lowered floor, removable or adjustable seating, hand controls, and an access ramp. Vans with lowered floors have a lower overall height than other modified vans. Dimensions below are for lowered floor vans.
2. Vans may have raised tops to permit drivers and passengers in wheelchairs to move about inside. Raised tops typically increase the total height of a standard van to approximately 8 ft 10 in. Minimum required canopy clearance is 9 ft 0 in., only 2 in. greater than van height; therefore, a clearance of 9 ft 6 in. is recommended.

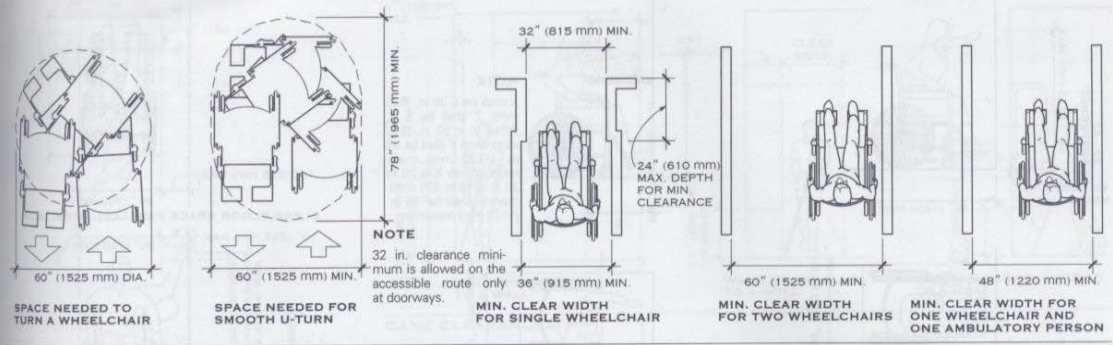
A variety of seating options is possible.

MODIFIED VANS

VAN LIFTS

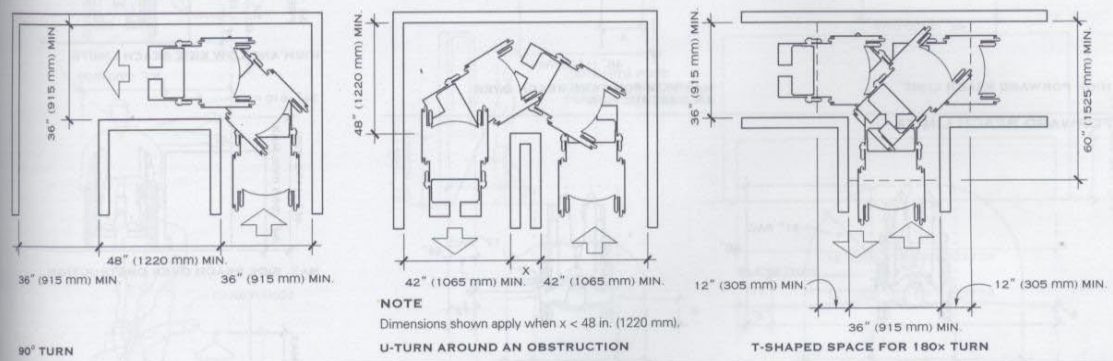
Janet B. Rankin, AIA; Rippeteau Architects; Washington, D.C.
Thomas D. Davies, Jr., AIA, Kim A. Beasley, AIA; Paradigm Design Group; Washington, D.C.

1 UNIVERSAL ACCESSIBILITY



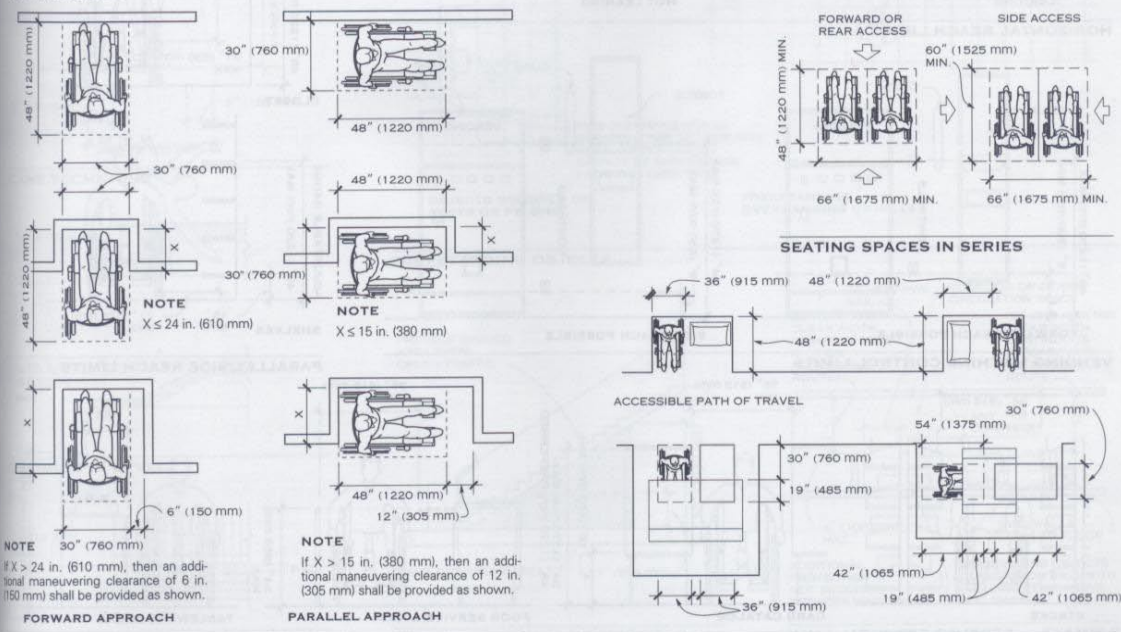
SPACE NEEDED TO TURN A WHEELCHAIR | SPACE NEEDED FOR SMOOTH U-TURN | MIN. CLEAR WIDTH FOR SINGLE WHEELCHAIR | MIN. CLEAR WIDTH FOR TWO WHEELCHAIRS | MIN. CLEAR WIDTH FOR ONE WHEELCHAIR AND ONE AMBULATORY PERSON

