



DESIGN DETAILS FOR ACCESSIBLE DISASTER RELIEF HOUSING



The United States Department of Housing and Urban Development (HUD) Office of Policy Development and Research (PD&R) has been extensively involved in supporting research and development on building technology innovations, construction systems, products, standards, regulations, and code issues that affect the affordability, safety, and livability of the nation's housing. HUD has worked with the Federal Emergency Management Agency (FEMA) to improve the performance of temporary housing for disaster survivors. Accessibility is critical to the success of those homes. This publication will enhance the ability of designers and manufacturers to better respond to the demands of a post-disaster environment with quality, accessible disaster relief housing. These design details are in the public domain and are available to anyone who may find them useful. While there are many graphic examples included in this publication, it is not the intent of this project to create an "approved government design." This booklet is meant to be a guideline for accessible design ideas only, and be used as a supplementary resource for those implementing, designing, and manufacturing disaster housing.

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DESIGN DETAILS FOR ACCESSIBLE DISASTER RELIEF HOUSING

A manual to assist designers and builders in creating emergency, transportable, temporary dwellings complying with the accessibility requirements of the 2010 Americans with Disabilities Act Standards for Accessible Design and the Uniform Federal Accessibility Standards

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Requirements for accessible features in dwellings are compiled from many sources including:

- The Architectural Barriers Act (ABA)
- Section 504 of the Rehabilitation Act of 1973 (Section 504)
- The Americans with Disabilities Act (ADA)
- The International Residential Code (IRC)
- The Access Board's Emergency Transportable Housing Report

Technical provisions in this publication reference:

- The Uniform Federal Accessibility Standards (UFAS)
- The 2010 Americans with Disabilities Act Standards for Accessible Design

Endnote citations are located in the last section of this publication.

Unless otherwise noted, all details in this publication are intended to comply with UFAS, 2010 Americans with Disabilities Act Standards for Accessible Design, Manufactured Home Construction and Safety Standards (MHCSS), IRC 2009 and the Access Board's Recommendations in their Emergency Transportable Housing Report as of July 30, 2011. The design and construction requirements of the Americans with Disabilities Act Standards for Accessible Design, the Architectural Barriers Act, and Section 504 of the Rehabilitation Act, the Manufactured Home Construction and Safety Standards, and the International Building Code are subject to various and possibly contradictory interpretations. Mark J. Mazz, AIA, and Loreen Arnold, AIA LEED AP, therefore, have used reasonable professional effort and judgment to interpret the applicable requirements. Mark J. Mazz, AIA, and Loreen Arnold, AIA LEED AP, do not warrant or guarantee that this publication complies with all interpretations of the laws, regulations, standards, and codes. The contents of this report are the views of the contractor and do not necessarily reflect the views and policies of the U.S. Department of Housing and Urban Development or the U.S. government.



Preface

The creation of emergency transportable, temporary housing that includes accessible features requires a specific set of tools that address unique design and construction challenges. These dwelling units are some of the smallest produced for housing, and they must accommodate a variety of functional criteria for mobility that often seems in conflict with the spatial requirements for accessibility. While the design and construction of accessible housing for disaster survivors requires attention to detail and some less common construction approaches, it can be relatively straightforward when integrated into the design and construction process. Many builders may find that the accessibility features of these homes are easily implemented and provide value for all residents.

This is not a regulatory document, but is intended to illustrate possible solutions, provide guidance to designers wishing to create accessible disaster relief housing, and aid the manufacturing industry. The focus of this publication is on the interior of these dwellings and is not site-specific, and so it does not include essential accessibility aspects of locating and installing the structures on site. Dwelling design is a creative process, and this document provides some approaches that can be used as a “point of departure” for designers to create safe, accessible housing units. Descriptions and graphic illustrations of accessible elements are provided in these pages, but it is not the intent of this guide to limit development of other accessible solutions, or to imply that this is a complete directory of all possible arrangements. It is also not the intent of this publication to replace, or be used in place of, existing standards and codes for manufactured and transportable dwelling units, and those involved in the creation of this housing must still diligently verify compliance once constructed. It is the goal of this publication that many may find this information useful in creating well-functioning housing for those who have had their lives disrupted by a disaster.

