



# THE DO·ABLE RENEWABLE HOME

MAKING YOUR HOME FIT YOUR NEEDS

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# DO<sup>THE</sup>•ABLE RENEWABLE HOME

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## PREFACE

**T**his book identifies and explains the design concepts, products, and resources that can help make an existing home more comfortable for its occupants who experience physical limitations.

While we have attempted to be thorough in assembling the information presented here, it is not a comprehensive study of the subject.

# TABLE OF CONTENTS

	<i>Page</i>
Introduction . . . . .	6
Physical Abilities of the Aging Body . . . . .	7
New Concepts of Accessibility . . . . .	10
Doors . . . . .	12
Stairs and Ramps . . . . .	19
Bathrooms . . . . .	23
Kitchens . . . . .	30
Resources . . . . .	36
Index . . . . .	43

## FORWARD

Few experiences can be more devastating for an older person than the realization that, due to physical limitations, they must move from their home. This is especially true here in America where homeownership is a cornerstone of the American dream.

John Salmen has produced an important and timely book that will assist scores of older persons in maintaining their independence in their own homes. *The DoAble, Renewable Home: Making Your Home Fit Your Needs* is a book of solid and practical information on adapting home environments to individual needs.

My congratulations to the American Association of Retired Persons on the publication of this indispensable guide for those experiencing physical limitations.

A handwritten signature in black ink, appearing to read "Bob Dole". The signature is written in a cursive, flowing style with a large initial "B".

Bob Dole  
Former United States Senator

## INTRODUCTION

According to most gerontologists, personal happiness in later life is the direct result of an individual's continued physical activity and involvement in everyday life. But for some of us, diminishing physical abilities can make the physical activities of daily routines difficult to manage. Climbing stairs, bathing, meal preparation, or household repairs can become complicated as our bodies change with age. This can cause us to retreat from the involvement that is so important to a healthy productive outlook on life.

This book is designed to help you overcome the problems you might encounter in your own home as you grow older, or in the home of someone you care about. It provides the information you'll need to make your home more livable and safer if you develop limitations in movement, strength, dexterity, eyesight, or hearing.

The book has many ideas, examples, and resources that tell you how to make changes in your house, or apartment,

or how to manage a designer or contractor to do the work. The illustrations show you how to make your own modifications (if you are handy), or they can serve as a guide for a designer or building contractor. The U.S. Fair Housing Amendments Act (FHAA) of 1988 includes an important set of rules called the FHAA-AG (Accessibility Guidelines) which dictate how all new multifamily housing of four or more units must be designed and constructed to be accessible. However, the law also gives a renter the right to make accessibility modifications to their home or apartment as long as they return the unit to its original condition when they leave. Nevertheless, if you rent your home, check with your landlord before you undertake any modifications. Because of the large market created by the aging of our society and the public awareness caused by passage of the Americans with Disabilities Act, the tools and expertise for making home changes are now readily available. More importantly,

many of the modifications are easy and/or inexpensive.

For example, most of the devices mentioned in this book (kickplates, hand levers, etc.) are available at local hardware stores. You can obtain other items from the sources listed in the Resources chapter that begins on page 36. But before you start any home modification, read through the entire book to make sure you understand your needs and options, but remember, the needs of the person who lives there are the real basis for any modifications. Their needs will help you decide which modifications are most necessary, useful, and cost-effective.

## PHYSICAL ABILITIES OF THE AGING BODY

**A**fter our youth and active adulthood, each of us experiences a gradual decline in physical strength, flexibility, dexterity, and endurance. A variety of conditions contribute to this natural aging process. Our concern is with the physical losses that can create difficulties in daily living.

No two persons age the same. Some will have vision and/or hearing losses while others might suffer from decreased physical abilities. Some of these conditions are described below, along with suggestions that can help compensate for physical and functional limitations.

### **Vision Loss**

Older people have a higher rate of blindness than any other age group. Among those 85 years and older, one of 20 persons is legally blind. Changes in vision accelerate after age 50 and increase in severity after age 65. It can become more difficult for older persons to see objects clearly. The lens of the eye can become opaque and yellow, affecting its ability to discern closely related colors, especially in the blue-green end of the color spectrum.

It takes longer for an older person's eyes to change focus from an object close at hand to another farther away. And it takes longer for them to focus when they move from light to dark areas or vice versa.

During these intervals, they may not be able to see hazards such as steps or furniture.

Fortunately, visual impairments and blindness are not always the severely handicapping conditions they are commonly imagined to be.

Visually-impaired people can adapt successfully to most environmental circumstances, especially familiar spaces such as their own homes.

If you or members of your household are visually impaired:

- Clearly mark (with white or reflecting tape) hazardous changes in floor levels.
- Position furniture away from areas where you walk or move about most often.
- Adjust the illumination throughout your home. Use higher wattage lightbulbs where appropriate. Distribute the light evenly and avoid using shiny surfaces, to help minimize glare.
- Become aware of your home's color scheme. Yellow-oranges and reds are more easily distinguished by older adults.
- Avoid using closely related colors together. Instead, use contrasting colors between places like doorways and walls, dishes and tablecloths, and the risers and flat surfaces of steps.
- Keep a consistent light level in both bedrooms and hallways and remember to use night lights.



## Hearing Loss

Hearing loss is the most common disability among older persons. As people age, they generally lose inner ear bone conductivity and/or nerve sensitivity. Hearing ability, especially in the higher frequencies, declines gradually. Background noises interfere with the ability to hear a normal conversation, and people with hearing loss may be considered inattentive and withdrawn from social participation.

A profoundly deaf person often cannot use telephones and often must travel to relay messages. Teletypewriters (TTYs) can greatly increase communication between hearing-impaired people, their families and friends. These machines type out telephone messages that can be picked up by another similar machine. People with less dramatic hearing loss can use amplified handsets or have an extension bell installed on their telephone.

Appropriate emergency communication systems are critical for deaf people. Audible warning signals should be accompanied by

visual warning systems or vibration devices. To ensure your own comfort and safety:

- For easier communication, it is helpful to be in the quietest corner of a room or in a side room away from group noises.
- Position yourself where you can easily hear a conversation.
- Carpet the floors and put curtains in the windows, to reduce sharp noises and distracting echoes.
- If necessary, purchase special electronic devices such as hearing aids, vibrating alarm clocks, and an amplified TV set or flashing lights to announce information and warnings.
- Contact your telephone company for amplified handsets, signal devices, TTYs, and extension bells. Ask for their special needs department.

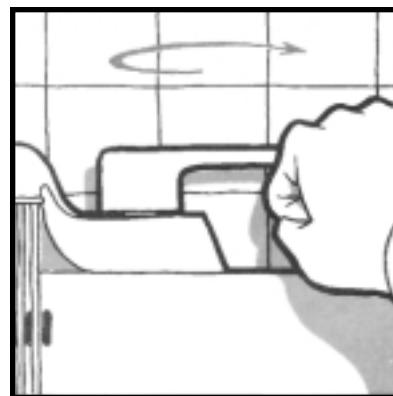
## Hand Limitations

Arthritis is a common disability among older persons. This malady can cause painful

degeneration of the joints and severely restrict mobility. For people with arthritis or other dexterity-limiting conditions, operating controls and switches, gripping objects such as door knobs, and using tools are the chief problems.

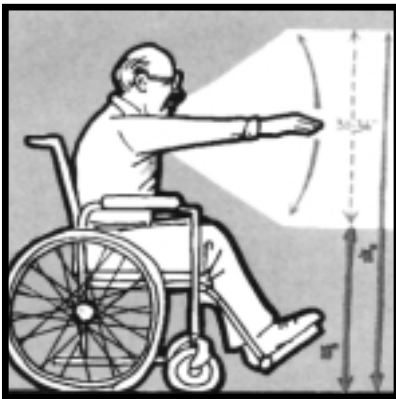
If arthritis affects anyone in your household, you may want to install large lever-type controls on faucets, door latches, and appliance knobs. You can easily modify an existing knob control by fitting a rubber furniture leg tip over the control and inserting a small wooden dowel through it to create a lever arm. To determine whether or not a control can be used by a person with a dexterity problem, try the following "rule of thumb":

If an able-bodied person can operate the control with his or her fist closed, then almost anyone, regardless of hand disability, will be able to operate the control.

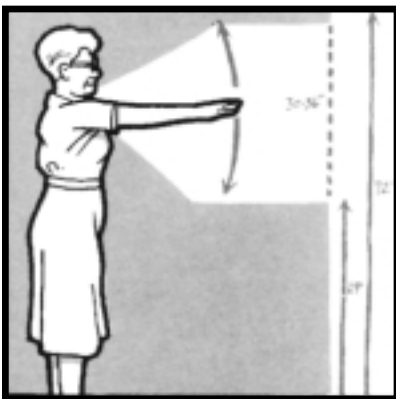


### Range of Reach

A person in a chair or wheelchair is limited to a maximum side reach of 54" and a maximum frontal reach of 48". The lowest easy reach from a seated position is approximately 9" to the side and 12" to the front.



A standing person has a very different range of reach. When you undertake any home changes, remember to consider these differences.

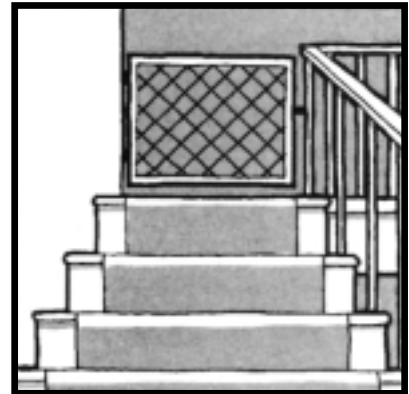


### Frailty, Disorientation, and Dizziness

Many older persons experience occasional dizziness, but a chronic condition resulting in disorientation, constant dizziness, or frailty can cause familiar environments to become hostile. If a member of your household displays any of these symptoms, try to make your home as safe and easily-perceived as possible. The following suggestions might prove helpful:

- Use furnishings that are stable and without sharp corners to minimize the effects of a fall.
- Make the environment safe by removing scatter rugs, sharp objects, and clutter but keep the layout of familiar furniture and pathways the same.
- You may also want to consider placing barriers at dangerous locations to prevent unstable or disoriented members of your house-

hold from inadvertently falling down stairs or entering unfamiliar rooms where hazards are present.

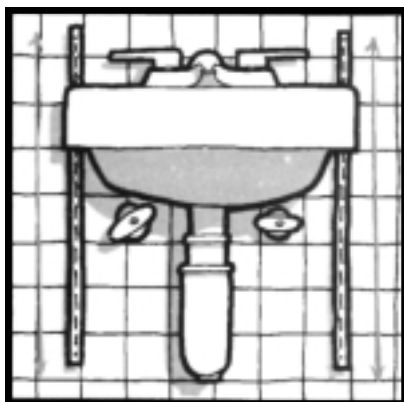


### Mobility Impairments

Walking from one place to another and going up and down steps can be extremely difficult for people with limited mobility. For those with heart disorders, these activities can be particularly hazardous.

You can overcome these problems by relocating bedrooms or living spaces onto the same level, by establishing convenient storage areas, and by removing hazards on paths between commonly used rooms in your home. Try to conserve energy by climbing stairs only when necessary and by storing frequently used household items where they can be retrieved with a minimum of bending, reaching, lifting, and carrying.

People have come up with innovative ideas and concepts to meet the wide range of financial, family, and physical conditions in which the growing population of older people find themselves. Reverse mortgages and Accessory or Echo housing are methods that can help people who own their homes to find the



capital to make renovations to make the home more accessible. See the Resources section, page 36, for more information.

### **Universal Design**

Universal or Life-Span Design is being applied to new homes and appliances. Universal Designs are solutions that work for everyone regardless of their age or physical abilities. Full length mirrors can be used by children, people in wheelchairs, or standing adults. Lever handles on doors work for everyone. The future will find people demanding that buildings and equipment being designed so that “one size fits all”. Some items, however, have very specialized requirements that make them difficult to fit all users. In these cases the concept of Adaptability is useful, providing choice for the users.