U-TURN AND PASSING SPACES



90° TURN | U-TURN AROUND AN OBSTRUCTION | T-SHAPED SPACE FOR 180° TURN

TURNAROUNDS



FORWARD APPROACH | PARALLEL APPROACH

MINIMUM CLEAR FLOOR SPACE IN ALCOVES

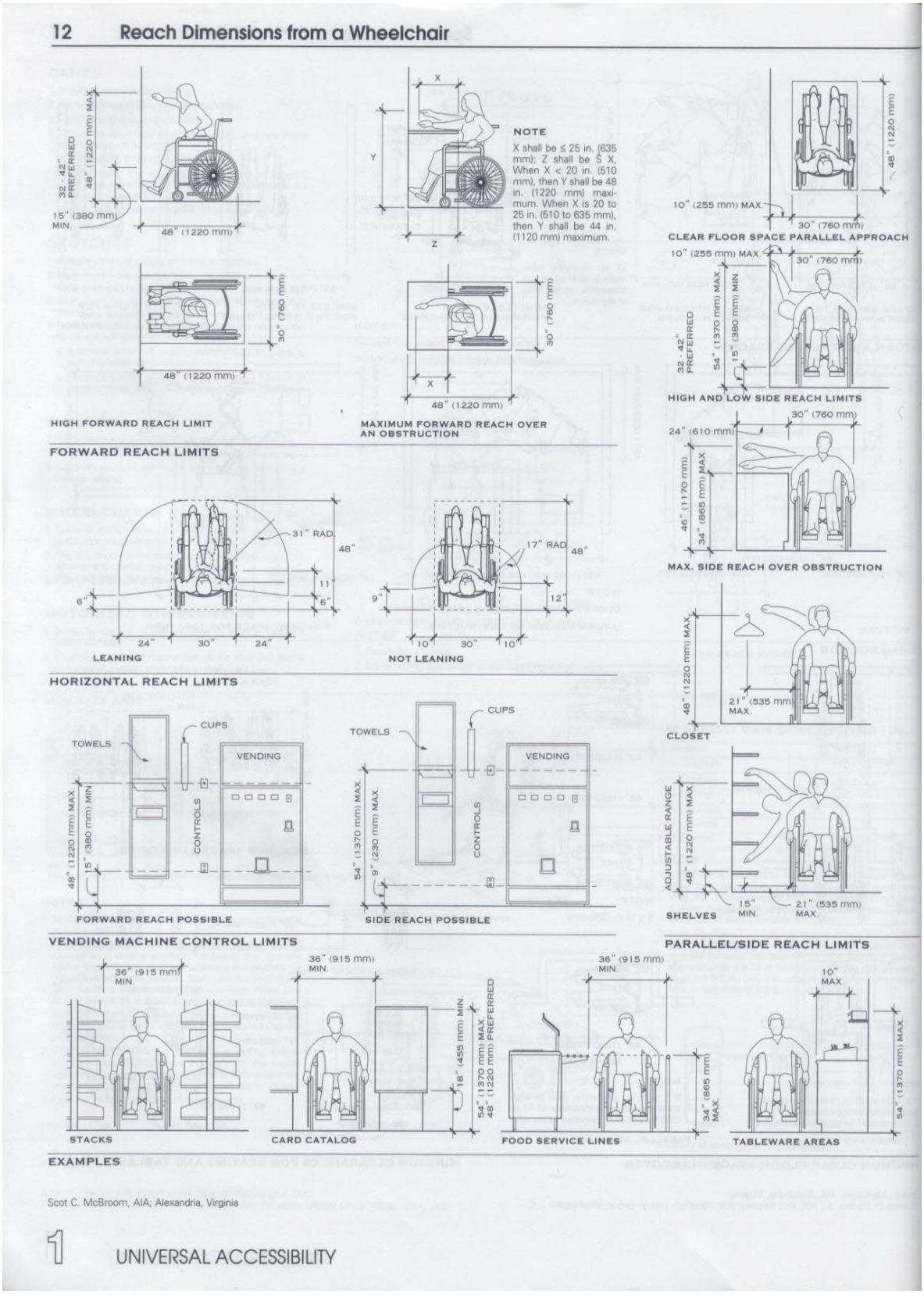
SEATING SPACES IN SERIES

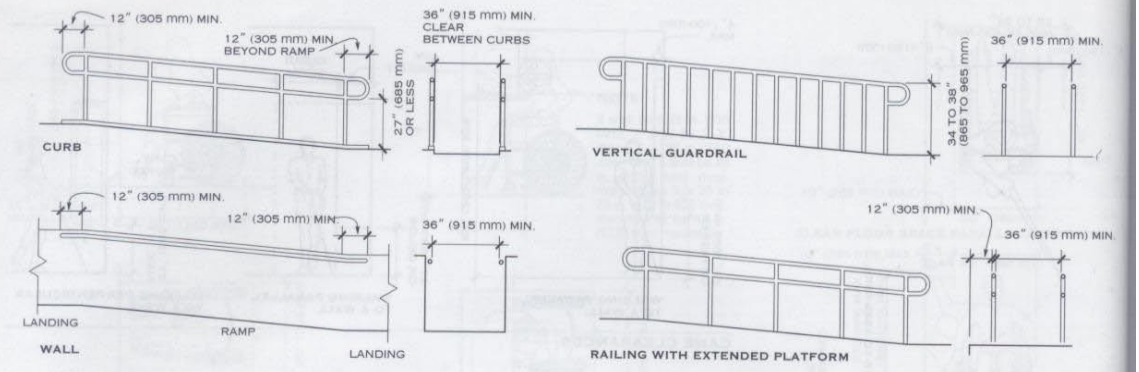
MINIMUM CLEARANCES FOR SEATING AND TABLES

Scot C. McBroom, AIA; Alexandria, Virginia
Thomas D. Davies, Jr., AIA, Kim Beasley, AIA; Paradigm Design Group; Washington D.C.

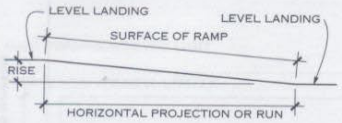
ADA

ADA


12 Reach Dimensions from a Wheelchair
32 - 42" PREFERRED
48" (1220 mm) MAX.
15" (380 mm) MIN.
48" (1220 mm)
HIGH FORWARD REACH LIMIT
X
Y
Z
NOTE
X shall be ≤ 25 in. (635 mm); Z shall be ≤ 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.
30" (760 mm)
48" (1220 mm)
MAXIMUM FORWARD REACH OVER AN OBSTRUCTION
FORWARD REACH LIMITS
31" RAD.
48"
11"
6"
24"
30"
LEANING
17" RAD.
9"
12"
10"
NOT LEANING
HORIZONTAL REACH LIMITS
TOWELS
CUPS
VENDING
CONTROLS
48" (1220 mm) MAX.
15" (380 mm) MIN.
FORWARD REACH POSSIBLE
54" (1370 mm) MAX.
9" (230 mm) MAX.
SIDE REACH POSSIBLE
VENDING MACHINE CONTROL LIMITS
36" (915 mm) MIN.
STACKS
18" (455 mm) MIN.
54" (1370 mm) MAX.
48" (1220 mm) PREFERRED
CARD CATALOG
34" (865 mm) MAX.
FOOD SERVICE LINES
10" MAX.
TABLEWARE AREAS
EXAMPLES
10" (255 mm) MAX.
CLEAR FLOOR SPACE PARALLEL APPROACH
54" (1370 mm) MAX.
HIGH AND LOW SIDE REACH LIMITS
24" (610 mm)
46" (1170 mm)
34" (865 mm) MAX.
MAX. SIDE REACH OVER OBSTRUCTION
21" (535 mm) MAX.
CLOSET
ADJUSTABLE RANGE
SHELVES
PARALLEL/SIDE REACH LIMITS
Scot C. McBroom, AIA; Alexandria, Virginia
1 UNIVERSAL ACCESSIBILITY



EDGE PROTECTION AND HANDRAIL EXTENSIONS



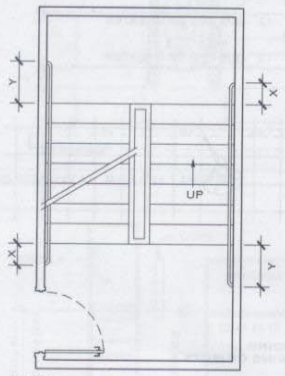
SAMPLE RAMP DIMENSIONS

SLOPE	MAXIMUM RISE IN.	MAXIMUM RISE MM	MAXIMUM RUN FT	MAXIMUM RUN M
1:12 to < 1:16	30	760	30	9
1:16 to < 1:20	30	760	40	12

NOTE

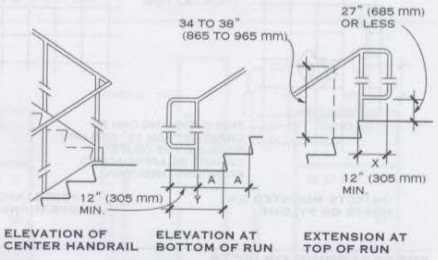
Slope < 1:20 is not a ramp so no handrails are required.

COMPONENTS OF A SINGLE RAMP

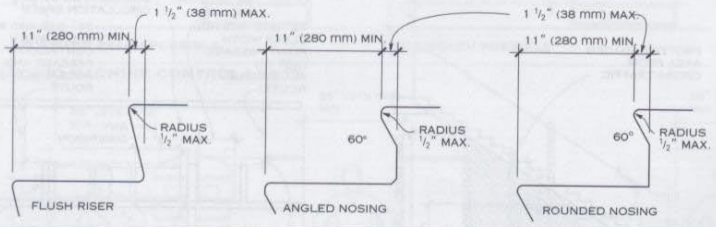


NOTE

X is the 12 in. minimum handrail extension required at each top riser. Y is the minimum handrail extension of 12 in. plus the width of one tread that is required at each bottom riser.



STAIR HANDRAILS



STAIR TREADS, RISERS, AND NOSINGS

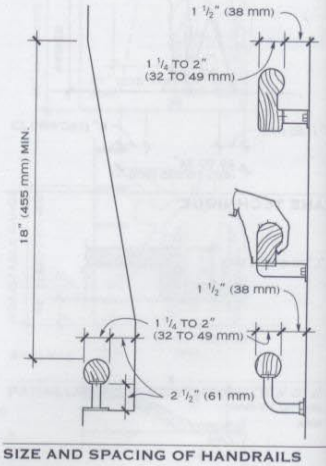
STAIRS

Interior or exterior stairs connecting levels not connected by elevator, ramp, or lift must comply with the following:

1. Uniform risers and treads; minimum 11 in. tread; open risers not permitted.
2. Nosings as shown.
3. Handrails as shown and described.
4. Design outdoor stairs and approaches so that water does not accumulate on walking surfaces.

RAMPS

1. Provide at accessible route; slopes greater than 1:20 are considered ramps.
2. Slope maximum 1:12; provide least slope possible; maximum rise of 30 in. per run.
3. Landings should be level at top and bottom of each ramp run and at least as wide as the run leading to it. A 60 x 60 in. landing is required where ramp changes direction. If there is a door at the landing, provide level maneuvering clearances.
4. Handrails required: where rise is greater than 6 in. or run is greater than 72 in.; both sides; see handrail examples and notes.
5. Edge protection required at ramps and landings with drop-offs; see examples.
6. Design outdoor ramps and approaches so that water will not accumulate on surface; maximum cross slope of 1:50.



SIZE AND SPACING OF HANDRAILS

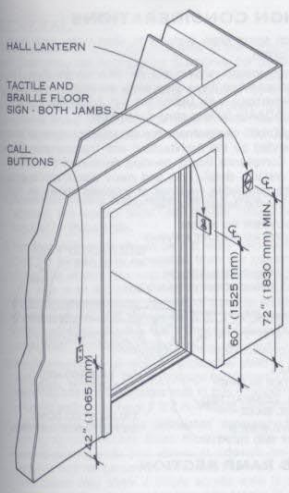
HANDRAILS

1. Provide continuous handrails at both sides of ramps and stairs; the inside handrail of switchback or dogleg ramps and stairs to be continuous.
2. If handrails are not continuous at bottom, top, or landings, provide handrail extensions as shown in the ramp and stair examples; ends of handrails to be rounded or returned smoothly to floor, wall, or post.
3. Provide handrails of size and configuration shown; gripping surfaces to be uninterrupted by newel posts or other construction elements; handrails shall not rotate within their fittings.

Scot C. McBroom, AIA; Alexandria, Virginia

ADA

ADA

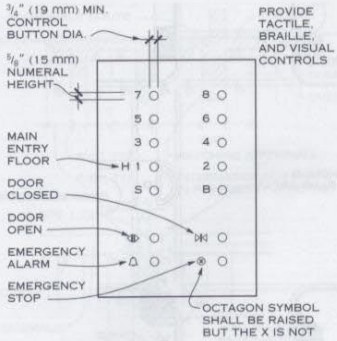


NOTES

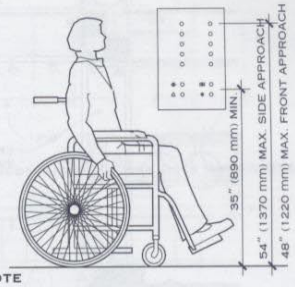
1. Floor designations: 2 in. high letters, including Braille, 60 in. above floor on both sides of elevator doorjamb.
2. Hall lanterns: sound once for up direction, twice for down; mount minimum 72 in. high; minimum 2 1/2 in. smallest dimension.
3. Visual and audible car position indicator.
4. See Americans with Disabilities Act Accessibility Guidelines (ADAAG) for mechanical requirements.

PLATFORM (WHEELCHAIR) LIFTS

The Americans with Disabilities Act (ADA) limits use of lifts for access in new construction to very specific applications to achieve access goals and in alterations and additions where no other method of access is available.