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Types of Disaster Relief Housing

Travel Trailers provide an extremely mobile temporary housing solution for disaster relief efforts. They are the smallest type of emergency transportable housing, generally no larger than 320 square feet in area with their narrowest dimension typically 8 feet wide. A one bedroom accessible unit will require at least one “slide-out” compartment to provide maneuvering clearances for a resident who uses a wheelchair. The industry uses the National Fire Protection Association (NFPA) 1192 Standard on Recreational Vehicles.



Travel trailer with “slide-out” provides additional interior area required for an accessible plan



A Park Model home can be rapidly deployed as a disaster relief dwelling

Park Model Homes (also known as Park Trailer Homes) are typically more spacious than travel trailers and can accommodate a greater variety of design alternatives. With sizes up to 400 square feet, these units are typically 11 feet to 11 feet 8 inches wide, and 34 to 36 feet long. This makes them a good choice for families and allows more flexibility in addressing accessibility needs. The industry uses the American National Standards Institute (ANSI) A119.5 and Recreational Park Trailer Industry Association Standards (RPTIA) in the construction of Park Models.

Manufactured Homes can be quickly built and deployed as temporary housing, and also have the added potential to become permanent housing. Manufactured homes are the largest of the transportable emergency housing used, generally greater than 400 square feet in area and 12 to 18 feet wide (single section units). These dwellings are regulated by the Manufactured Home Construction and Safety Standards (MHCSS; also known as the HUD Code).



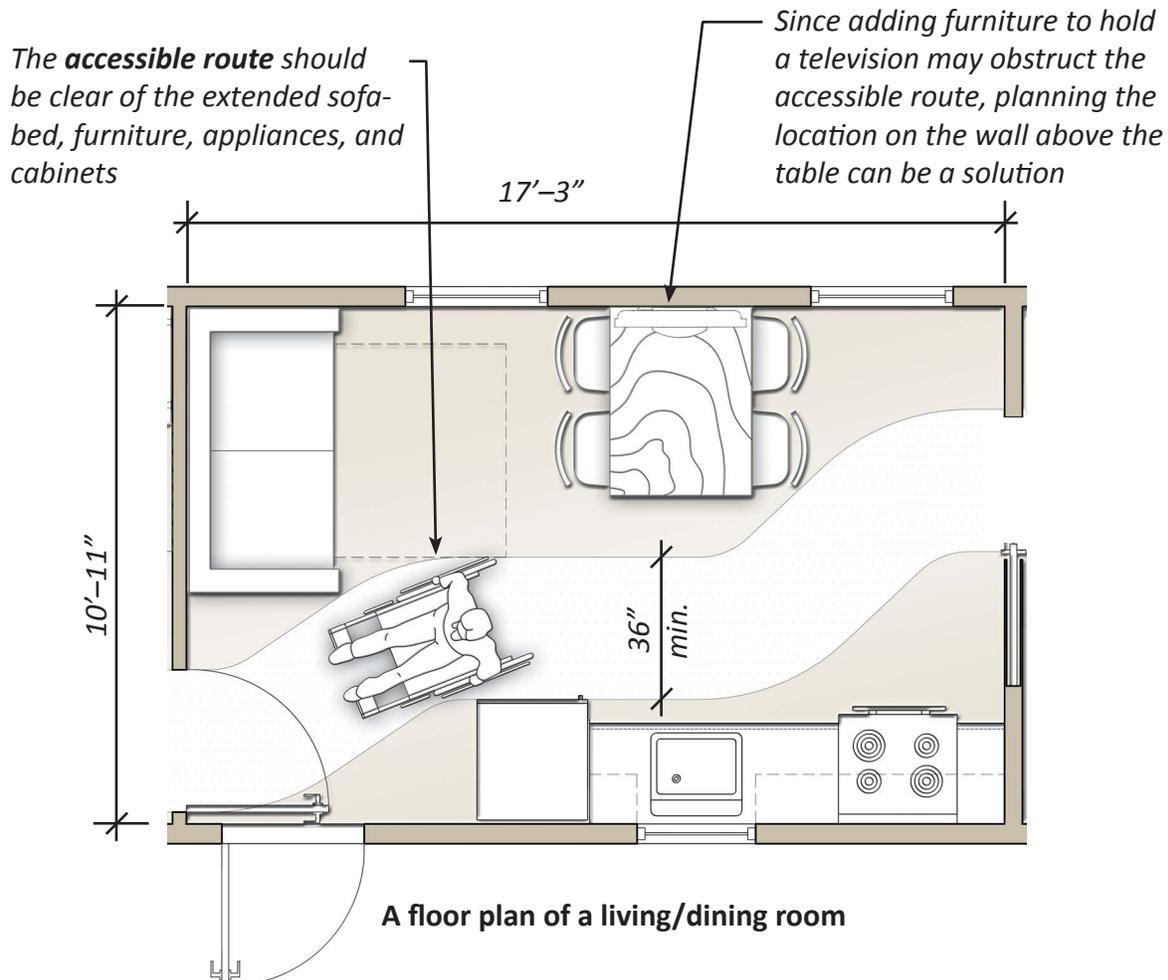
Manufactured housing can become permanent housing