### **Adaptability**

Adaptability is a concept whereby sinks, counters, and grab bars are installed so that they can be readjusted to different heights for different people. This feature helps everyone—not just those who are short or use wheelchairs. Adjustable brackets on kitchen and bathroom counters and sinks as well as continuous 3/4" thick wood blocking in the walls surrounding a toilet or bathtub allow for adjustability in the fixtures or grab bars at each location. Installing this type of detail into a new house can eliminate the need for costly renovation. What's more, adaptable elements won't change the appearance of a house if they're carefully constructed. A home can easily be re-modified to a "standard" appearance should you decide to sell the house and move at a later date.

### **Accessibility**

During the past two decades building codes and, since 1992, the Americans with Disabilities Act, have made public buildings accessible to our entire population. These building codes, which are generally applicable only to stores, banks, and other public buildings, have generated new ideas for achieving accessibility in private homes. The most important of these ideas is the accessible route of travel.

### **Accessible Routes**

A continuous corridor that is 3' wide, 6'8" high, free of hazards and abrupt changes in level should connect all important areas of your home. This pathway should lead from the point where you enter the property, through the entrance to all important rooms. If such an "accessible route" is available, anyone, regardless of physical limitations, will be able to move easily around your home.



# DOORS

## Doors

The freedom to move easily around our homes is something most of us take for granted. But it's a freedom that's envied by those with limited mobility and strength. Many of our homes were designed with agile, young, and strong people in mind. However, when older persons occupy these houses, they may not be able to open some windows, climb steps, or go through doors, especially if they have limited strength or hand dexterity, or use a wheelchair or other mobility device.

Deciding which doors to make accessible isn't difficult when you think of making an accessible route to the main activities you enjoy. In your



home, you should have easy access through at least one entry door (preferably two for fire evacuation reasons) and all doors along the accessible routes between your bed-

room, kitchen, dining, bathroom, living or family room, and probably the laundry room. Some doors may not need to be accessible, especially if they lead to seldom-used areas or rooms such as basements, shallow closets, or guest bedrooms.

There are four major reasons why people have difficulty using doors:

### Width

The doorway opening is too narrow to allow passage of wheelchairs, walkers, or other mobility assisting devices.

### Landing

The floor space on either side of the door is too small to allow a person who uses a wheelchair or walker to approach and open the door.

### Hardware

The latch or lock is located where it's hard to reach and operate or, just as often, the type of latch, lock, or handle is difficult to operate by someone who has limited hand dexterity.

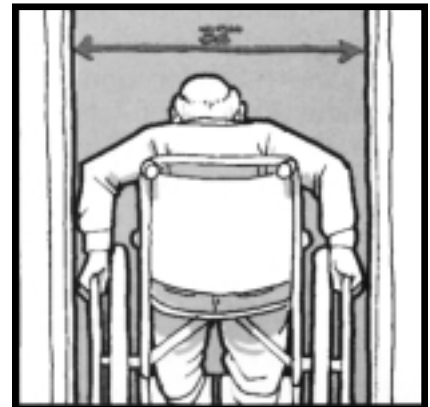
### Weight

The door is too heavy or the door closer or spring pressure is too strong to open easily.

Each of these conditions has several solutions:

## Width Problems

A standard wheelchair is 24-27" wide. When you add 1½" on both sides of the chair to allow for finger and knuckle clearance, plus an inch or two to allow for inaccurate maneuvering and the usual oblique approach to doors, the clear opening width totals 32". That's why, this width is used in most building codes.



A swinging door is commonly available in a 3' width, but 3' doors are generally used only as front doors on



most homes. The usual reason for providing 3' doors is to allow for easy furniture movement. It's especially difficult to find doors of this width on bathrooms (builders used to think bathrooms would never have furniture moving through them).

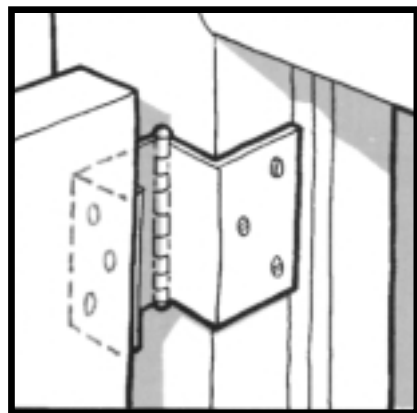
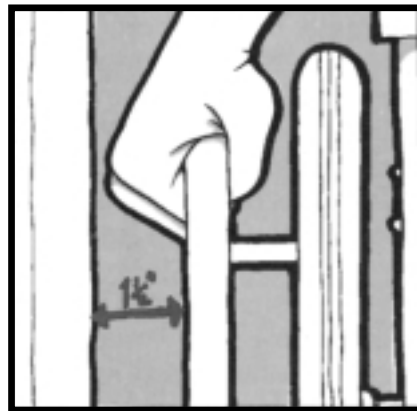
Short of replacing the entire door and frame with a wider doorway, there are several solutions to the narrow door problem.



• **Swing Clear Hinges**

You can replace the existing hinges on your doors with "swing-clear hinges." They enlarge the clear opening of the door by 1½"-1¾" (the thickness of the door itself). This additional clearance is often enough to provide the necessary minimum width for a wheelchair to pass through the doorway, though it may be a tight squeeze. If the clearance is tight, you may want to glue or screw a piece of plastic laminate or sheet

metal on the door so wheelchairs won't mar the surface as they pass through the doorway.



• **Remove Door Stops**

You can often remove the small wooden door stops which create a stop for swinging doors and re-install them 3' above the floor.

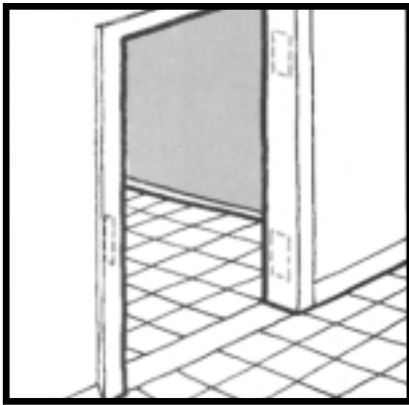
This will add an additional ¾" to the clear opening width of the doorway, which may be enough to allow a wheelchair to pass through.



• **Remove Doors**

If you remove existing doors you can provide an additional 1½"-2" of clear door opening. If you also remove the door's stops as mentioned, you'll gain an additional ¾" and a total of 2¼"-2¾" will be added to the clear width of otherwise inaccessible doors.

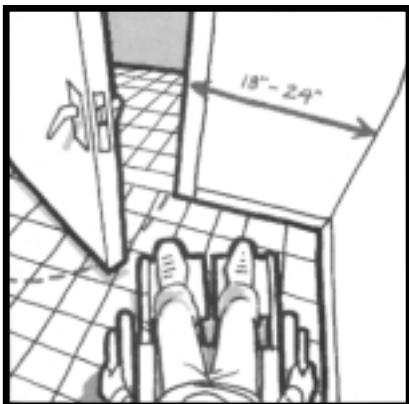
You may want to simply remove the pins from the hinges and remove the door from some doorways. In other locations, where aesthetics are a consideration, you can remove the hinges, door stops, and other hardware, fill the resulting holes with wood putty or spackle, and repaint or refinish the door frame. Before you remove hinges altogether, make sure you'll never want to reinstall the door in the doorway. Reinstallation may be fairly difficult once your door frames have been modified.



### Landings

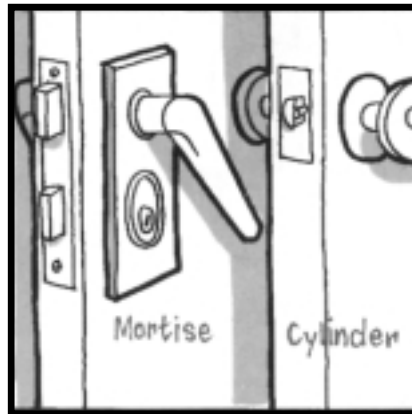
Small landings on either side of doors can create problems if you or others in your home use mobility devices. It is difficult to pull a swinging door open if you, or your wheelchair or walker already occupy the landing area where the door must swing. Usually 18"-24" is needed beyond the strike jamb on the pull side of the door to allow enough room for a wheelchair user to easily open the door. 12" is needed on the push side if there is a lock and closer on the door.

Unfortunately, to enlarge a landing you may have to relo-



cate walls or partitions. This may be a difficult task, especially in older homes where walls or partitions bear the weight of the house or where electrical or plumbing lines are located.

Two alternatives are available. You can either remove the door from the doorway and eliminate the need to open or close it, or you can install an automatic door opener. Either option will eliminate the need for a wide door landing. For more information, refer to the section on door openers, page 42.



### Hardware

Hardware choices include latches, locks, thresholds, kickplates, vision panels, and door openers. Depending on your needs, all or some of these options may be appropriate in your home.

### Latches

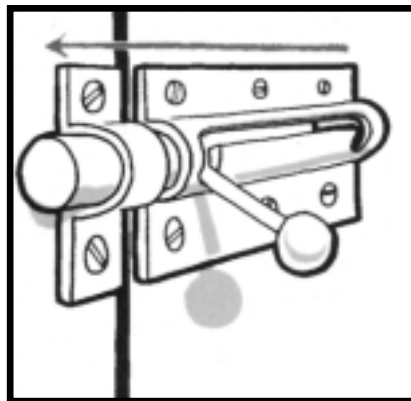
Latches are a means of keeping doors closed. If a latch isn't necessary (i.e. spring loaded or well-balanced doors), you may prefer to



deactivate the latch. Anyone can push open a door or pull it shut if there is no excessive weight involved and the hardware for pulling the door is easy to grasp.

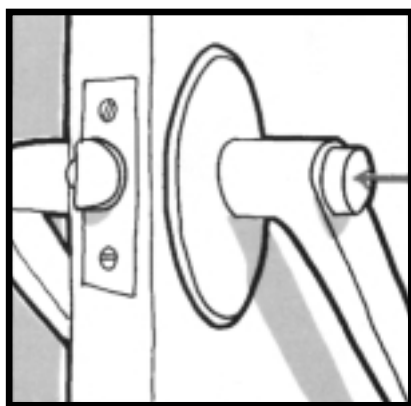
When latches are required, you may want to install a device that requires no fine gripping or strong twisting ability. Lever hardware is now available in a wide variety of types, finishes, and qualities from most manufacturers.

Most residential construction uses cylindrical lock sets and latches which may require more expensive replacement levers. But lever arm add-on units are available from several manufacturers for adding a lever arm to existing cylindrical latch sets. For information about these products, refer to the Resources chapter which starts on page 36.



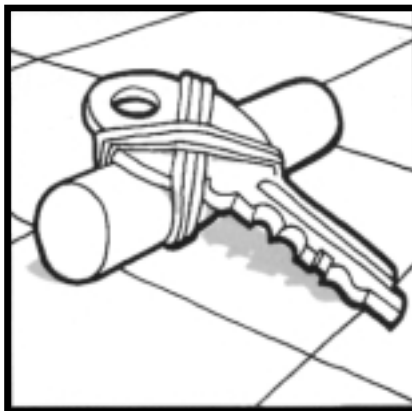
Lever hardware is preferable to any kind of small twist knob. Push buttons may be satisfactory if they don't require fine dexterity to release the lock. A push button lock in a cylindrical lever latch is perfect from an operational point of view, but it doesn't generally provide the security of a dead bolt mechanism.

Slide bolts, however, are fairly easy for anyone to operate and provide nearly the same security as dead bolts.



### Locks

The security you desire for your home may be more difficult to achieve if you have hand dexterity impairments. Many locks require fine dexterity and finger strength. Using the closed fist rule, you can easily determine whether your locks are useable by older persons in your household who have arthritis.

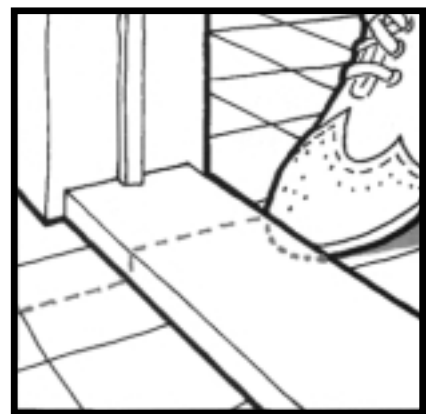


A lever arm welded or attached to an existing turn knob, may be an acceptable way to adapt your door locks.