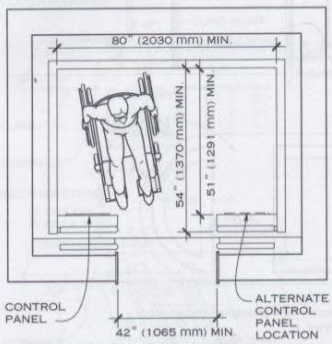
CONTROL PANEL DETAIL



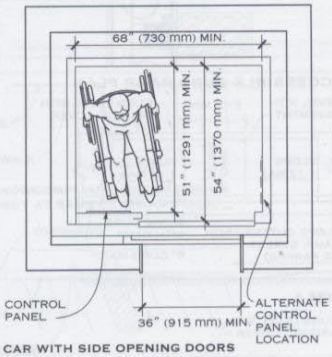
NOTE

If provided, emergency communications must be accessible per ADAAG.

CONTROL PANEL HEIGHT

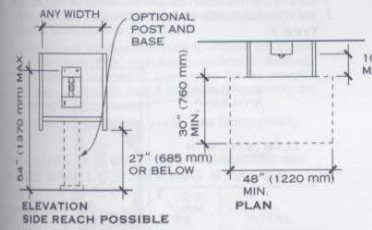


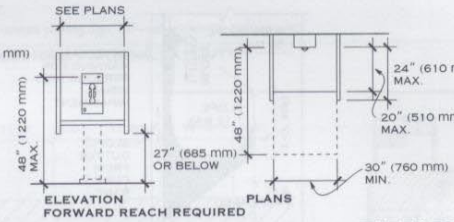
CAR WITH CENTER OPENING DOORS

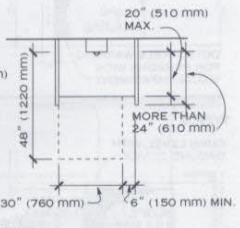


CAR WITH SIDE OPENING DOORS

ELEVATORS







NOTE

Requirements are for public telephones, including closed circuit (such as apartment entry phones and hotel house phones), pay, and other types.

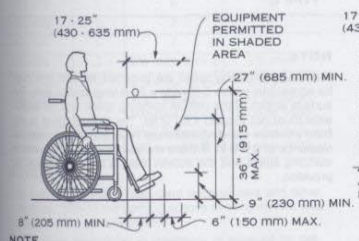
VOICE CONTROL TELEPHONES

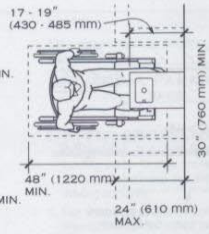
Provide hearing aid compatible telephones; volume control required for accessible telephones and for at least 25% of all other telephones.

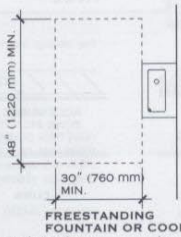
TEXT TELEPHONES

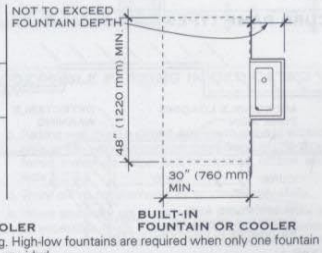
One required where four or more public pay telephones are provided in a facility and at least one is provided at an interior location. Also required in specific facility types and areas (e.g., stadiums, arenas, hospitals, convention centers, transit facilities).

TELEPHONES





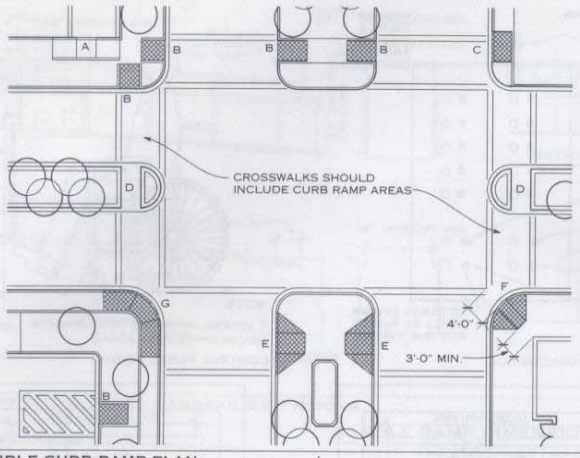




NOTE

Both high and low fountains are required, no fewer than 50% wheelchair accessible; others are to be located at a standard height convenient to those with difficulty stooping. High-low fountains are required when only one fountain is provided.

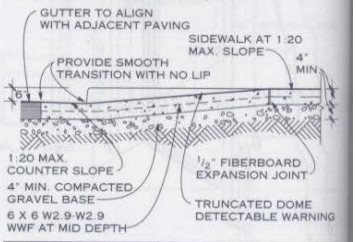
Scot C. McBroom, AIA; Alexandria, Virginia



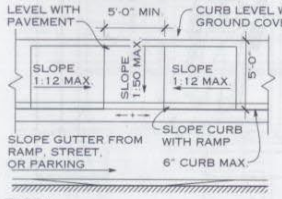
ACCESSIBLE CURB RAMP PLAN

DESIGN CONSIDERATIONS

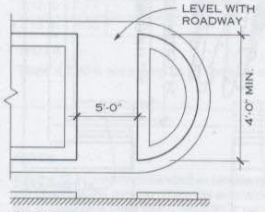
1. Design storm drain systems to shed water away from curb ramps.
2. The dimensions shown are for new construction. For alterations when these dimensions are impractical, review the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for less strict dimensions.
3. The ADAAG requirement for detectable warnings was suspended by the Architectural and Transportation Barriers Compliance Board, pending revision of the detectable warning detail. FHA and many states continue to require detectable warnings at locations shown on this page but the details specified vary.



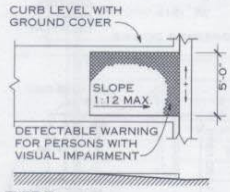
CURB RAMP SECTION



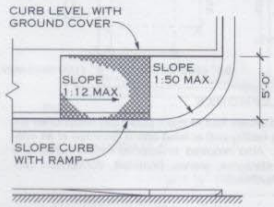
TYPE A



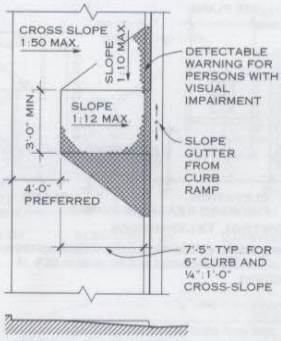
TYPE D



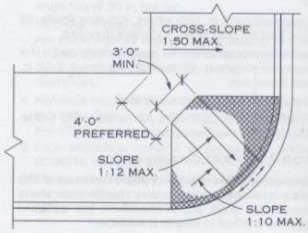
TYPE B



TYPE C



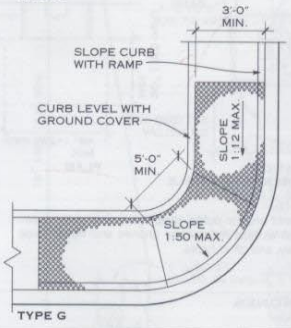
TYPE E



NOTE

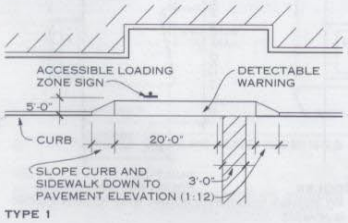
If the 4 ft 0 in. minimum dimension cannot be met for type F, the 1:10 slope becomes 1:12 maximum.

TYPE F

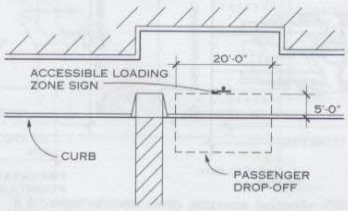


TYPE G

CURB RAMP TYPES



TYPE 1



TYPE 2

NOTE

If passenger loading zones are provided, at least one must be accessible, with a 5 ft wide x 20 ft long access aisle. The surface slopes of the vehicle standing space and the access aisle must not exceed 1:50 (2%). The path of travel to and from a vehicle standing stall must have a minimum vehicular clearance of 9 ft 6 in. If there are curbs between the vehicle standing space and the access aisle, a curb ramp must be provided.

ACCESSIBLE PASSENGER LOADING ZONE

Mary S. Smith, P.E.; Walker Parking Consultants/Engineers, Inc.; Indianapolis, Indiana
Mark J. Mazz, AIA, P.A.; Hyattsville, Maryland

ADA

Appendix A

GENERAL

The information on this page conforms to the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (36 CFR 1191, July 26, 1991), also known as ADAAG, and Bulletin No. 6: Parking (February 1994), both issued by the Architectural and Transportation Barriers Compliance Board. State and local requirements may differ, but ADA requires that designs conform to the higher requirement.

NOTES

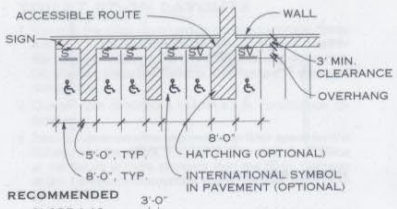
1. Accessible parking stalls should be 8 ft wide with an adjacent 5-ft access aisle. No special clearance is required for these stalls.
2. Van-accessible stalls should be 8 ft wide with an adjacent 8-ft access aisle accessible from the passenger side of the vehicle. (Backing into 90° stalls from a two-way aisle is an acceptable method of achieving this.) Vehicular clearance along the path of travel to and from a van-accessible stall should be 8 ft 2 in. In parking structures, van-accessible stalls may be grouped on a single level.
3. It is permissible for all required accessible stalls to conform with Universal Parking Design guidelines. Since vans may use any accessible stall in this arrangement, universal stalls must have 8 ft 2 in. vehicle clearance.
4. Access aisles should be delineated separately from parking spaces. Access aisles must be at the same level as parking stalls (not above, at sidewalk height). Required curb ramps cannot be located in access aisles. Two spaces may share a single access aisle (except when van stalls require passenger-side access in one-way designs).
5. Parking spaces and access aisles should be level with surface slopes not exceeding 1:50 (2%) in any direction.
6. The stalls required for a specific facility may be relocated to another location if equivalent or greater accessibility in terms of distance, cost, and convenience is ensured.
7. Accessible stalls in the numbers shown in the accompanying table must be included in parking facilities leased or 100% reserved for employees. However, they need not be reserved for accessible parking (i.e., they need not be marked with signs) until or unless an employee with a disability needs the stall in that location.
8. Provide an accessible route from accessible parking stalls to the destination. This should make it possible for persons in wheelchairs to travel without rolling down parking aisles past more than one parked vehicle (other than their own). Crossing a parking aisle at 90° is preferable to rolling down a parking aisle.
9. Provide signs at accessible stalls to reserve the spaces for individuals with disabilities; pavement markings alone are not acceptable. Signs need not be provided for every accessible stall if they clearly delineate the accessible parking spaces.
10. Requirements are per lot, not by total facility parking.