Accessible Design creates dwelling units that can be used more easily by many individuals. While primarily concerned with specific characteristics that allow full use by a person with mobility impairments it also creates better spaces for individuals with visual or hearing impairments, the senior population, and individuals with multiple disabilities.

There are a number of arrangements or “building blocks” that are essential elements to include when creating accessible disaster relief dwellings. An **accessible route** connecting all spaces and rooms must be provided throughout all spaces in the home. This route

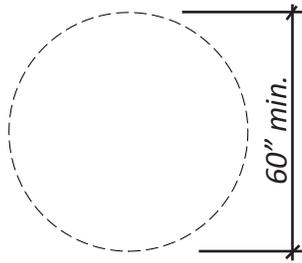
cannot pass through bathrooms or closets in order to get to living areas, and it must be at least 36 inches wide and have a clear headroom of at least 80 inches above the floor. The floor of the accessible route may reduce to 32 inches wide for a distance of no more than 24 inches (such as between fixtures) and it must be level or provide accessible transitions (see “Detail Elements” page 32).

Since alternate ways to arrange furniture are limited in these small dwellings, the designer should verify that the **furnishing locations do not obstruct any part of the accessible route.**^{1.10}

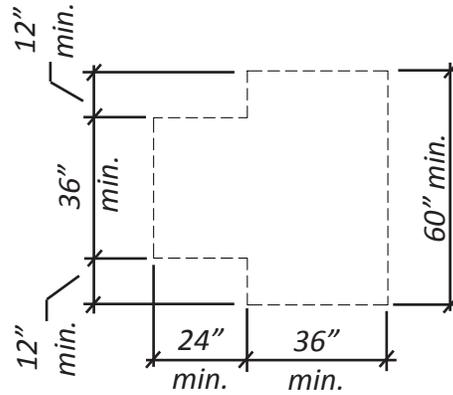


In an accessible space, a resident in a wheelchair can enter, turn around, and exit without assistance. Each room must include a **turning space** having one of two configurations. These configurations are either a circular turning space, which

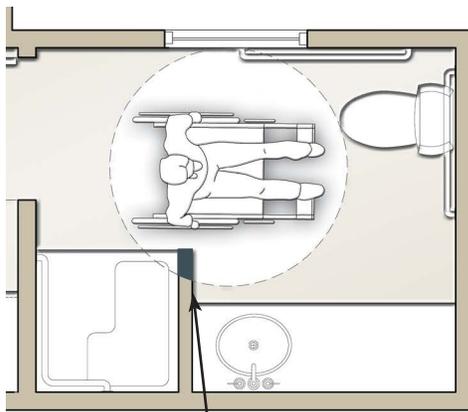
requires a floor area of 60 inches diameter, or a T-shaped turning space. The T-shape allows a user to execute a three-point turn within the specific measurements illustrated below and one leg of the turning space may use knee and toe clearance under an object.