Magnetic card readers, remote control locks, and combination locks which are push-button activated work well for many people. If you have key locks which retract dead bolts (mortised lock-sets), you may be able to attach a dowel or other lever arm to the key. This makes it easy for people with limited finger strength to operate and retract the dead bolt.

### Thresholds

Abrupt changes in levels greater than  $\frac{1}{2}$ " can create tripping hazards for people with walking problems and barriers for people who use wheelchairs. Thresholds should be ramped or removed so they do not create any type of barrier.





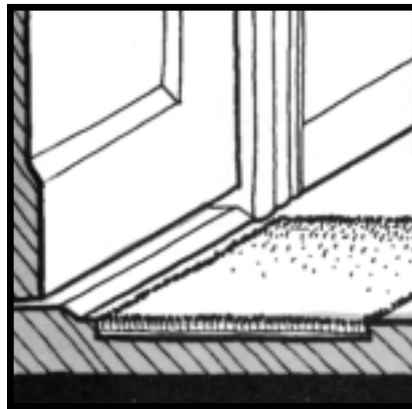


### Doormats

Doormats, while helping to keep your house clean, can create tripping hazards. Secure doormats to the floor surface. You may need to fasten them in place with tacks, staples, or double-sided carpet tape. In new construction, recess them to be flush with the surface so they don't create an edge profile that can cause someone to trip. Since doormats can also slip and slide around on the floor, rubber backed doormats or non-skid rubber under-mats may reduce the problem.

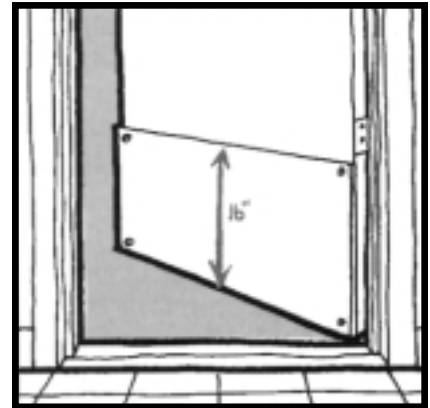
To remove a threshold, you must either cut or pry up and patch the flooring at wooden thresholds, or replace metal or masonry thresholds with others that have a lower profile. In some cases, you may be able to install a beveled ramp that abuts the edge of the threshold and eliminates the wheeling and tripping barrier.

Alternatively, you can fill the area with mortar or plastic material that will level the approach to the threshold. You should try to eliminate the threshold completely, however, since even a gradual ramp may create problems for some residents or visitors in your home. Analyze the abilities of the members of your household to determine what's best for you and those who live with you.



### Kickplates

Where a doorway is especially narrow or someone habitually pushes the door open with wheelchair foot rests, excessive wear can occur. Oversized kickplates can reduce this wear. Kickplates



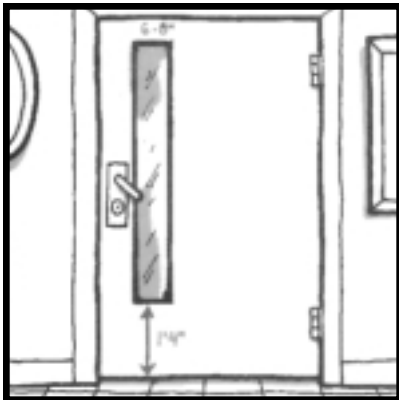
should extend from the floor surface up to a height of at least 10" and preferably 16". You can fasten plastic laminate, metal, and even hardwood kickplates to the door to provide protection. Kickplates should be as thin as possible so they won't reduce the clear door width opening.

### Vision Panels

If you have interior passage doors that you normally leave closed, you may want to install vision panels in them so that slow-moving persons won't be knocked over by others coming through the

door. These panels should be located as shown in the illustration.

For security reasons, you may want to provide one-way vision panels and/or peepholes on entrance doors.



This will allow you to visually survey any visitor before you open the doorway and expose yourself to risk. For people in wheelchairs, peepholes should be located approximately 36"-45" above the floor.

### Automatic Operators

If one or more of your doors are difficult to open because they are excessively heavy or the landings are small, you may want to install automatic door openers. A simple system of pulleys and weights as shown in the illustration may be a satisfactory solution for doors where access is a problem.

Electro-mechanical openers that plug into an electrical outlet and are operated from a remote button or sensor are effective for many installations. Pneumatic systems like



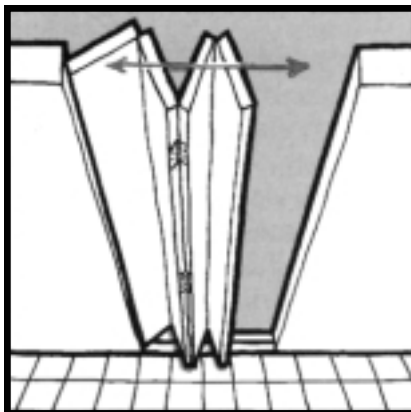
those at supermarkets require compressors and piping, and are generally much more expensive than the electro-mechanical systems mentioned above. Automatic operators are available for sliding or swinging doors. Refer to the Resources chapter which begins on page 36 for the names of manufacturers.

## Door Types

If you plan to modify or replace doors for better accessibility, remember that several types of doors may be suitable. Swinging doors are the most common, but they require landings on both sides.

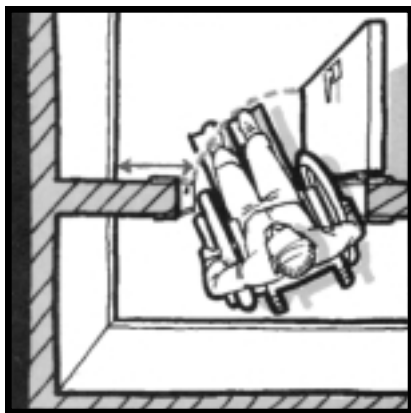
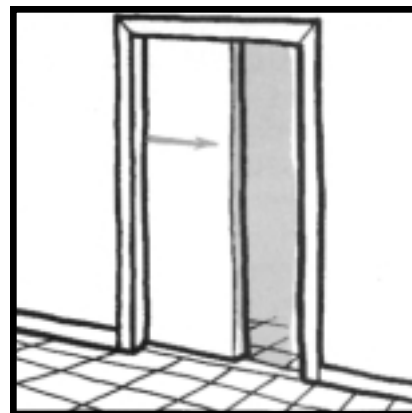
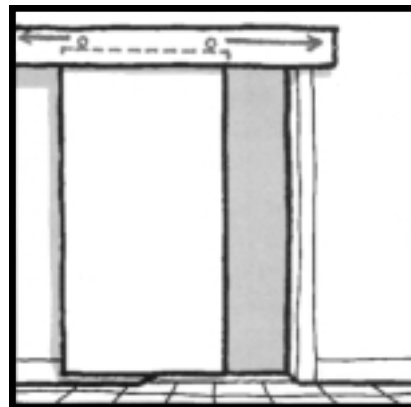
Sliding doors are often useful when space is limited, but their weight and lateral movement can cause problems for some people. And some sliding doors require a floor track that can create a tripping or wheeling problem for some people. Threshold modification may be necessary.

Folding doors are another option. They require lateral force, but are generally lighter in weight than most other doors. However, the hardware for these types of doors sometimes will not withstand constant use.



Pocket doors are coming back into style. Where there is only an occasional need for privacy they're especially effective. When they aren't being used, they're out of the way and out of sight (hidden in a wall).

Pocket doors can also be inexpensively mounted on the surface of an existing wall, but may be less attractive than when hidden in walls.



# STAIRS AND RAMPS

## Stairs

Stairs that are easy to use are also safe stairs. For example, handrails on stairways are an important safety factor for all of us. But for many people, stairs are useless unless they have handrails.

Stairways are a necessary evil, second only to bathrooms in incidence of accidents. As we become older, stairways become more and more difficult to use and their design becomes critical. The information in this section applies to both interior and exterior stairs in your home.

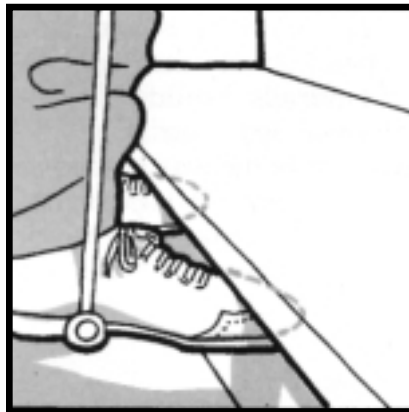
## Treads and Risers

Tread and riser designs are extremely important.

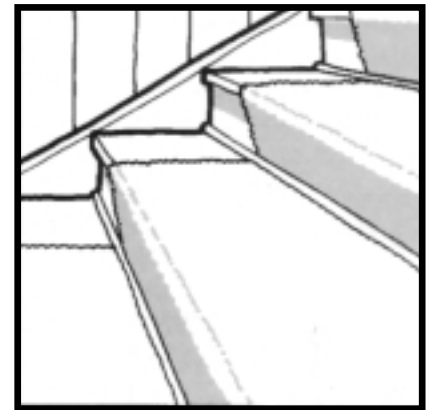
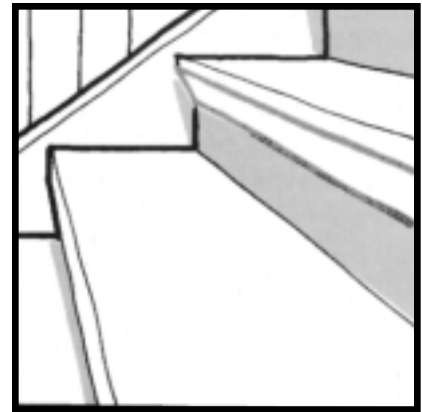


Risers in excess of 6"-7" are difficult for many people to climb and are dangerous tripping hazards.

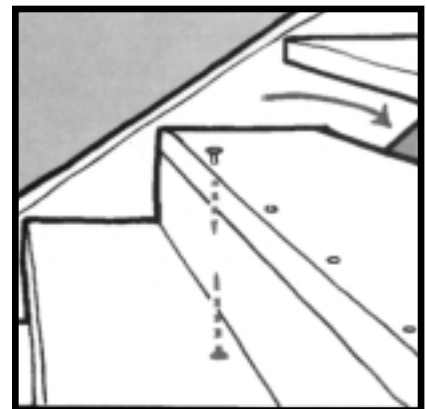
Outside risers should have a maximum height of 4". The tread should be wide enough to allow your foot to rest completely on the tread without extending over the edge of the step. Where the total length of a stairway is limited, you can extend tread width by installing a projecting edge, or a nosing on the front of the treads. However, unless you install them properly, nosings can create tripping hazards, especially for people with leg paralysis.



Nosings should be beveled, either by the insertion of a piece of wood or metal that will allow toes to slide up and over or by carpeting to slant the nosing projection.

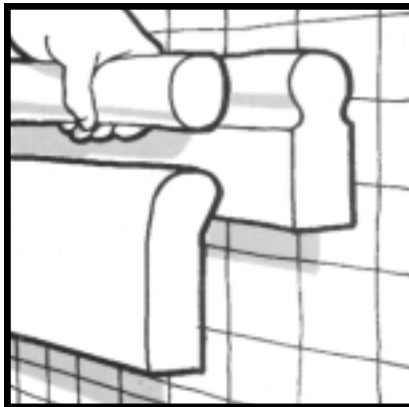
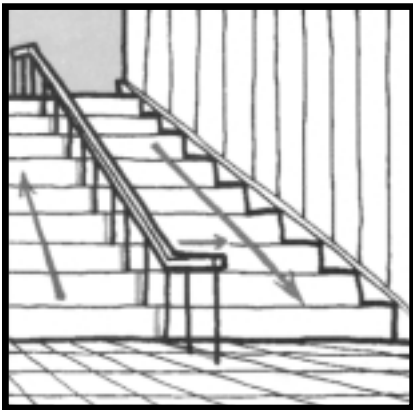


Open risers (found on many exterior wooden stairs) are a real hazard to most people because of their tripping potential, but you can easily close them off with pieces of wood.