REQUIRED MINIMUM NUMBER OF ACCESSIBLE PARKING SPACES

TOTAL PARKING IN LOT	VANS	CARS	TOTAL
1–25	1	0	1
26–50	1	1	2
51–75	1	2	3
76–100	1	3	4
101–150	1	4	5
151–200	1	5	6
201–300	1	6	7
301–400	1	7	8
401–500	2	7	9
501–800	2	2% min., less 2	2% min.
801–1000	3	2% min., less 2	2% min.
1001–1400	3	17+1 for each 100 over 1000	20+1 for each 100 over 1000
1401 and more	12.5% of total	17+1 for each 100 over 1000	20+1 for each 100 over 1000

NOTES

1. At facilities providing outpatient medical care and other services, 10% of the parking spaces serving visitors and patients must be accessible.
2. At facilities specializing in treatment or services for persons with mobility impairments, 20% of the spaces provided for visitors and patients must be accessible.



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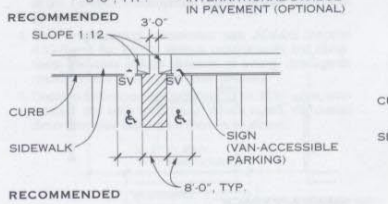

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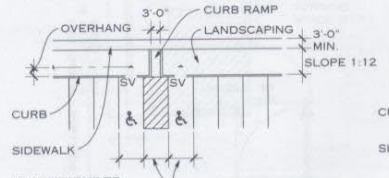

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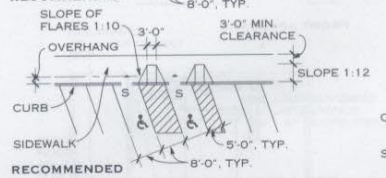

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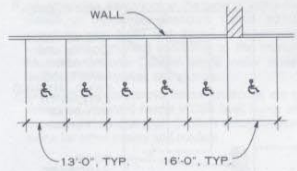
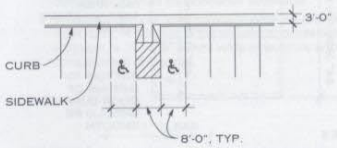
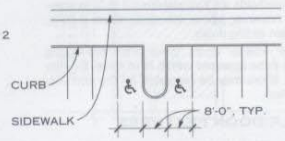


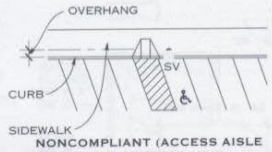
NONCOMPLIANT (ACCESS AISLE NOT MARKED)



NONCOMPLIANT (RAMP IN ACCESS AISLE)



NONCOMPLIANT (ACCESS AISLE NOT AT SAME LEVEL AS STALL)

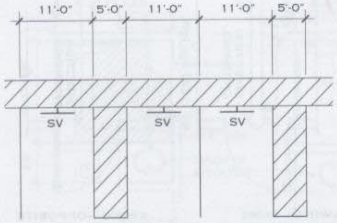


NONCOMPLIANT (ACCESS AISLE ON WRONG SIDE FOR VAN)

NOTE

S—accessible parking sign; SV—van-accessible parking sign.

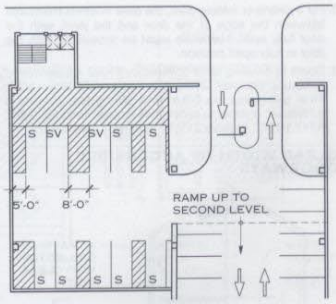
ACCESSIBLE PARKING LAYOUTS



NOTE

SV—van-accessible parking sign. (All universal spaces are van-accessible.)

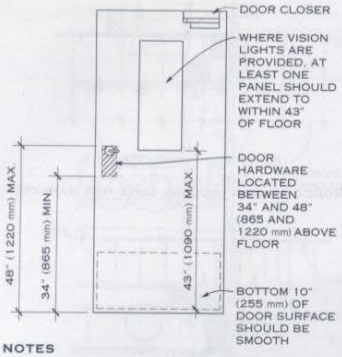
UNIVERSAL PARKING DESIGN



ACCESSIBLE PARKING IN DEDICATED BAY

3. The information in this table does not apply to valet parking facilities, but such facilities must have an accessible loading zone. One or more self-park van-accessible stalls are recommended for patrons with specially equipped driving controls.
4. Fair Housing requirements match the ADAAG requirements, except as noted below:
   a. Van-accessible stalls are not required.
   b. Two percent of total parking must comply.
   c. Parking stall may be sloped. Maximum slope of access aisle is 5% with a maximum cross-slope of 2%. Preferred maximum slope and cross-slope of stall and aisle is 2%.
   d. There are no requirements for employee-only stalls.
   e. When sidewalks are not provided, ensure that there is an accessible route through the driveways or provide additional compliant parking at each accessible feature on the property.

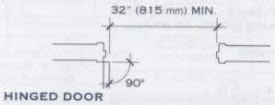
Mary S. Smith, P.E.; Walker Parking Consultants/Engineers, Inc.; Indianapolis, Indiana



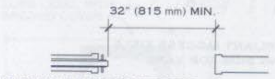
NOTES

1. Hardware: Specify hardware that can be operated with one hand, without tight grasping, pinching, or twisting of the wrist.
2. Thresholds: Thresholds are typically limited to ½ in. maximum height; however, some standards allow a ¾ in. height for certain sliding doors.
3. Opening force: Interior doors (other than fire doors) should be able to be operated with 5 lb of force. Exterior doors and fire doors may be regulated by the authority having jurisdiction.

ACCESSIBLE DOOR FEATURES



HINGED DOOR

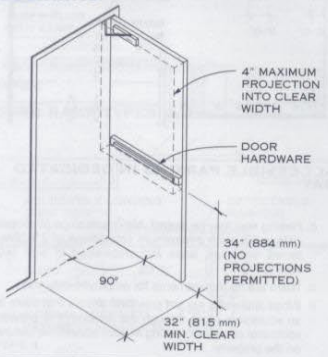


SLIDING OR FOLDING DOOR

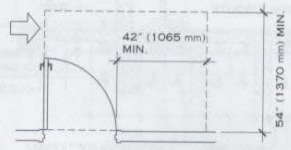
NOTES

1. For a hinged door, the clear width is measured between the face of the door and the door stop with the door open at a 90° angle.
2. For a sliding or folding door, the clear width is measured between the edge of the door and the jamb with the door fully open. Hardware must be accessible with the door in fully open position.
3. Doors in dwelling units covered by FHAG are permitted to have a "nominal" 32 in. clear width. HUD allows a 2 ft 10 in. swing door or a 6-ft exterior sliding door installed in a "typical" manner to satisfy this requirement. ICC/ANSI A117.1-1998 allows a 31¾ in. (810 mm) clear width.

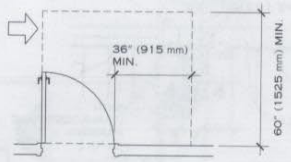
CLEAR WIDTH OF ACCESSIBLE DOORWAYS



PROJECTIONS INTO CLEAR WIDTH (1998 ANSI ONLY)



HINGE APPROACH



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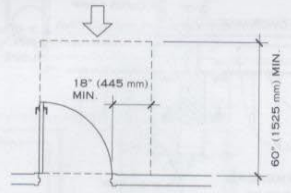
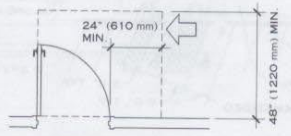
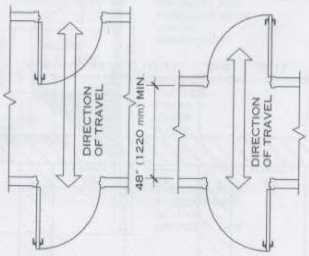


FRONT APPROACH



LATCH APPROACH

PULL-SIDE MANEUVERING CLEARANCE AT SWINGING DOORS



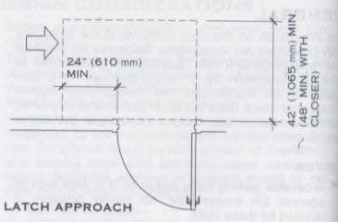
SWING—SAME DIRECTION

SWING—OPPOSITE DIRECTION

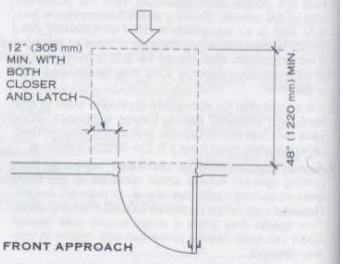
MANEUVERING CLEARANCE FOR TWO DOORS IN A SERIES

NOTES

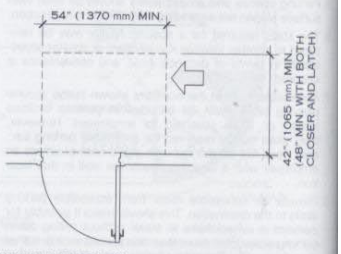
1. Maneuvering clearances are also required at power-assisted doors.
2. Maneuvering clearances are not applicable at full-powered automatic doors or low-energy power-operated doors.
3. The floor and ground surface within the required maneuvering clearance of a door must not slope more than 1:48 and must be stable, firm, and slip-resistant.
4. Where doors are recessed more than 8 in. (such as in an alcove or in a very thick wall), the maneuvering clearances for forward approach should be used.
5. For doors within dwelling units covered by Fair Housing Accessibility Guidelines (FHAG), maneuvering clearances are not required.