## Handrails

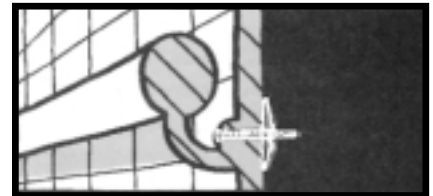
You should install handrails on both sides of your stairways so that you or anyone else who has strength on only one side will have support as you go up or come down. If you have a wide stairway or you can't provide handrails on both sides, you may want to install a single handrail in the center of the stairway. This installation allows users to keep the handrail on their strong side. Handrails should also extend beyond the top and the bottom nosings because users need their support to get on and off the last step.



Handrails should be designed so that users can grip the rail between thumb and fingers. This "grasp-ability" or opposition is essential to the safety of users.

Handrails should be mounted approximately 1½" away from the wall to allow adequate grasping space for knuckles and fingers. They should be mounted to support up to 250 pounds at any point. You can secure a handrail by screwing directly into the upright studs behind

the wall surface. Handrails made from wood should be properly finished to avoid splinters.



## Stairway Lighting

Many stairway accidents can be prevented with lighting that shines uniformly on the steps and the top and bottom landings.

Be certain, however, that your stairway lights don't create glare or distract persons who use the stairs. Indirect lighting (lighting that does not shine directly on the object being lighted), is the best alternative for stairways.

## Ramps

Many barrier-free design specialists prescribe ramps wherever floor levels change. Ramps help people in wheelchairs, but for others they create additional problems. Bifocal wearers sometimes misjudge the correct distance and slope of a ramp. Some users slip if the surface is not properly prepared. By following the advice listed below, you can make your ramps safer.

## Slope

Exterior ramps should have a maximum slope of 1" of rise for every 20" of length (1 to 20 slope) to ensure that ice, snow, leaves, and other debris won't create a sliding or slipping hazard. If possible, they should be located where sunshine will reach them in winter to help melt accumulated snow or ice.

Interior ramps should have a maximum slope of 1" to 12" of length because many people in wheelchairs cannot push themselves up a steeper incline, and a steeper slope can cause a wheelchair to tip over backwards.

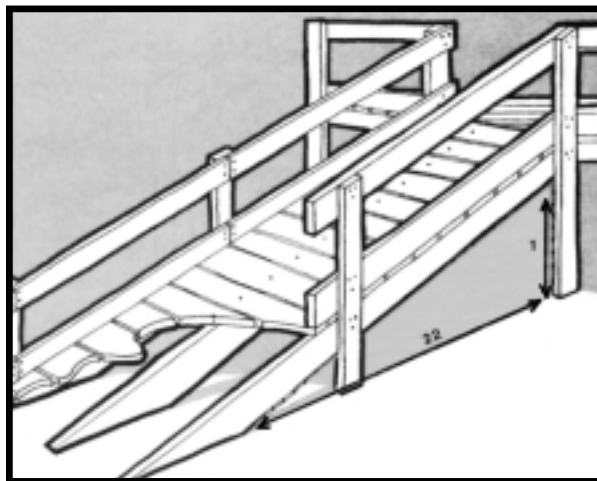
Ramps used in and outside the home are usually made of treated wood. Their structural details are shown below.

Outside, concrete or metal ramps may be more suitable than wood ramps. In some

cases, ramps with an extreme slope (1 to 8, for example) may be appropriate for persons in wheelchairs if they have strong upper torsos or power wheelchairs. Before you install ramps of any kind, determine the exact needs of the people who will use them.

## Landings

Landings are necessary at the top and bottom of ramps, and at intermediate levels where a ramp changes direction or rises higher than 3'. Intermediate landings provide rest areas and adequate maneuvering space for turns. Landings should be at least 5' long at all of these locations.



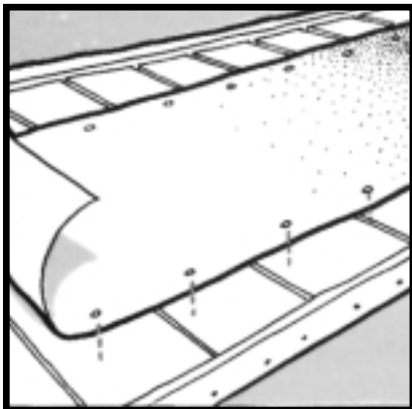
## Handrails

If you install ramps, make sure to provide handrails on both sides, for the same reasons they are needed on stairways.

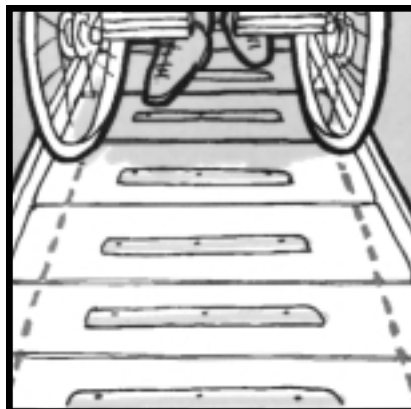
## Ramp Surfaces

Since an inclined surface creates an increased slipping hazard, you should provide a non-slip surface on all ramps. For exterior wooden ramps, you can apply paint mixed with sand. One pound of silica sand added to a gallon of paint (and mixed thoroughly) is effective. Several paint manufacturers make nonskid deck paints which provide the same type of nonskid surface.

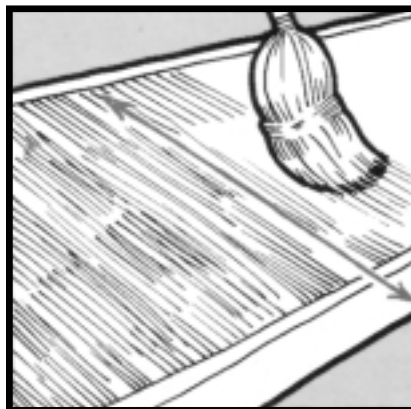
You can also use rolled roofing material. When properly tacked down, it provides a good non-slip surface for walking or wheeling.



If your ramps are exposed to snow and ice, or have an extreme slope, you or another attendant will have to assist members of your household or visitors who use wheelchairs. Battens (small strips of wood nailed to the surface) provide adequate footing for this purpose.



Broom-finished concrete is an excellent surface for exterior concrete ramps.

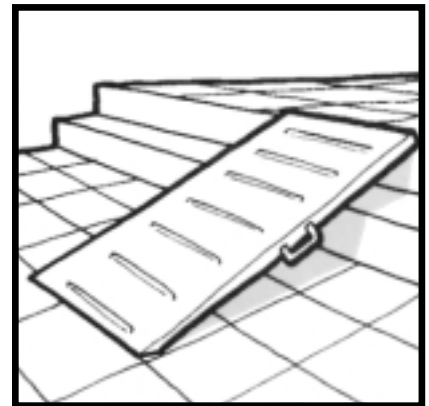


Make sure the broom strokes are perpendicular to the slope of the ramp.

On interior ramps, most surfaces work adequately if they aren't slippery. Try to avoid using carpeting, waxed linoleum, or glossy painted surfaces.

### Portable ramps

Portable ramps are sometimes adequate, but are usually short and can only facilitate a small level change. They are available from many surgical supply houses, and from manufacturers listed in the Resources chapter which begins on page 36.



# BATHROOMS

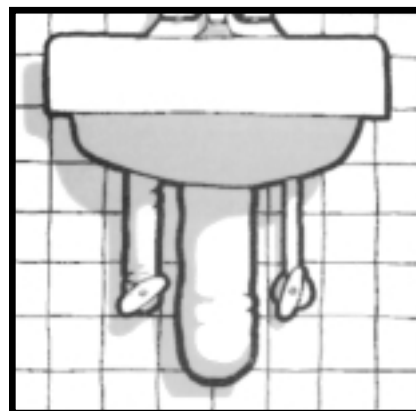
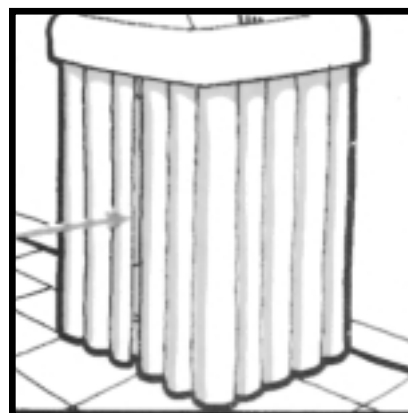
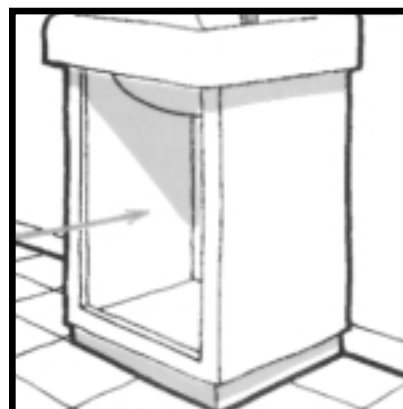
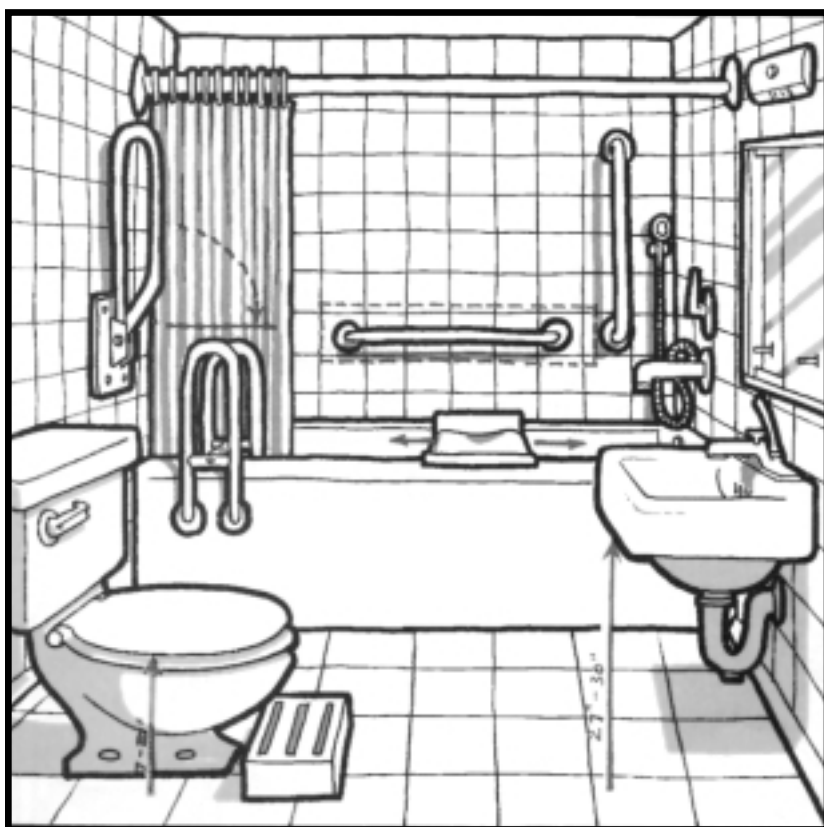
## Sinks and Lavatories

Three elements are critical in lavatory design: the clearance underneath the sink (for those who use wheelchairs), the height of the sink (for those who may have difficulty bending from the waist or for others who are seated in chairs), and the faucet hardware (for those who have hand dexterity problems).

People in wheelchairs need approximately 27" to 30" of height underneath the front of the sink so they can get as

close as possible to the basin. Removing the doors or the entire cabinet below the sink can eliminate access problems. A decorative curtain below the sink will allow access while providing a concealed undersink storage area. If you remove your sink cabinet, cover or shield any sharp edges or hot water supply and waste pipes (if the hot water temperature is set above 115° Fahrenheit). To cover the pipes, use pipe insulation (as illustrated

below) or build a box around the pipes to protect you from burns.



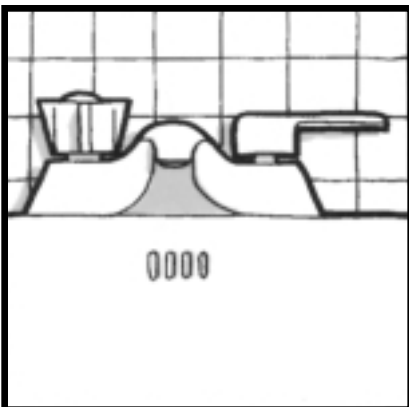


### Vanity Top

Your sink should be located at a height where you can use it comfortably whether you're seated in a wheelchair or standing. Generally, a 30" high lavatory top provides easy access if you're seated; 34" is the maximum height allowed by barrier-free design standards. If you are very tall and have difficulty bending, raise the top to 36" or even 40". If there are others in your household who are short, a compromise height of approximately 30"-34" should be acceptable to everyone.

### Faucets

If you have limited hand dexterity, adapt your faucets so you can operate them easily with a single hand. Single lever faucets are best because they provide a visual indication of water temperature, and don't require fine hand dexterity to operate. They also provide a mixed water temperature from a single tap. You can replace existing knob-type hardware by removing the handles and installing double levers or cross knobs (available at most hardware stores) that fit the faucet stems. When handles are hard to turn, their washers probably should be replaced.

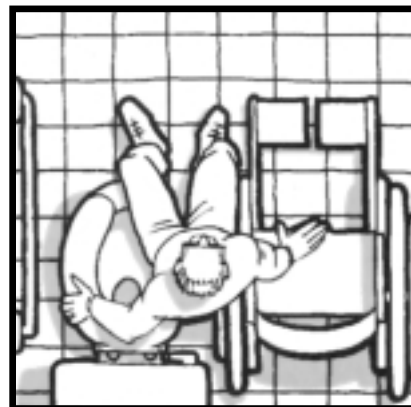
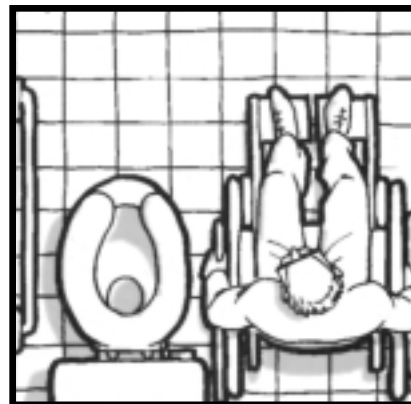


### Toilets

The optimal toilet seat height varies from one individual to another. It's easy for most people to sit down or get up from an 18" high seat. However, this seat height often creates problems with bowel movement. Many older people need to assume a squat position, with their knees above the level of their buttocks. Toilets mounted at a low height would resolve this problem, but they create problems for persons who have difficulty getting up and sitting. A design which raises the feet slightly helps to resolve the problem.



Rehabilitation hospitals now teach people how to transfer themselves without assistance from wheelchair to toilet or tub as illustrated below.



Stable support such as grab bars or tub edges is critical to allow individuals to safely complete this independent transfer. If independent transfer isn't possible, lifts are available to help people from one place to another, but they usually require assistance from another person.



### Grab Bars

Grab bars surrounding toilets must be located so they are convenient and strong. Most building codes require that they be capable of withstanding a 250-pound load. To support this weight, the bars should be screwed directly into wall studs, or installed using a blocking technique. Molly bolts, nails, or screws into sheetrock are *not* adequate.

There are three basic types of grab bars: wall-mounted, sheltering arms, and pivoting. Consider the needs and capabilities of users in your home before you select a particular type.

Pivoting grab bars can be moved out of the way and yet be close when they're needed to provide support. Wall-mounted grab bars are the most stable, and sheltering arms provide the best support for getting up and sitting down on a toilet from a standing position.

Grab bars designed for wheelchair users aren't always satisfactory for people who use crutches, canes, or walkers to get around. Many elderly people find getting up from or sitting down on a toilet difficult because they've lost muscle strength in their legs and knees. For this reason, sheltering arm grab bars are superior to wall-mounted grab bars.

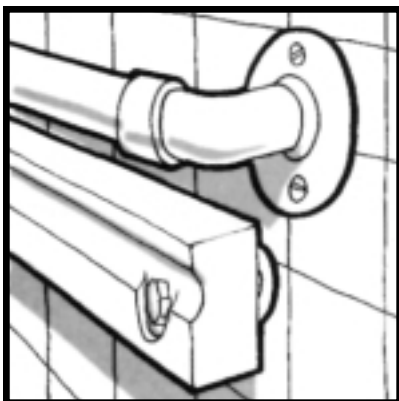
The sheltering arm grab bar surrounds you, providing support similar to the arm rest of a standard chair. It allows you



to use your arm and leg muscles to lower yourself onto the toilet and return to a standing position. Sheltering arms also provide better balance support while you are seated on the toilet.

Make sure that these bars are firmly secured to the toilet to prevent instability or shifting. Tightly attach the bolts to the toilet and check them every few weeks. Sheltering arm grab bars which have legs that extend to the floor (see illustration) are more stable than bars which rest only on the toilet bowl.

You can make perfectly useable wooden or plastic grab bars from common construction materials.



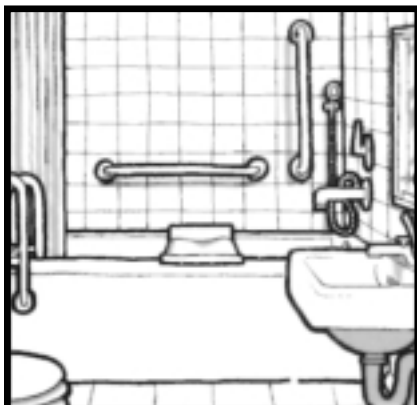
If you make rectangular wooden grab bars, allow closure between the thumb and fingers of your hand. This provides the best grip when you close your hand around the bar. The optimum diameter for grab bars is 1¼"-1½" for adults. For a child or person with a very small hand, the ideal diameter is 1"-1¼". The distance between the wall and the grab bar should be 1½". A wider space can be dangerous if you slip and your elbow lodges between the wall and the bar. A narrower

space is not adequate for fingers and knuckles.



### Tubs and Showers

Transferring someone from a wheelchair to the tub is one of the most hazardous activities you may ever have to attempt at home. Getting into the tub is also hazardous for semi-ambulatory persons. To accommodate these individuals, your tub area must be carefully designed to provide maximum safety for a minimum effort. Grab bars should be securely mounted on the walls or on the tub side to provide support during the transition.



Tub seats allow persons in wheelchairs or others who have poor strength in their legs to sit in the tub and take a bath or shower without having to lower themselves to the floor of the tub. A tub seat also works well for those who tire easily and need to sit while bathing.



Several types of tub seats are available. Refer to the Resources chapter which begins on page 36 for manufacturers. You can also install a built-in tub seat, which will be more stable and safer than a removable seat. Be sure to carefully design this seat for drainage, so that water runs back into the tub and not out the side when you bathe.

**Shower/Tub Controversy**  
Since many people prefer a bath to a shower, think about your preference before deciding which is the most appropriate unit to install. If you have poor circulation in your extremities, you may find that soaking in a warm tub at the end of the day is an excellent way to relax and get more comfortable.

### **Shower and Tub Controls and Accessories**

As with lavatory faucets, single lever shower and tub controls are the best. Antiscald temperature controls are available that prevent the water temperature from exceeding an established limit. If the water temperature in your house is above 115° Fahrenheit, you should consider installing this feature.

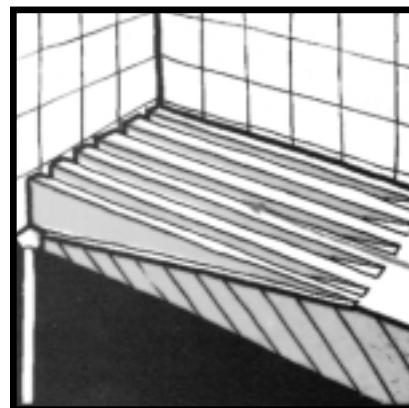
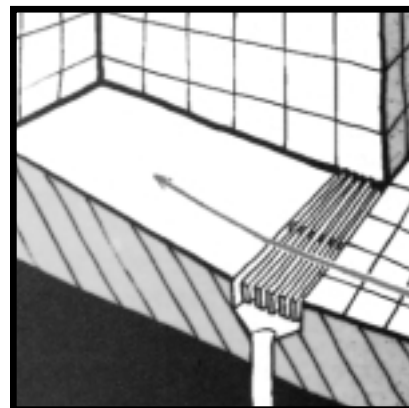
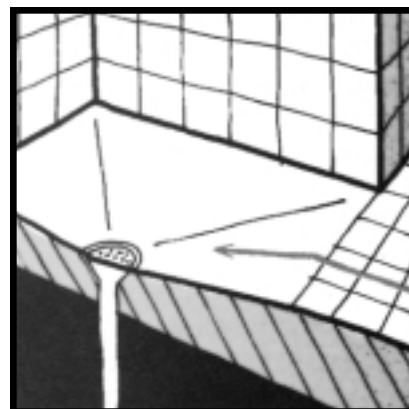
Shower curtains and doors are the two primary means of containing water within showers or tubs. But sliding doors with tracks can present a formidable barrier if you are transferring from a wheelchair to a tub seat. The lower tracks often have sharp edges which can injure persons

who try to slide over them. For this reason, you should try to provide a shower curtain in a tub to be used by a person transferring from a wheelchair.

### **Shower Units**

Accessibility standards call for two types of showers in accessible facilities: roll-in showers and transfer showers.

Roll-in showers provide a gentle, easily crossed threshold that keeps water in the shower area. A person in a wheelchair can easily roll from the shower area to the rest of the bathroom. In most cases, people who will roll into the shower will use a special commode chair. Because its small wheels can catch on ridges, thresholds, and cracks, it's important to have smooth thresholds between the bathroom and the shower.



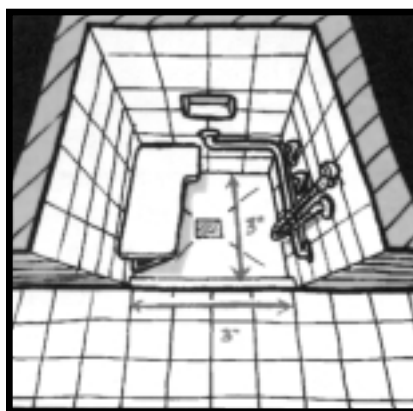
Roll-in showers normally require a larger space than standard showers, but they should be equipped with the same hardware and controls as standard showers.

Transfer showers require that you transfer from your wheelchair to a seat in the shower compartment. The dimensions of a transfer shower are critical. When you're seated in the cubicle you should be able to easily reach the surrounding grab bars and controls.

You can probably transform your existing shower into a transfer shower by simply installing a seat and the appropriate controls. Make sure that a clear floor area is available for a wheelchair to approach the shower area and allow an easy transfer to the shower seat.

Hand-held shower heads are a necessity for many people, particularly those who are seated in a shower or tub. These fixtures often come with adjustable height rods and/or fixed hooks to allow the shower head to become a fixed level unit. It's imperative

to have at least 5' of hose attached to the shower head so that it can reach the end of the tub or shower. Many manufacturers provide special adapters that replace the existing shower head or tub spigot with a nipple for attaching the shower hose.



### Safety Issues

You're more likely to have an accident in your bathroom than in any other room in your home. Therefore, your bathroom should be designed and equipped to help you avoid slipping or injury when you use the facility.

### Floor Surfaces

Non-skid adhesive strips, flowers, or dots are a low-cost solution to the problem of slippery walking surfaces, both inside and outside of the bathing unit.



Replacing the existing floor surface with a slip-resistant surface, such as a non-skid ceramic tile or indoor/outdoor carpeting, is another solution that is more costly, but may be more aesthetically acceptable.

### Grab Bars

Securely mounted grab bars or strong towel bars are necessary at places where a person may be off balance. They

must be capable of supporting at least 250 pounds of force (more if anyone who is a frequent user of the facility weighs more than 200 pounds). To make sure they are capable of supporting this weight, ask the dealer or manufacturer, and screw the bars directly into the studs in the walls or a secure form or blocking that has been applied to the studs. Screws fastened into tile or sheetrock are not adequate anchoring.