LATCH APPROACH

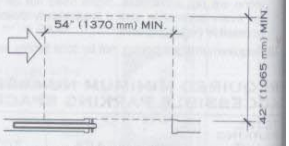


FRONT APPROACH

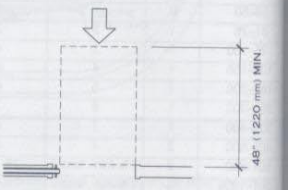


HINGE APPROACH

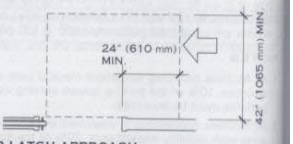
PUSH-SIDE MANEUVERING CLEARANCE AT SWINGING DOORS



POCKET OR HINGE APPROACH



FRONT APPROACH



STOP OR LATCH APPROACH

MANEUVERING CLEARANCE AT SLIDING AND FOLDING DOORS

Lawrence G. Perry, AIA; Silver Spring, Maryland

ADA

Appendix A

GENERAL NOTES

1. All dimensional criteria on this page are based on ANSI A117.1–1998, and on adult anthropometrics.
2. In new construction, all public and common use toilet rooms are generally required to be accessible.
3. Where multiple single-user toilet rooms or bathing rooms are clustered in a single location, and each serves the same population, only 5%, but not less than one, of the rooms must be accessible. The accessible room(s) must be identified by signs.
4. Single-user toilet and bathing rooms provided within a private office are permitted to be adaptable. Making the room accessible is permitted to involve replacement of the water closet and lavatory, changing the swing of the door, and installing grab bars in previously reinforced walls.
5. In accessible toilet and bathing rooms, at least one of each type of fixture and accessory provided must be accessible.
6. A wheelchair turning space is required within accessible toilet and bathing rooms.
7. Doors are not permitted to swing into the required clear floor space at any fixture, except in single-user rooms, where a clear floor space is provided beyond the swing of the door.

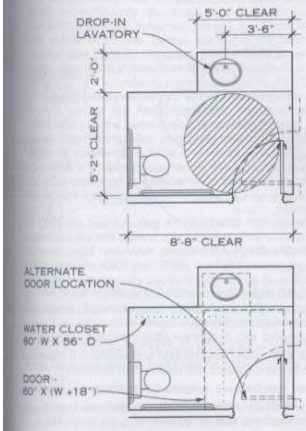
UNISEX TOILET AND BATHING ROOMS

ASSEMBLY AND MERCANTILE OCCUPANCIES

1. Recent model codes require accessible unisex toilet and bathing rooms in certain assembly and mercantile occupancies. These unisex rooms are beneficial for parents with small children and for persons with disabilities who require personal assistance in using toilet facilities, since the assistant may be a person of the opposite sex.
2. This requirement applies when a total of six or more water closets (or water closets and urinals) is provided in the facility.
3. Fixtures provided in unisex rooms are permitted to be included in the number of required plumbing fixtures.
4. Unisex facilities must be located within 500 feet, and within one floor, of separate-sex facilities. In facilities with security checkpoints, such as airport terminals, unisex facilities must be located on the same side of the checkpoint as the separate-sex facilities they serve.
5. Unisex toilet rooms require a single water closet and lavatory. Unisex bathing rooms must also provide an accessible shower or bathtub. An exception allows the use of a room containing two water closets (or one water closet and urinal) in lieu of a dedicated unisex room.
6. Doors to unisex toilet and bathing rooms must be securable from within the room.

ALTERATIONS

1. Accessible unisex toilet and bathing rooms are permitted in alterations in lieu of altering existing separate-sex facilities in certain conditions.
2. Unisex rooms must be located in the same area and on the same floor as the existing inaccessible facilities.



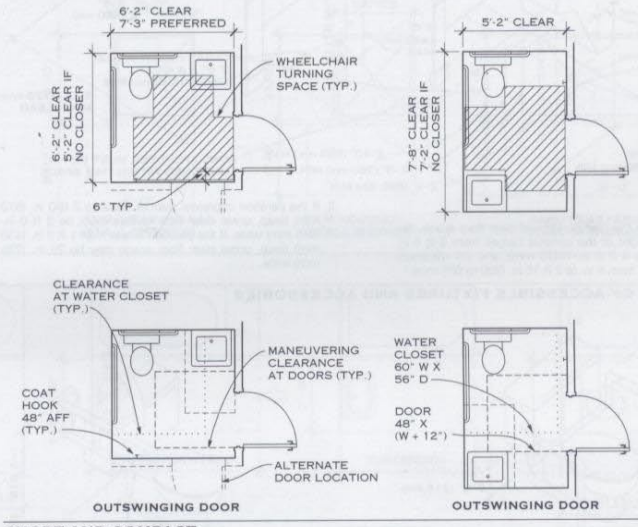
LAVATORY ON SIDE WALL

TOILET ROOM LAYOUTS

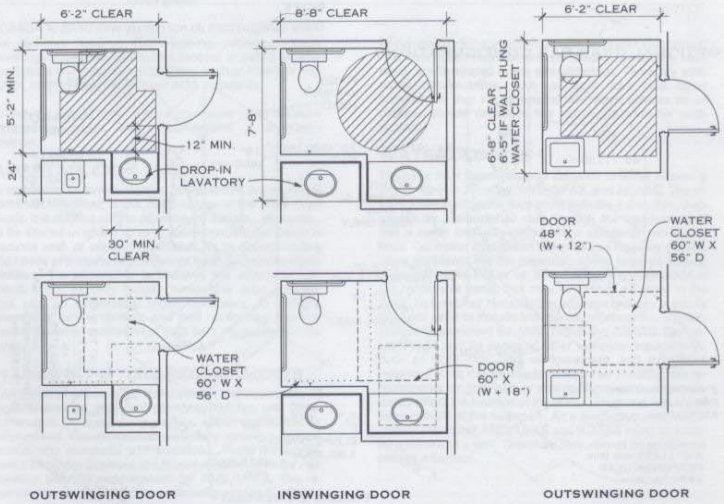
1. Some of the toilet room layouts shown are similar. Variations are in the direction of the door swing and whether the width or depth is the more constraining dimension. Dimensions show comfortable minimums and preferred dimensions.
2. Overall room dimensions include a 2 in. construction tolerance.
3. Each layout shows the required clear floor space for the fixtures and the doors. Frequently, the clear floor space at the fixture is more stringent than the 60-in. diameter or the T-shaped maneuvering space required. Both must be considered.
4. Door maneuvering clearances: see ADAAG (section 4.13.6 and fig. 25) for various requirements and conditions. Variables include direction of swing, direction of approach, size of door, and door hardware.
5. Doors to bathrooms are assumed to be 36 in. wide, with a closer and latch for privacy. Where noted, the overall dimension may decrease if there is no closer.
6. Maneuvering clearances at the base of water closets are based on American Standard model #2108 (floor-mounted tank type) and #2257 (wall-mounted, flush-valve type), mounted according to the manufacturer's recommendations. Confirm actual water closet dimensions for other makes and models.
7. Maneuvering clearances below lavatories are based on American Standard model #0355 (wall hung) and #0475 (mounted in countertop). Confirm actual lavatory dimensions for other makes and models.

TOILET COMPARTMENTS

1. Where toilet compartments are provided, at least one compartment must be wheelchair accessible.
2. Where six or more toilet compartments are provided in a toilet room, in addition to the wheelchair accessible compartment, a 36-in. (915 mm) wide ambulatory accessible compartment is required.

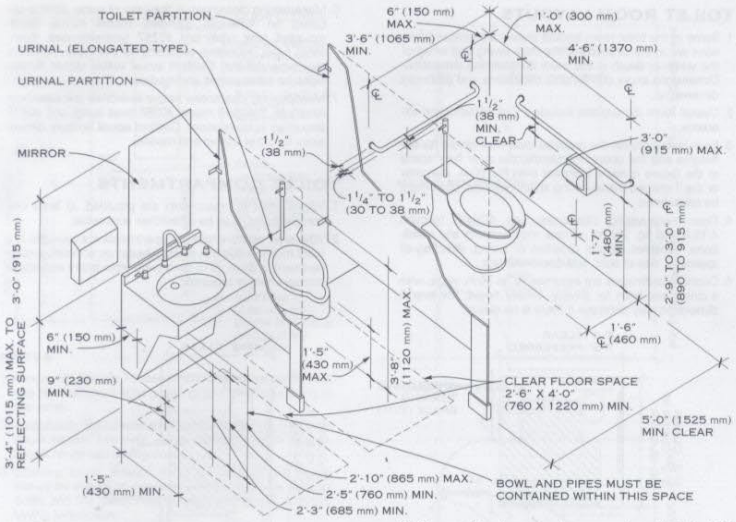


SHORT AND COMPACT



LAVATORY ON OPPOSITE WALL

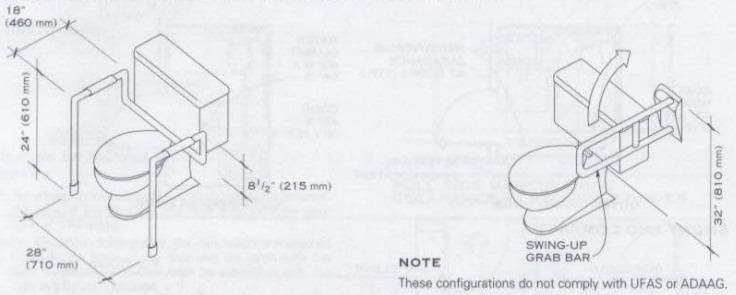
Lawrence G. Perry, AIA; Silver Spring, Maryland



NOTES

1. Depending on the configuration of clear floor space, the maximum height of the controls ranges from 3 ft 8 in. (1120 mm) to 4 ft 6 in. (1420 mm), and the minimum height ranges from 9 in. to 2 ft 10 in. (230 to 865 mm).
2. If the partition is greater than or equal to 2 ft 0 in. (610 mm) deep, urinal clear floor spaces must be 3 ft 0 in. (915 mm) wide. If the partition is less than 1 ft 5 in. (430 mm) deep, urinal clear floor space may be 29 in. (735 mm) wide.