### **Lighting**

Make sure you have adequate lighting in your bathroom so you won't trip, slip, or hurt yourself. It's especially important to light the area around the lavatory or sink for convenience, personal grooming, and easy reading of medicine containers and directions. It's also important that your lights

shine on the object being viewed, rather than directly into your eyes. Direct light sources create special problems for people who wear glasses that refract light, causing glare problems. Cover bulbs with some kind of shade to create indirect, soft illumination.

### **Electrical Shock**

If you use any electrical appliances in the bathroom (hair dryers, electric shavers, electric hair curlers, etc.) their circuits should be Ground Fault Interrupted (GFI). This type of equipment virtually eliminates the possibility of electrical shock and is part of the bathroom building code in many states. Hire a professional electrician to install GFI outlets to make sure they are properly grounded, and test the circuits regularly to make sure that they are operational, using the button on the outlet.

### **Storage**

Many older homes don't have adequate storage space for medicine, equipment, and linens in or near the bathroom. If your space is limited, you may want to install medicine cabinets or shelves to hold these items. If you or others in your home have equipment ordered by your doctor or rehabilitation therapist to assist you with personal hygiene, make sure the items you use frequently are stored within easy reach.

## KITCHENS

**T**here are so many labor-saving kitchen devices on the market today that even a severely limited person can be a great cook. Many of the techniques you can use to make food preparation easier are described below.

### Work Triangle

The flow of activity in efficient kitchens follows a triangle. The path starts at the food preparation area, which is generally around the sink where foods from the refrigerator or storage are cleaned

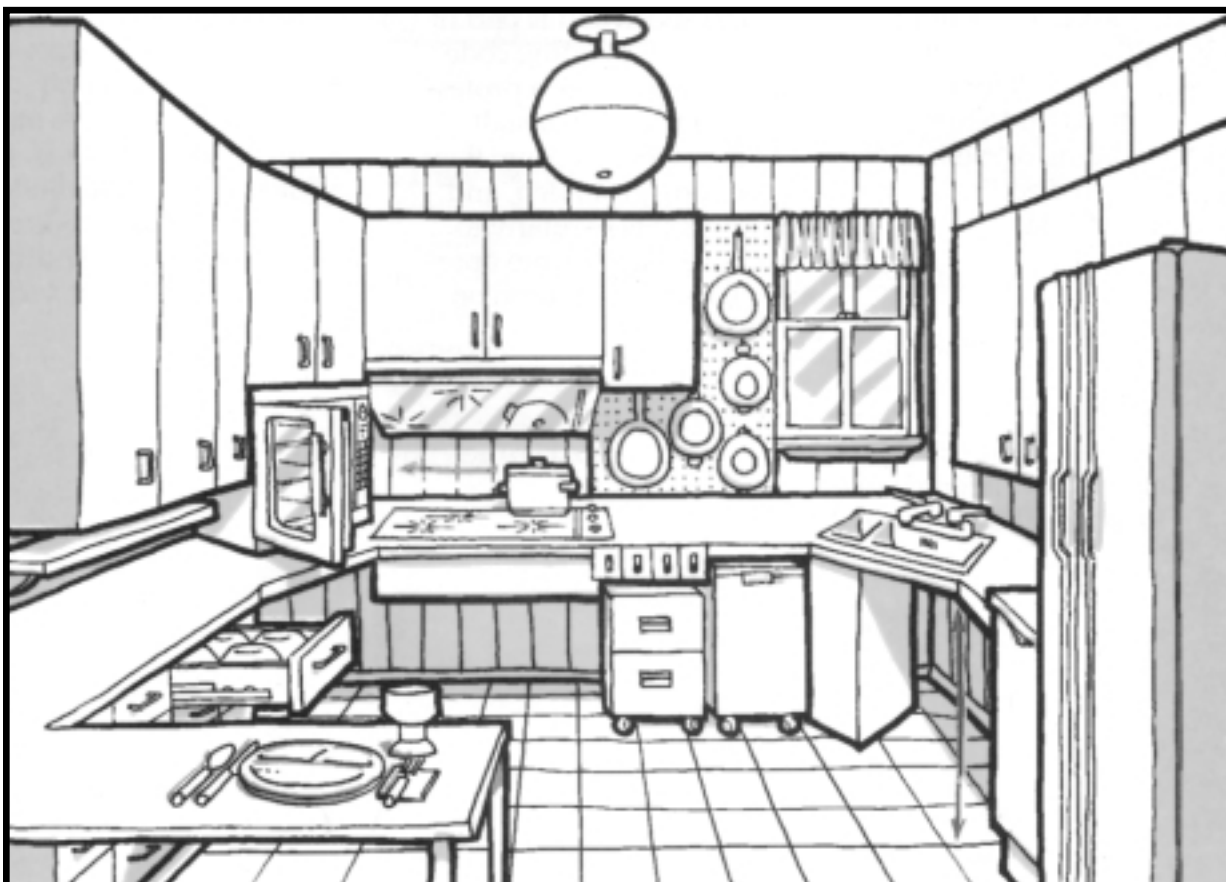
and washed. The next stage is the mixing area, where foods are mixed and processed. The third stage is stove, range, microwave, etc. where the food is cooked. You should try to arrange these stages in a linear or triangular pattern to conserve your energy and to function efficiently.

### Refrigerators and Freezers

Side-by-side refrigerator/freezers allow access to each area, at least in part, by everyone, regardless of their bending or reaching capabilities. A

person who uses a wheelchair can reach the lower portion of this appliance. A person who has difficulty bending over can use the upper areas.

However, some people dislike side-by-side refrigerators because their freezer sections are narrow. A top freezer (the most common model available) is easily used by a person who has bending difficulties. A bottom freezer is much more easily used by a short person or someone who uses a wheelchair.



Self-defrosting refrigerator-freezers, ice cube makers, and cold water spigots are especially helpful to persons with limited strength and dexterity.

### Counters and Work Surfaces

If you're kneading bread, you probably require a counter surface at wrist height. If you're chopping vegetables, you probably prefer a higher counter height. Tall people prefer higher counters; short people and people in wheelchairs prefer lower counters. Adjustable countertops can satisfy each of these preferences. The only counter area which cannot be raised or lowered easily is the area directly above the dishwasher. Instead of a work area, you can use this counter as a transition area for food coming to and from the refrigerator or sink.

Stand-alone kitchen tables are useful if you need or prefer to sit when preparing food. You can also attach a

lapboard to your wheelchair or place it on your knees.

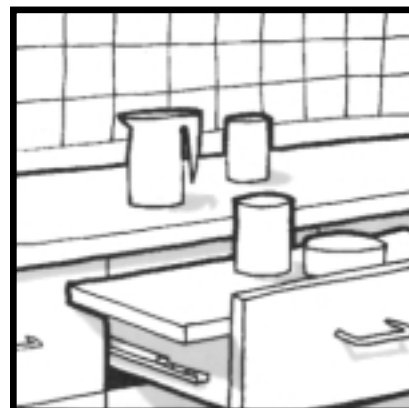


Corner counters can be used effectively for stoves and sinks, providing the leg space you'll need if you're seated or use a wheelchair. This arrangement eliminates the problem of storage in an inaccessible corner.

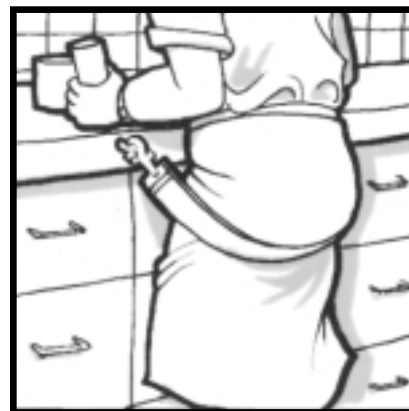
Remember to allow at least 18" of counter space next to any major appliances to hold containers or food that is going to be used or put away.

You can also create different counter heights by installing folding or pull-out surfaces, like cutting boards,

at convenient heights, or by placing a wooden board on top of a convenient drawer.



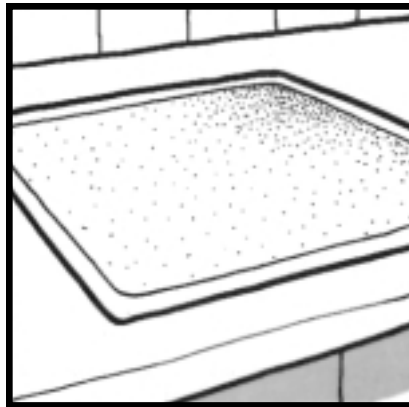
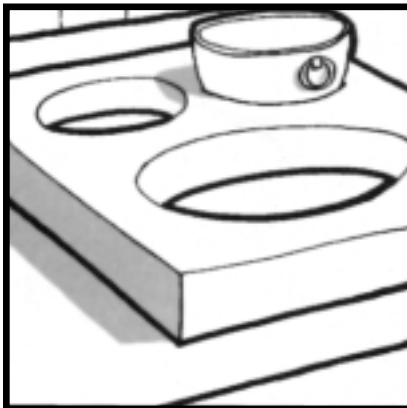
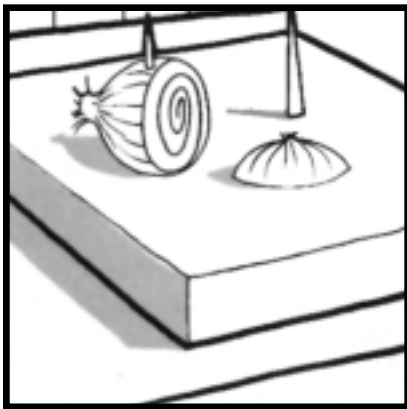
A stool will allow you to sit at the counter without back strain. Tall stools or adjustable height chairs are also useful. They can be mounted with casters to make getting around easier. If you're unable to stand for long periods, a sling belt can be outfitted on the counter to help you when you feel fatigued.





Persons in wheelchairs have great difficulty using standard counters because of the cabinets below. You can remove the base cabinets or just the cabinet doors to resolve this problem.

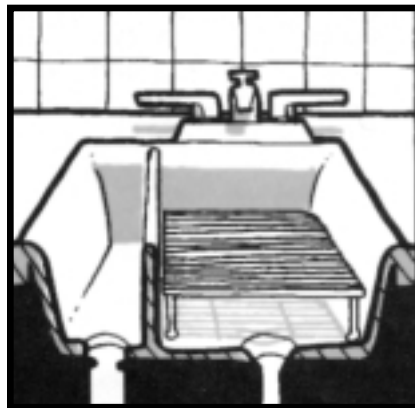
If you have limited hand dexterity, or can use only one hand, there are many ingenious devices that can help you prepare food. Spiked cutting boards, mixing bowl holders, and nonskid surfaces, are just a few of the devices that have been developed. The Resources chapter lists several publications which



describe this type of equipment in detail and where it can be obtained.

### Sinks

If your sink is too deep and causes you back strain when you lean over to reach things at the bottom, install a wooden, wire, or plastic rack. This will raise the working level to a height that's more comfortable for you.



You'll also need an open area below the sink if you use a wheelchair. Garbage disposals, which can obstruct this

area, should be located as far back as possible to provide the maximum amount of clearance. You may want to install a separate sink alongside your standard sink and attach the garbage disposal unit to it so you'll have adequate leg space underneath the primary sink. If the supply temperature to the hot water exceeds 115° Fahrenheit, insulate the hot water supply and the waste lines (refer to page 23).

### Cook Top

Ranges with staggered burners allow persons who use wheelchairs to reach the back burners without burning themselves. A mirror above the stove (similar to those used on cooking shows) allows a person in a wheelchair to visually supervise the progress of cooking food.



Your range controls should be located at the front or side of the cooktop so you can operate them without having to reach over hot burners. If there's leg room underneath the cooktop, insulate it so you won't accidentally burn yourself on the undersurface. Flush ceramic cook top units (which have a flat surface) allow persons who have little upper torso strength to easily slide pots and pans full of food and water from one area to another.



If your sink is located near the cooktop and has a handheld hose/sprayer, you may be able to fill a pot or pan from the sink without having to move the container off the stove.