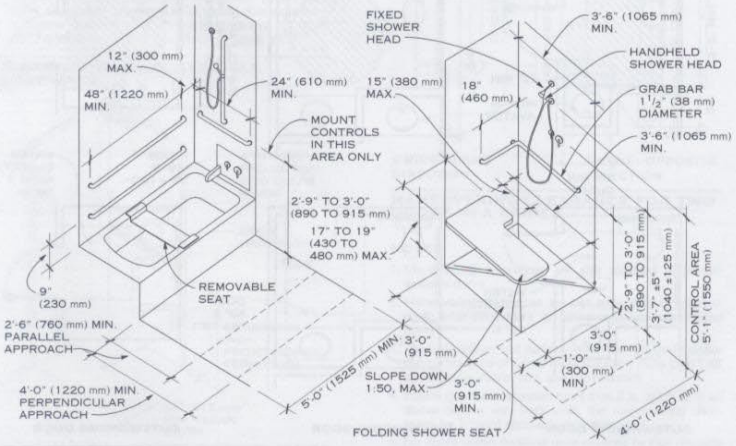
LOCATION OF ACCESSIBLE FIXTURES AND ACCESSORIES



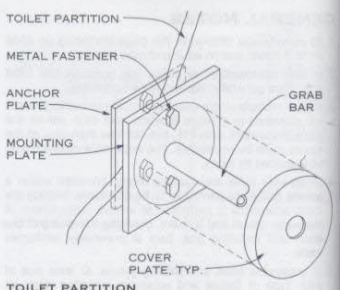
NOTE

These configurations do not comply with UFAS or ADAAG.

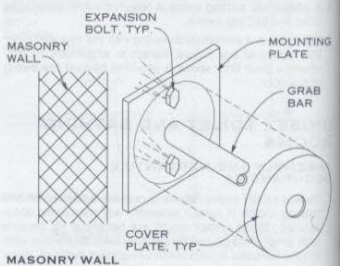
OPTIONAL GRAB BAR CONFIGURATIONS



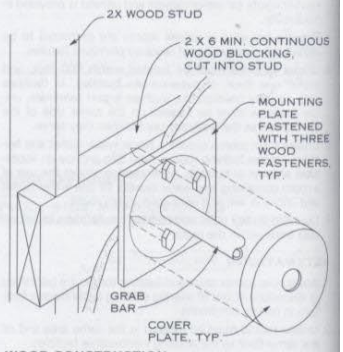
ACCESSIBLE BATHTUB AND SHOWER



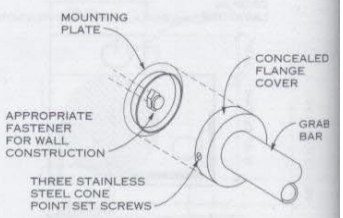
TOILET PARTITION



MASONRY WALL



WOOD CONSTRUCTION



CONCEALED FLANGE

NOTES

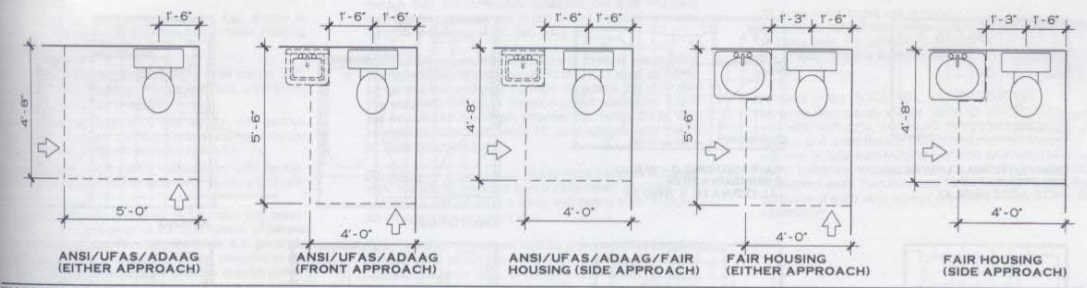
1. Size: 1½ or 1¼ in. O.D. with 1½ in. clearance at wall.
2. Material: Stainless steel chrome-plated brass with knurled finish (optional).
3. Installation: Concealed or exposed fasteners; return all ends to the wall, intermediate supports at 3 ft maximum. Use heavy-duty bars and methods of installation.
4. Other grab bars are available for particular situations.
5. Consult ANSI and ADAAG requirements, as well as applicable local and federal regulations.

GRAB BAR ATTACHMENT DETAILS

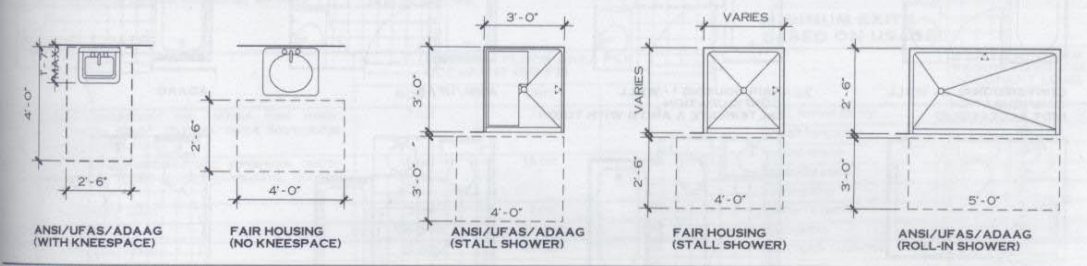
Mark J. Mazz, AIA, P.A.; Hyattsville, Maryland

ADA

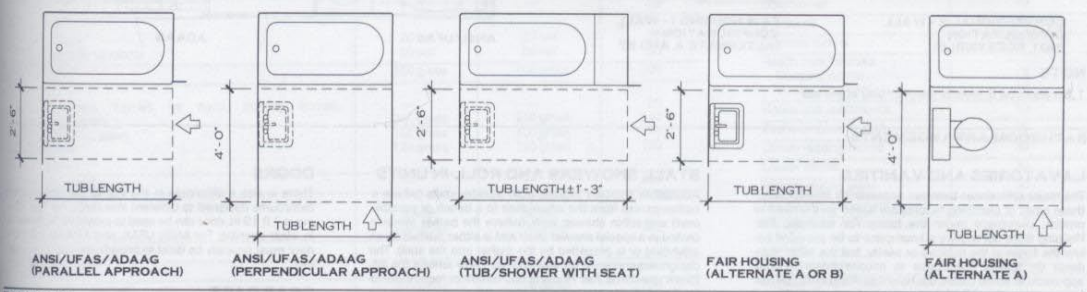
Appendix A



WATER CLOSETS



LAVATORIES AND SHOWERS



BATHTUBS

GUIDELINES FOR ACCESSIBILITY

Residential bathrooms and toilet rooms can be divided into two general categories: private facilities such as those in single or multifamily dwellings, and institutional bathrooms such as those in nursing homes, hospitals, dormitories, hotels, or motels. Design standards for toilet room fixtures have been an important part of most accessibility codes since the first American National Standards Institute (ANSI) A117.1 standards were published in 1961. Standards specifically intended for private dwellings did not become a part of the ANSI document, however, until the 1981 edition. Four years later, the Uniform Federal Accessibility Standard (UFAS) published nearly identical standards for dwellings in federal projects. The ANSI/UFAS standards are typically applied to between 1% and 5% of the total dwellings in multifamily projects, depending on the local or federal code.

In 1988 the Fair Housing Amendments Act was enacted; guidelines for this federal law included different standards for residential bathroom designs. Though less strict than those found in ANSI and UFAS, the Fair Housing standards must be more broadly applied, typically to between 30% and 100% of the total units in a project, depending on the building configuration and whether it has a passenger elevator. Two alternative design standards are included in Fair Housing. In dwellings with more than one bathroom, the more strict of these can be used for one bath; minimal standards for an accessible route can be applied to the second bathroom.

The Americans with Disabilities Act Accessibility Guidelines (ADAAG) are not typically applied to private residential facilities because Fair Housing addresses these dwellings. However, bathrooms located in public accommodations and commercial facilities, such as hotels or hospitals, may be required to meet ADA standards.

Architects should verify bathroom requirements because accessibility codes and interpretations of standards change.

ADAPTABLE FEATURES

In residential bathroom design, "adaptability" is a technical term first described in the 1980 edition of the ANSI Standards. It is defined as "the capability of certain... elements... to be altered or added so as to accommodate the needs of persons with or without disabilities, or to accommodate the needs of persons with different types or degrees of disabilities." For accessible bathrooms, the adaptable elements might typically include "removable" base cabinets that can be eliminated, when necessary, to provide kneespace below vanities, and wall reinforcing that will permit the later installation of grab bars around certain fixtures.

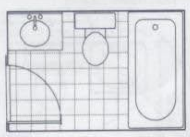
PLUMBING FIXTURE REQUIREMENTS

Categories of accessibility standards for bathrooms are 1) requirements for individual plumbing fixtures, and 2) requirements for maneuvering space within bathrooms or toilet rooms. Fixture requirements vary among common accessibility standards and guidelines. There are significant differences between the fixture requirements for Fair Housing and the requirements for ANSI/UFAS. The requirements for ADAAG are essentially similar to ANSI/UFAS except for some very subtle technical differences. The floor space requirements for these accessibility standards are illustrated in the plan drawings. There are additional requirements, such as grab bars and other accessories, that are associated with most fixtures, so architects should reference the applicable code for each project.

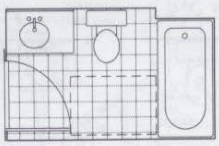
WATER CLOSETS

The clear floor space required adjacent to water closets is similar for Fair Housing, ANSI/UFAS, and ADAAG. The arrows illustrated on the floor plans indicate a direction of approach by a wheelchair user, though the significance of this is never explicitly stated in the standards and guidelines. The major differences between Fair Housing and the other standards are the minimum space required behind the water closet (33 in. vs. 36 in.) and the configuration of the lavatory or vanity that may be located adjacent to the toilet. To meet Fair Housing, the adjacent lavatory or vanity does not need to include kneespace, whereas this is an important requirement for ANSI/UFAS and ADAAG. Designers should also be aware of other technical requirements such as grab bars, wall reinforcement, and toilet seat heights. For all the standards except Fair Housing, the requirements for grab bars or wall reinforcement can significantly affect the location of the water closet and the overall arrangement of the bathroom. As a practical matter, water closets that meet ANSI/UFAS and ADAAG must be located adjacent to a wall. Therefore they cannot be positioned next to a bathtub.