### Ovens

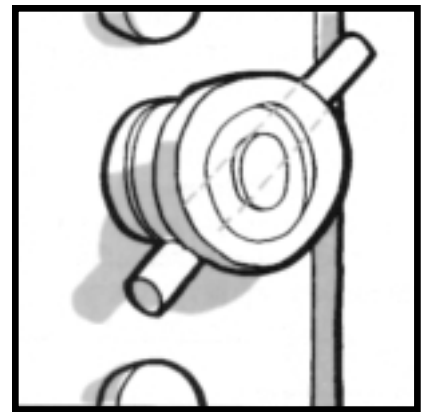
Oven location is important. A standard stove with the oven below the cooktop can create problems for people in wheelchairs because they have to bend over and reach a long distance to open the oven and pull out its contents.



Wall-mounted ovens with side opening doors are ideal for persons whose mobility is limited. However, convection and microwave ovens are the only appliances currently manufactured with side opening doors. A toaster oven is often more accessible and convenient for cooking or heating small items.

### Controls

As mentioned earlier, people with hand dexterity limitations are often unable to operate equipment controls. A rubber cane tip with a dowel through it, installed over an existing appliance control knob can help.



Any markings designating temperatures, settings, etc. should contrast with their background, so that persons with poor eyesight can easily see the level at which the appliance is set.

Controls should also have audible or tactile markings for cooks with limited eyesight. Warning lights or pilot lights should be visible so users will know when the appliance is on or off. A wooden safety hook can help ensure that a person doesn't burn himself when using an oven.



Controls for under-cabinet lights, exhaust fans, and wall-mounted electrical outlets should be located on the front edge of the counter. This allows a seated person to easily operate these devices without having to stretch a long distance.



The controls of wall-mounted ovens should be located no higher than 40" above the floor so that persons in wheelchairs can reach them easily.

### Storage

Where storage and the reach of the cook are limited, you should analyze the goods and equipment that you want to store. You may find out-of-the-way areas that are perfect for long-term or "deep" storage

items, such as the punch bowl that's used once a year, or the 50-pound bag of lima beans. Other items such as tableware, spices and condiments, and everyday dishes should be conveniently located. If you identify things you need only occasionally, you'll be able to anticipate when you need someone to help you reach out-of-the-way storage.

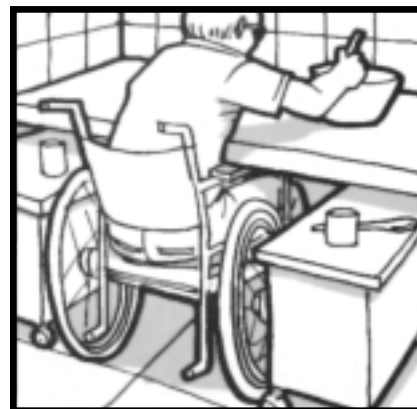
If you are short or in a wheelchair, kitchen storage



can be a problem. Base cabinets are the best storage areas, but when the space under a counter must be clear

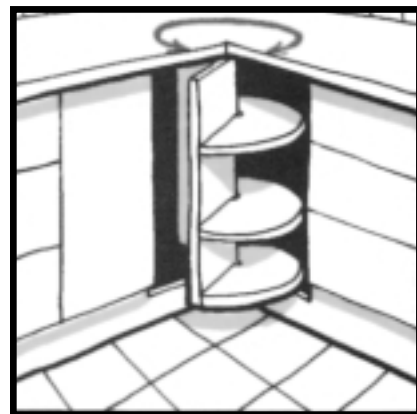
so a wheelchair can approach the area, the storage is lost.

One alternative is rolling storage carts that can be moved out of the way when access to the work surface is necessary. These carts can also help you work at one

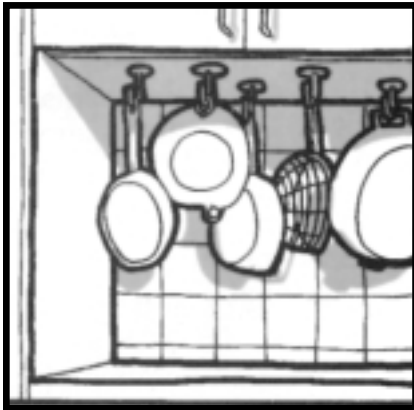


position with utensils and equipment on either side, and safely transport dishes and food from the kitchen to the serving area.

In corner cabinets, lazy susans eliminate the need for a long reach back into an inaccessible area.



Many innovative ideas are available to help you maximize your storage space, including door racks for brooms, hooks for pots and pans, and hangers for glassware and cups.



### Hardware

Replacing a knob with a loop can mean the difference between dependence and independence in the kitchen. Drawer suspension systems that make it possible to pull out a heavy drawer containing pots and pans are essential to some people.

Most of these types of hardware are relatively inexpensive, but indispensable for persons who use their kitchens frequently.

### Garbage and Cleaning

Trash compactors can help you limit the number of trips you make to the garbage can. However, compactors occupy valuable under-counter space, and make heavy loads that may weigh more than you can easily carry.

Garbage disposals are an excellent way to dispose of smelly trash. If you put all your organic materials in the disposal, you can reduce your daily trip to the garbage can to a single weekly trip.

However, as mentioned above, garbage disposals occupy space under the sink that you may need if you're in a wheelchair.

### Tableware

Appropriate tableware can ease the process of eating and eliminate embarrassment if you have unsteady hands. Lips

on plates allow a person with the use of only one hand to push food against the lip, onto the fork or spoon.

Glasses and stemware with contours that fit the human hand allow those with severe arthritis to drink gracefully again.

If you have poor hand dexterity, molded flatware that conforms to your hands can eliminate your dependence on others to cut your food.

Each of these items fosters greater independence, while reinforcing self-worth and promoting a sense of identity. With products becoming available, the institutional look is rapidly being replaced by fashionable styles. (Refer to the Publications section on page 38.)

### Safety

You should try to strike a balance between safety and usability in your home, especially if very old and frail persons or very young children are present. For example, many barrier-free design specialists recommend front controls so persons in wheelchairs won't have to reach across heater burners. However, you may not want a stove with front controls if your grandchildren visit frequently.

## Funding Suggestions

There are many options available to the homeowner or tenant who wants to make a home more accessible. Most of these take some time and legwork to find and secure the financing, but they may well be worth the effort. Following are some suggestions.

## Financing Options

Home equity loans are offered by many banks. They allow a homeowner to obtain low interest loans for renovations with the home itself acting as collateral on the loan. Remember, however, these are loans that must be paid back over time.

Large old homes can sometimes be subdivided to provide an "Accessory Apartment." These are sometimes called Echo Housing or 'granny flats'. The owner moves from the main part of the house to an attached or detached apartment and rents out the main portion of the house to a family. Another alternative of this option can provide even greater income to the owners in the accessory apartment by selling the house to the new family and using the down payment to make the accessibility improvements. The agreement needs to be carefully written to ensure long term security

for the old owner/new tenant of the accessory apartment.

## State and Local Funding

Many states and localities provide special grants and loans to their citizens for home remodeling. Contact your local or state housing authorities to determine the availability of such programs in your area. State finance agencies, departments of public welfare, community development departments, and building inspection departments are other possible sources of information. Private funding may be easier to locate than public funding, but you should thoroughly research the availability of money from public sources. A variety of agencies or departments may have funding available, so don't hesitate to ask questions that may lead you to other resources.

In most cases, the key to obtaining money is an effective proposal. A two or three page letter with supporting documents is the strongest approach to many of these agencies and associations, although some may have their own application forms. Your letter should include at least the following:

1. The reason for modification.
2. The solution you're proposing.

3. The total cost of the project with an analysis of appropriate separate elements. An itemized estimate by a qualified individual is often helpful.
4. The amount you are able to pay.
5. A conclusion requesting funds and thanking the organization for its consideration.

Remember that short, succinct proposals are the best form of communication.

## Public Sources for Funding Assistance

- The Rural Development office provides 502 or 504 loans in rural areas. Low income homeowners over age 62 also qualify for grants under 504 to build and repair their homes. Contact your local United States Department of Agriculture/Rural Development county office.
- The U.S. Department of Housing and Urban Development (HUD) provides direct loans to certain neighborhood development and employment agencies. Contact your city government or HUD field office to determine if such a program is available in your area. HUD also distributes funds under the Community Development

### Block Grant (CDBG)

Program to towns and cities for neighborhood improvement. The local government decides how to use this money, but some jurisdictions have elected to use part of their grants to help residents fix their homes. Contact your local government to determine if such a program exists in your area.

- The Veterans Administration (VA) provides low-interest loans to veterans to modify their homes. Contact the Veterans Administration to help you secure funding.
- The Internal Revenue Service (IRS) allows you to deduct equipment, furnishings, and permanent changes for access to your home as medical expenses on your IRS form. These deductions must be itemized on Schedule A with other medical expenses. If you're audited, you'll need a statement from your realtor or contractor. The IRS Treasury Publication 907 can explain how to take these deductions.

### Private Organizations

Most private organizations aren't able to provide large sums of money to individuals, so you may have to search for funding from several different organizations for different segments of your entire project. Don't be discouraged if your first few inquiries aren't productive. Send them the same short letter or proposal mentioned above. The following foundations and agencies may be able to provide the funds you need.

- American Cancer Society
- Muscular Dystrophy Association
- Multiple Sclerosis Society
- Cerebral Palsy Society of your metropolitan area
- Your State Governor's Committee or Council for the Handicapped
- Chamber of Commerce

If you or a member of your family belong to one of the following organizations, ask them for assistance:

- Rotary Club
- Lions Club
- B'nai B'rith
- Shriners Club
- Knights of Columbus
- Sertoma

- 4H Club
- Masons
- Church, synagogue, or other religious organization

Many communities have instituted home weatherization programs which make accessibility modifications, as well as energy efficiency modifications, to homes. Contact your local branch of the organizations listed below for information about such programs:

- Energy Conservation Corps
- Ebenezer Society
- Little Brothers
- YMCA
- Boy Scouts of America
- Other voluntary work programs
- Local area agency or council on aging

**Rebuilding Together**, formerly known as Christmas in April, is a program gaining popularity around the country. Volunteers make substantial improvements to a selected number of homes belonging to low-income, elderly, and disabled homeowners on a particular Saturday in the spring of each year, designated as the "Rebuilding Together Day." Both labor and materials are donated. Local

churches, social service agencies, and individuals can nominate potential houses of needy people to the local Rebuilding Together chapter. Contact Rebuilding Together to see if there is a group active in your community, or consider starting an affiliate.

**The Foundation Center**, with offices in San Francisco, New York City, Cleveland, Atlanta, and Washington, DC, can provide information about private funding sources around the country. Visit their Web site at [www.foundationcenter.org](http://www.foundationcenter.org) for more information.

### **Practical Considerations**

When you hire and work with building contractors, remember the following advice:

- Always get at least three bids. Make a list of the items you want to modify before you talk with the contractors so that each provides you with a bid for comparable work. All bids should be submitted to you in writing, and should indicate the amount of time (or starting and completion dates) required to accomplish the job.
- Ask your contractor to determine in advance how long it will take to complete the work. Make sure you

hold them responsible for finishing the project on schedule. On projects over \$2,000 it's common to provide some money up front. If you arrange to make payments throughout the period of construction, follow a 30 percent, 30 percent, 40 percent schedule (pay 30 percent up front, 30 percent after substantial completion, and 40 percent upon total completion of the project). Keep some funds in reserve to ensure that your contractor will complete the project to your satisfaction. Approximately one-third of your total payment is an adequate reserve to ensure that the contractor will complete the project.

- Ask each contractor who bids for at least three references. After you've selected the best bid, talk to at least two of the references to make sure that the contractor was punctual, that his cost forecast was realistic, that he was able to work well with the client and that his assistants were capable craftsmen.

## **DESIGN PUBLICATIONS**

### **Accessible Housing**

**Design File** by Barrier Free Environments, Inc.

### **UFAS Retrofit Guide:**

**Accessibility Modifications for Existing Buildings** by Barrier Free Environments, Inc.

### **Barrier-free Environments** by Michael J. Bednar

*Available from:*

John Wiley & Sons  
1 Wiley Drive  
Somerset, NJ 08875-1272  
1.800.225.5945  
[www.wiley.com](http://www.wiley.com)

### **American National Standard for Accessible and Usable Buildings and Facilities** by

International Code Council  
The basis for all accessible design in the United States; a 66-page technical manual with illustrations.

*Available from:*

International Code Council  
4051 Flossmoor Road  
Country Club IL 60478  
1.800.786.4452  
[www.iccsafe.org](http://www.iccsafe.org)

### **Accessible Stock House Plans Catalog** by Center for Universal Design **Affordable and Universal Homes** by Center for Universal Design

Catalogs of floor plans and perspectives for accessible

homes including accessible features and ordering information for the plan sets.

*Available from:*

Center for Universal Design  
North Carolina State  
University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)

### **Accessible Cabinetry and/or Accessible Plumbing**

Technical reports published by the IDEA Center, University at Buffalo. They describe state-of-the-art accessible fixtures, accessories and/or cabinetry. For use by people with disabilities and includes case studies of available products.

*Available from:*

Center for Universal Design  
North Carolina State  
University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)

### **A Comprehensive Approach to Retrofitting Homes for a Lifetime** by Lenny Rickman

*Available from:*

NAHB Resource Center  
400 Prince George's  
Boulevard  
Upper Marlboro MD 20774  
1.800.638.8556  
[www.nahbrc.org](http://www.nahbrc.org)

### **A Consumer's Guide to Home Adaptation**

A handy checklist for evaluating a disabled person's abilities and his/her home's limitations to determine what accessibility modifications will be most effective.

*Available from:*

Adaptive Environment  
Center, Inc.  
374 Congress Street,  
Suite 301  
Boston MA 02210  
617.695.1225  
[www.adaptiveenvironments.org](http://www.adaptiveenvironments.org)

### **Simple Solutions: Home Automation Technology for Easy, Safe, and Accessible Living**

Twelve relatively inexpensive home technology solutions that can benefit everyone from busy professionals, new moms, older adults and persons with disabilities. Information on equipment—what it can do, how it operates and installation requirements.

*Available from:*

Center for Universal Design  
North Carolina State  
University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)

### **Universal Design**

**Newsletter** by Universal Designers & Consultants, Inc., quarterly newsletter.

*Available by subscription  
from:*

Universal Designers and  
Consultants, Inc.  
6 Grant Avenue  
Takoma Park MD 20912  
301.270.2470  
[www.universaldesign.com](http://www.universaldesign.com)

### **ICAN at Arkansas Rehabilitation Services.**

Created through the Assistive Technology Act of 1998, Web site has a resource library of 2,000 books, pamphlets, audio tapes, video cassettes and papers on assistive technology and disability-related issues.

ICAN  
Arkansas Rehabilitation  
Services  
2201 Brookwood Drive,  
Suite 117  
Little Rock AR 72201  
1.800.828.2799  
[www.arkansas-ican.org](http://www.arkansas-ican.org)

### **TECHNICAL PACKAGES**

The following technical packages are available from:

Center for Universal Design  
North Carolina State  
University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)



### **Grab Bars GBTP.2.93**

A technical assistance booklet that contains descriptions of different types of grab bars and details on reinforcing walls for grab bar installation.

### **Universal Design for Decks, Patios, Porches and Balconies DPTP.2.94**

Information for making outdoor living areas accessible to all is provided through text and illustrations.

### **FINANCE PUBLICATIONS**

The following publications are available from:

Center for Universal Design  
North Carolina State University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)

### **Financing Home Accessibility Modifications**

A reference source that identifies potential sources of financial assistance for renters and homeowners and offers guidance and direction for locating assistance at the state and local level. A resource list of organizations and publications is also included.

**Financing Accessibility Modifications**, Fact sheet #8. FAFS.2.92.

**Home Financing for Older People**, Fact Sheet #5.

**Benefits of Accessory Unit Housing for Elderly Persons and Persons with Disabilities**, Fact Sheet #7.

### **ORGANIZATIONS that can assist you in the DESIGN of an ACCESSIBLE HOME**

#### **Adaptive Environment Center, Inc.**

374 Congress Street,  
Suite 301  
Boston MA 02210  
617.695.1225  
[www.adaptiveenvironments.org](http://www.adaptiveenvironments.org)

#### **Access Unlimited**

702 West Park Avenue  
Edgewater FL 32132  
1.800.575.8270  
[www.accessunlimited.net](http://www.accessunlimited.net)

#### **American Society of Interior Designers**

1.800.610.2743  
[www.asid.org](http://www.asid.org)

### **Center for Universal Design**

North Carolina State University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)

### **Universal Designers and Consultants, Inc.**

6 Grant Avenue  
Takoma Park MD 20912  
301.270.2470  
[www.universaldesign.com](http://www.universaldesign.com)

### **CATALOGS / DIRECTORIES of Accessibility and Personal Assistance Equipment**

#### **Directory of Accessible Building Products**

NAHB Resource Center  
400 Prince George's Boulevard  
Upper Marlboro MD 20774  
1.800.638.8556  
[www.nahbrc.org](http://www.nahbrc.org)

#### **MAXIAIDS Catalog**

Maxi  
P O Box 3209  
Farmingdale NY 11735  
1.800.522.6294  
[www.maxiaids.com](http://www.maxiaids.com)

#### **Accent on Information**

Accent on Information  
1660 L Street NW Suite 700  
Washington DC 20036  
1.800.872.5827  
[www.ucpa.org](http://www.ucpa.org)

**ORGANIZATIONS,  
ASSOCIATIONS, and  
RETAIL STORES that can  
assist you in finding  
ACCESSIBLE PRODUCTS**

**ABLEDATA**

National Rehabilitation  
Center  
8630 Fenton Street,  
Suite 930  
Silver Spring MD 20910  
1.800.227.0216  
[www.abledata.com](http://www.abledata.com)

**Yes I Can, Inc. (Retail Store)**

35-325 Date Palm Drive  
The Esplanade, Suite 131  
Cathedral City CA 92234  
1.800.366.4226

*also at:*

79-440 Corporate Center  
Drive, Suite 109  
La Quinta CA 92253  
760.771.9900  
[www.yesican.com](http://www.yesican.com)

**NAHB Resource Center**

400 Prince George's  
Boulevard  
Upper Marlboro MD 20774  
1.800.638.8556  
[www.nahbrc.org](http://www.nahbrc.org)

**GRAB BAR MANUFACTURERS**

**American Specialties, Inc.**

441 Saw Mill River Road  
Yonkers NY 10701  
914.476.9000  
[www.americanspecialties.com](http://www.americanspecialties.com)

**C.D. Sparling**

498 Farmer Street  
Plymouth MI 48170  
734.455.3121  
[www.cdsparling.com](http://www.cdsparling.com)

**Elcoma Metal Fabricating**

521 Lawrence Road NE  
Canton OH 44704  
1.800.352.6625  
[www.elcoma.com](http://www.elcoma.com)

**Seachrome Corporation**

344 West 157th Street  
Gardena CA 90248  
1.800.955.2476  
[www.seachrome.com](http://www.seachrome.com)

**BATHTUB SEAT  
MANUFACTURER**

**Graham-Field Health  
Products**

2935 Northeast Parkway  
Atlanta GA 30360  
1.800.645.5272  
[www.grahamfield.com](http://www.grahamfield.com)

**SHOWER SEAT  
MANUFACTURERS**

**Seachrome Corporation**

344 West 157th Street  
Gardena CA 90248  
1.800.955.2476  
[www.seachrome.com](http://www.seachrome.com)

**Kohler Co.**

444 Highland Drive  
Kohler WI 53044  
1.800.456.4537  
[www.kohler.com](http://www.kohler.com)

**PORTABLE, MODULAR, OR  
PERMANENT RAMP  
MANUFACTURERS**

**AlumiRamp, Inc.**

855 E Chicago Road  
Quincy MI 49082  
1.800.800.3864  
[www.alumiramp.com](http://www.alumiramp.com)

**Handi-Ramp Inc.**

510 North Avenue  
Libertyville IL 60048  
1.800.876.7267  
[www.handiramp.com](http://www.handiramp.com)

**The Braun Corporation**

1014 South Monticello  
Winamac IN 46996  
1.800.843.5438  
[www.braunlift.com](http://www.braunlift.com)

**DOOR LEVER HARDWARE  
MANUFACTURERS**

**Extend, Inc.**

437 Clearview Court  
Moorhead MN 56560  
1.800.425.3837

**Adams Rite Quadrastat**

260 Santa Fe Street  
Pomona CA 91767  
1.800.872.3267  
[www.adamsrite.com](http://www.adamsrite.com)

**Best Access System**

6161 E 75th Street  
Indianapolis IN 46250  
1.800.711.6814  
[www.bestaccess.com](http://www.bestaccess.com)

**Overhead Door Company**

1800 Vantage  
Carrollton TX 75006  
972.416.7100  
[www.dallasdoors.com](http://www.dallasdoors.com)

**Power Access Corporation**

P O Box 1050  
New Hartford CT 06057  
1.800.344.0088  
[www.power-access.com](http://www.power-access.com)

**Stanley Access Technology**

65 Scott Swamp Road  
Farmington CT 06032  
1.888.366.7444  
[www.stanleyworks.com](http://www.stanleyworks.com)

Also available is a Consumer  
Product Guide on Door  
Hardware:

**A Guide for Buyers,  
Manufacturers, and  
Designers**

Center for Universal Design  
North Carolina State  
University  
Box 8613  
Raleigh NC 27695-8613  
1.800.647.6777  
[www.design.ncsu.edu/cud/](http://www.design.ncsu.edu/cud/)

**AUTOMATIC DOOR  
OPERATOR  
MANUFACTURERS**

**Besam, Inc.**

2140 Priest Bridge Court  
Crofton MD 21114  
1.866.237.2687  
[www.besam.com](http://www.besam.com)

# INDEX

Accidents	28	Garbage	35	Ramps	21
Acoustics	8	Grab bars	25,26,28	Range of reach	9
Adaptability	11	Ground Fault Circuits	29	Refrigerators	30
Arthritis	8	<hr/>		Risers	19
Automatic door openers	17	Hand-held shower heads	28	Roll-in-showers	27
<hr/>		Hand limitations	8	Rolling storage carts	34
Barriers	9	Handrails	20, 21	<hr/>	
Bathrooms	23	Hardware	12, 14	Safety	28,35
Bathtubs	26	Hearing loss	8	Semi-ambulatory	9
Bifocal wearers	7	Hinges	13	Sheltering arm grab bars	25
Blocking	11	<hr/>		Showers	27
Broom-finished concrete	22	Independent transfer	24	Sinks	23, 32
<hr/>		Ice	21	Sliding doors	18
Cabinets	34	<hr/>		Slide bolt	15
Carpeting	8	Kickplates	16	Stairs	19,20
Chair height	9	Kitchen	30	Stools	31
Clear opening	11, 12	Knob-type hardware	8,14	Storage	29, 34
Combination locks	14	<hr/>		Stove	32
Concrete ramps	22	Landings	14, 21	Swinging doors	18
Cook top	33	Lap boards	31	Swing clear hinges	13
Counters	31	Latches	14	<hr/>	
Cutting boards	31	Lavatory	23	Tableware	35
Cylindrical door hardware	14	Lazy susans	34	Threshold	15
<hr/>		Levers	8,14,24	Toilets	24
Dead bolt locks	15	Lifts	35	Transfer showers	26
Dishwasher	31	Lighting	29	Tread	19
Disorientation	9	Locks	15	Tubs	26
Doors	12, 18	<hr/>		Tub seat	26
Door knobs	14	Medicine cabinets	29	<hr/>	
Door openers		Mixing bowl holders	32	Vanity	24
(see automatic door openers)		Mobility Impairments	9	Vision panels	16
Doormats	16	Money	36, 6	Vision loss	7
<hr/>		Mortised door hardware	14	<hr/>	
Electrical outlets	29	<hr/>		Walkers	12
Exhaust fans	34	Non-skid surfaces	21	Wheelchairs	9,11, 12,13
Faucets	24	<hr/>		Work surfaces	31
Floor surfaces	28	Ovens	33		
Folding doors	18	<hr/>			
Freezers	30	Paint with added sand	21		
Funding suggestions	36	Pocket doors	18		
		Portable ramps	22		





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