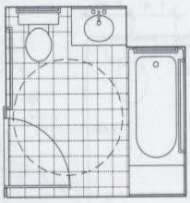
Thomas D. Davies, Jr., AIA, Kim A. Beasley, AIA, Paradigm Design Group; Washington, D.C.



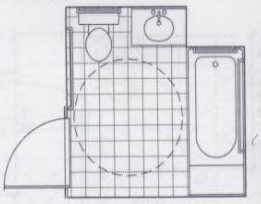
CONVENTIONAL 1 - WALL CONFIGURATION (NOT ACCESSIBLE)



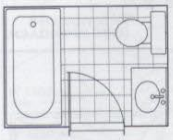
FAIR HOUSING 2 - WALL CONFIGURATION (ALTERNATE A AND B)[1]



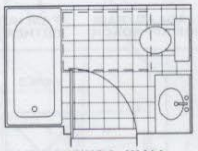
ANSI/UFAS



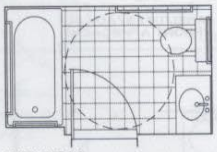
ADAAG



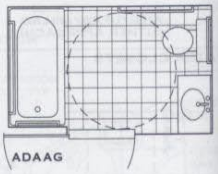
CONVENTIONAL 2 - WALL CONFIGURATION (NOT ACCESSIBLE)



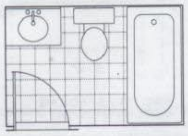
FAIR HOUSING 1 - WALL CONFIGURATION (ALTERNATE A AND B WITH TUB)



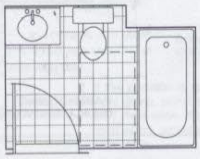
ANSI/UFAS



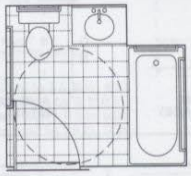
ADAAG



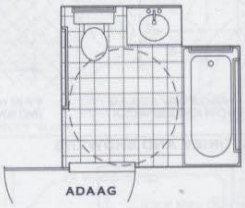
CONVENTIONAL 2 - WALL CONFIGURATION (NOT ACCESSIBLE)



FAIR HOUSING 1 - WALL CONFIGURATION (ALTERNATE A AND B)[1]



ANSI/UFAS



ADAAG

NOTE

1. For alternate B, reverse the plumbing at the tub.

BATHROOM ARRANGEMENTS

LAVATORIES AND VANITIES

The major differences between accessibility standards for these types of plumbing fixtures are based on the need to provide kneespace under the basin. For example, Fair Housing does not require a kneespace to be provided below the basin at the lavatory or vanity, but the other standards do require this space to accommodate a front approach. In some cases, the height of the kneespace has been increased in ADAAG as compared to both ANSI and UFAS. There are also additional requirements in all accessibility standards, except Fair Housing, for the maximum depth of the sink basin and for the design of the faucets, mirror, and medicine cabinet.

BATHTUBS AND TUB/SHOWERS

There are also subtle differences between standards for accessible bathtubs. The clear floor space requirements for these fixtures are similar to those for water closets in that a specific direction of approach is indicated (either perpendicular or parallel) in the standards. The significance of the approach direction is not clear, particularly for ANSI, UFAS, and ADAAG where a lavatory adjacent to the tub will always have kneespace. Therefore, wheelchair access to the faucets and controls is available in either case, though access for ambulatory bathers is compromised when a lavatory is installed in this location. Under the Fair Housing guidelines, either a water closet or a lavatory or vanity without kneespace can be located in this position.

Fair Housing has different requirements for clear space; the designer may choose from two different standards. Of these alternatives, the second option (Alternative B) is the more strict. This requires clear space adjacent to the foot of the tub.

For any of the accessibility standards, there are also requirements for grab bars or wall reinforcement. Except for Fair Housing, the grab bar/reinforcement requirements essentially dictate that the tub basin be enclosed on three sides. There is also an alternate tub configuration illustrated in ANSI, UFAS, and ADAAG that includes a small built-in seat at the head of the basin. The intended use of this seat, however, is not completely clear. These standards also address the design and location of the mixing valve and other operating controls as well as the shower-spray head.

STALL SHOWERS AND ROLL-IN UNITS

Accessible showers include both transfer stalls (where a bather moves from the wheelchair to a bench or portable seat) and roll-in shower units (where the bather remains seated in a special shower chair and is either pushed by an attendant or is propelled by the bather into the stall). The design requirements for stall showers vary among the different standards. Fair Housing has less strict requirements for the stall size and requires a smaller clear space in the bathroom outside the shower entrance. ANSI, UFAS, and ADAAG require a built-in seat in the stall and also address the location and design of the mixing valve, operating controls, and shower-spray head. All accessibility standards require either wall reinforcing or grab bars in the shower. ANSI, UFAS, and ADAAG include a maximum limit on the height of the dam or threshold for stall showers.

All the accessibility standards except Fair Housing include roll-in showers. These stalls are much larger and have no threshold to restrict wheelchair access. Therefore the floor structure or slab beneath the shower must typically be either lowered or depressed to provide an essentially flush transition from the bathroom floor.

MANEUVERING SPACE

An accessible bathroom must meet different arrangement requirements, depending on the standards used. Each bathroom must provide the fixture clearances required by the applicable standard. In addition, some maneuvering space must typically be provided, though the amount of space and the rules vary.

Bathrooms that comply with Fair Housing must be "usable." If the door swings into the bathroom, there must be enough clear space to position a wheelchair clear of the door swing. This requirement is described diagrammatically as rectangular space 30 by 48 in. For ANSI, UFAS, and ADAAG, the maneuvering space is described as either a 5 ft diameter circle or a 5 ft T-shaped area.

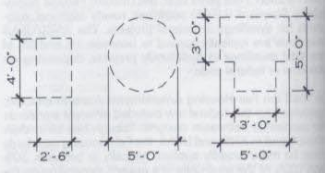
All of the standards permit the floor space for fixtures to overlap with required clear floor space. ADAAG, however, does not permit the bathroom door to swing into any fixture clearances. In almost all cases, this will effectively require the door to swing out.

DOORS

There is also a difference in the size of the doors serving bathrooms designed to different standards. For Fair Housing, a 2 ft 10 in. door can be used to provide a "nominal" 32 in. clear opening. For ANSI, UFAS, and ADAAG a 3 ft 0 in. door must typically be used to provide the full 32 in. opening.

GRAB BARS

The arrangement of grab bars can also influence the floor plan of an accessible bathroom. For Fair Housing, the standards for grab bars are less strict and this permits the design of small bathrooms. For example, the grab bar adjacent to a water closet can be shorter than that required by ANSI. In fact, Fair Housing permits swing-down grab bars so that the water closet does not need to be adjacent to a wall. The more strict grab bar requirements of ANSI, UFAS, and ADAAG will become critical factors in water closet and bathtub arrangements and therefore impact the overall design of the bathroom.



WHEELCHAIR SPACE | TURNING CIRCLE | T-TURN

WHEELCHAIR SPACES

Thomas D. Davies, Jr., AIA, Kim A. Beasley; AIA, Paradigm Design Group; Washington, D.C.

ADA

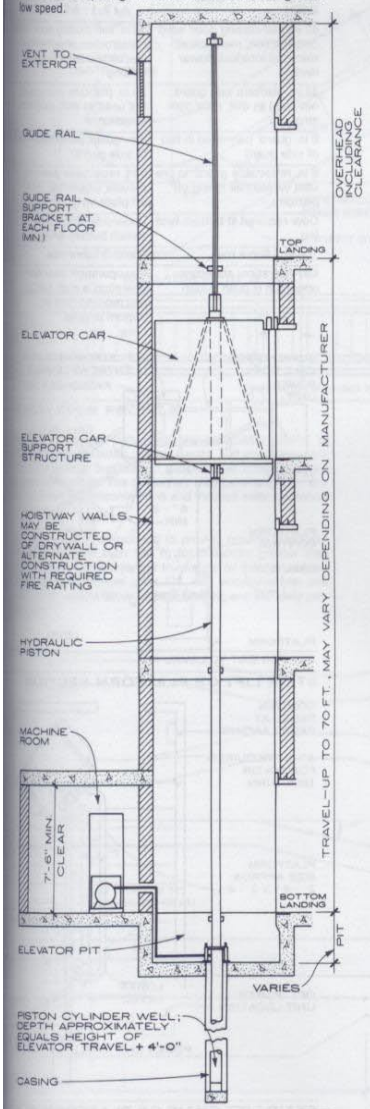
Appendix A

GENERAL NOTES

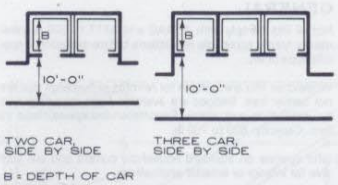
Lowrise buildings may use either oil hydraulic or electric elevator systems. Elevator selection, arrangement, and design of lobby and cars are similar in both cases. The primary differences between the two systems are in their operational requirements. The hydraulic elevator system is described below; the electric elevator system on the next page.

The major architectural considerations of the hydraulic elevator are the machine room, normally located at the base, and the hoistway serving as a fire protected, ventilated passageway for the elevator car. Adequate structure must be provided at the base of the hoistway to bear the load of the elevator car and its supporting piston or cylinder.

Generally speaking, oil hydraulic elevators are used in applications requiring limited vertical travel usage and low speed.

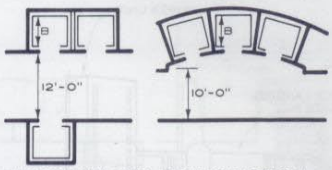


HYDRAULIC ELEVATOR—SECTION



TWO CAR, SIDE BY SIDE — THREE CAR, SIDE BY SIDE

B = DEPTH OF CAR



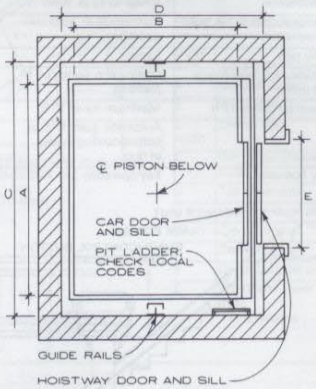
TWO OR THREE CAR, OPPOSITE — THREE CAR, SPECIAL ARRANGEMENT

NOTES

Certain guidelines lead to effective placement, grouping, and arrangement of elevators within a building. Elevators should be: (a) centrally located, (b) near the main entrance, and (c) easily accessible on all floors. If a building requires more than one elevator, they should be grouped, with possible exception of service elevators.

Within each grouping, elevators should be arranged to minimize walking distance between cars. Sufficient lobby space must be provided to accommodate group movement. Elevators may not open into a corridor.

ELEVATOR ARRANGEMENT, TWO AND THREE CARS (TYPICAL FOR LOWRISE APPLICATIONS)



HYDRAULIC ELEVATOR DIMENSIONS

RATED LOAD (LB)	DIMENSIONS (FT-IN.)				
	A	B	C	D	E
1500	4-10	5-0	6-8	5-9	2-8
2000	6-0	5-0	7-4	5-9	3-0
2500	7-0	5-0	8-4	5-9	3-6
3000	7-0	5-6	8-4	6-3	3-6
3500	7-0	6-2	8-4	6-11	3-6
4000	6-0	6-0	7-4	9-8	4-0

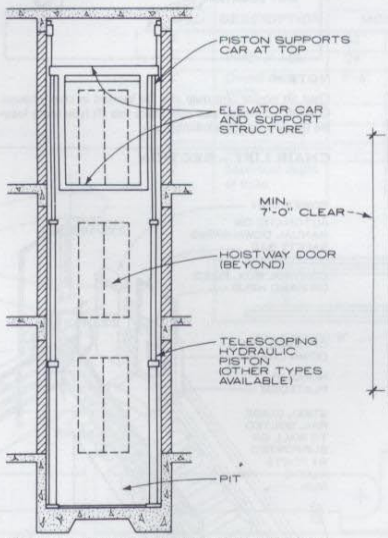
Rated speeds are 75 to 125 fpm.

NOTES

Elevator car and hoistway dimensions of the preengineered units listed above are for reference purposes only. A broad selection of units is available. Representatives of the elevator industry should be contacted for the dimensions of specific systems.

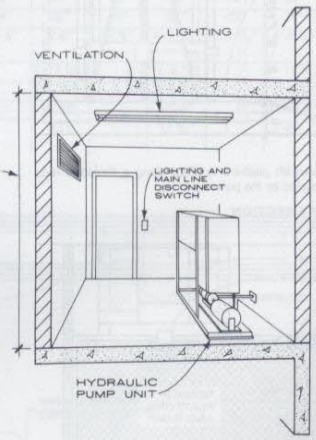
Hoistway walls normally serve primarily as fireproof enclosures. Check local codes for required fire ratings. Guide rails extend from the pit floor to the underside of the overhead. When excessive floor heights are encountered consult the elevator supplier for special requirements.

ELEVATOR CAR AND HOISTWAY



One type of holeless hydraulic elevator uses a telescoping hydraulic piston as the lifting device, eliminating the need for cylinder well excavation. This system is presently limited to a height of three stories or 21 ft 6 in. Other types of holeless hydraulic elevator units are also available using an inverted cylinder attached to the side of the elevator car.

HOLELESS HYDRAULIC ELEVATOR—SECTION

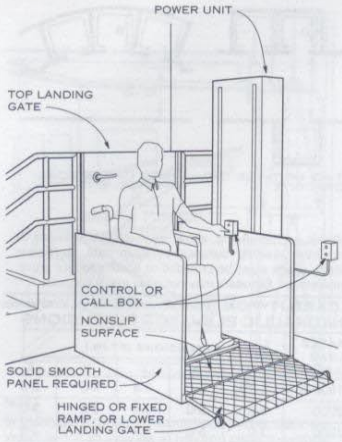


The MACHINE ROOM of a hydraulic elevator system is usually located next to the hoistway at or near the bottom terminal landing. Consult with elevator manufacturers for required dimensions. Refer to local codes.

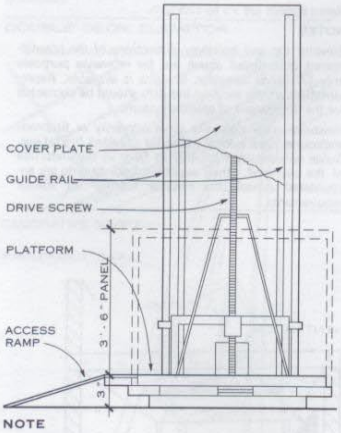
Machinery consists of a pump and motor drive unit, hydraulic fluid storage tank, and electronic control panel. Adequate ventilation, lighting, and entrance access (usually 3 ft 6 in. x 7 ft) should be provided.

MACHINE ROOM

Alexander Keyes; Darrel Downing Rippeteau, Architect; Washington, D.C.



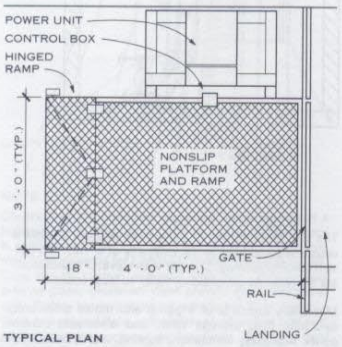
OVERALL VIEW – WHEELCHAIR LIFT



NOTE

Screw driven lift platform is lifted along a threaded rod, which is rotated by the power unit.

CUT-AWAY SECTION



TYPICAL PLAN

WHEELCHAIR LIFT

GENERAL

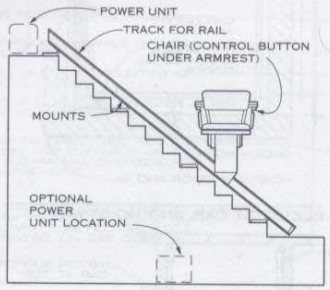
Not all lifts comply with ADAAG and A117.1-1998 requirements. Verify applicable regulations before selecting a specific type of lift.

Wheelchair lifts are suitable for retrofits of buildings that are not barrier free. Bridges are available from manufacturers for installation over stairs. Recommended speed:10 to 19 fpm. Capacity: 500 to 750 lb.

Lifts operate on standard household current and are suitable for interior or exterior applications.

WHEELCHAIR LIFT REQUIREMENTS

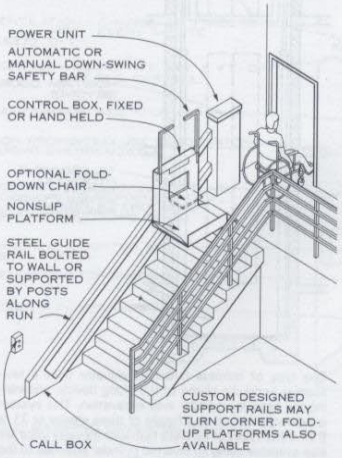
TYPICAL ANSI A17.1, SEC. 2000.1B	PRIVATE RESIDENCE ANSI A17.1, SEC. 2100.1
42 in. door for top and bottom landings, mechanical/electrical interlock, solid construction	36 in. door for top landing; bottom landing can have guard (other requirements similar to 42 in. door)
Platform sides: 42 in. solid construction	Platform 36 in. solid construction
Grab rails	Same
Enclosure or telescoping toe guard	Obstruction switch on platform
Maximum travel 12 ft	Maximum travel 10 ft
	Automatic guard 6 in. at bottom landing in lieu of door
Key operation	Key operation



NOTE

Chair lift power unit may also be located in chair chassis. Chair lift's compact size may make this lift type more feasible than others for residential use.

CHAIR LIFT – SECTION



STAIR LIFT OR PLATFORM (STRAIGHT RUN)

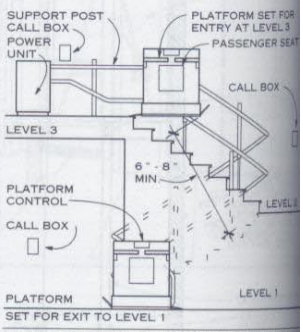
Inclined stair lifts can be adapted to straight run and stairs. Standard types run along guide rails or tube tened to solid wall, stairs, or floor structure. Power may be placed at the top or bottom of the lift run or lift chassis, depending on the manufacturer. Some in lift systems fold up out of the way for daily stair use.

Where stair width necessitates a more compact lift, residential use, chair lifts are available for straight run ral stairs. However, many inclined stair lifts come with dard fold-down seats.

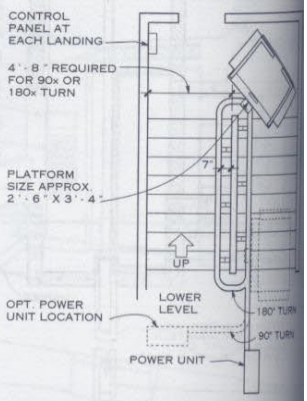
Recommended speed, 20 to 25 fpm on straight run fpm on curved sections. Capacity, 500 lb. Typical plat size, 30 x 40 in. Check local code capacities.

INCLINED WHEELCHAIR LIFT REQUIREMENTS

TYPICAL RESIDENCE ANSI A17.1, SEC. 2001	PRIVATE ANSI A17.1, SEC.210
42 in. self-closing door: solid construction, mechanical/electrical interlock, lower landing	36 in. self-closing door: s construction, mechanica electrical interlock, upper landing
42 in. platform side guard: not used as exit, solid construction	36 in. platform side guard not used as exit, solid co struction
6 in. guard: permitted in lieu of side guard	6 in. guard: permitted in l of side guard
6 in. retractable guard: to prevent wheelchair rolling off platform	6 in. retractable guard: to prevent wheelchair rolling off platform
Door required at bottom landing	Underside obstruction switch bottom landing
Travel 3 floors max.	Travel 3 floors max.
Key operation; attendant operation is push button	Key operation: attendant operation is push button and requires door at bottom landing



STAIR LIFT OR PLATFORM SECTION



STAIR LIFT CHAIR OR PLATFORM PLAN WITH TURNS

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ADA

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