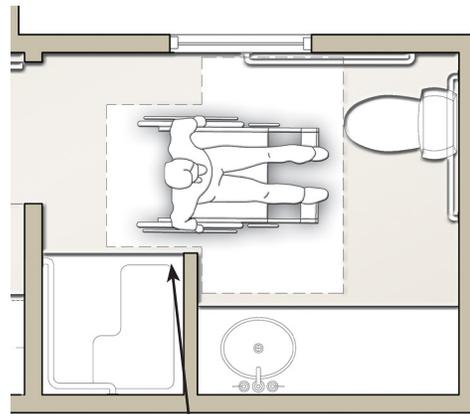
Circular turning space dimensions



T-shaped turning space dimensions



The circular turnaround does not fit in this bathroom since it intersects the shower

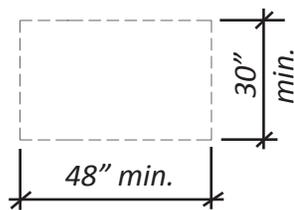


A T-shaped turning space fits well in this bathroom because of its shape

Comparison of different types of turning spaces in a bathroom

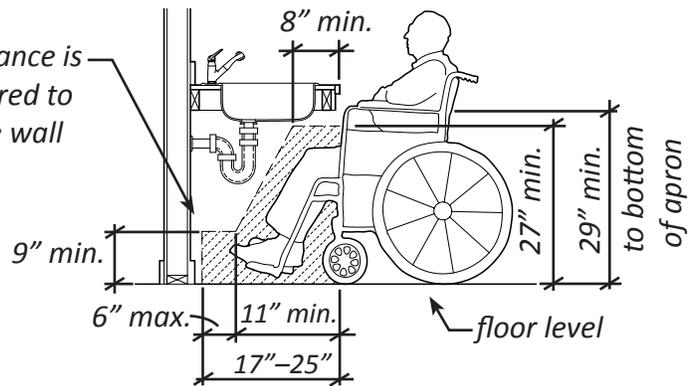
Clear floor space is required by a resident in a wheelchair to use appliances, fixtures, and equipment. It is a level, rectangular shaped space 30 inches by 48 inches minimum that is directly adjacent to the accessible route. It can provide either a parallel or a perpendicular approach, depending on the application. Specific spaces and conditions may require additional maneuvering clearances such as at plumbing fixtures and doors.

Knee and toe clearance is the area under a horizontal element that can be part of the clear floor space if it meets specific clearances. Clearance is required at accessible lavatories, workspaces, sinks, and tables.



A clear floor space for a person using a wheelchair

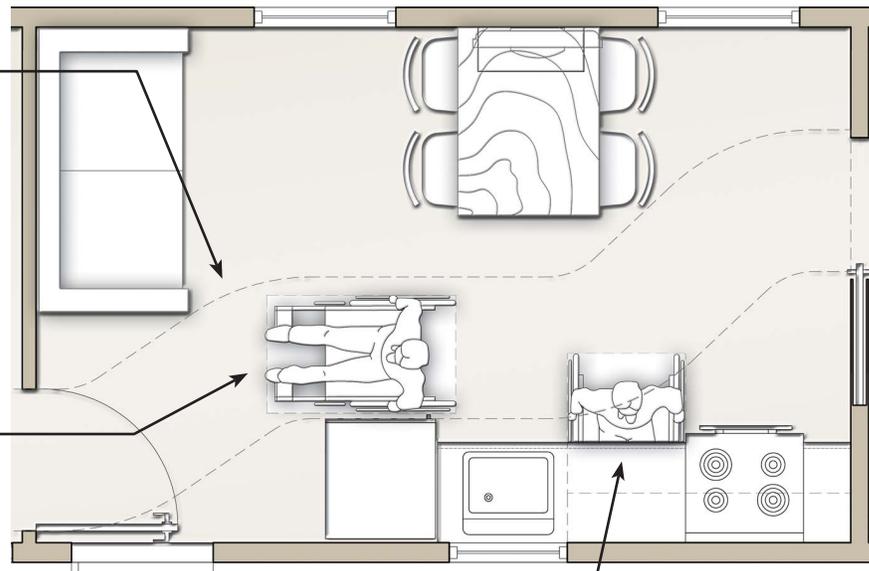
Toe clearance is not required to touch the wall



Knee and toe clearance

Clear floor space must be adjacent to the accessible route

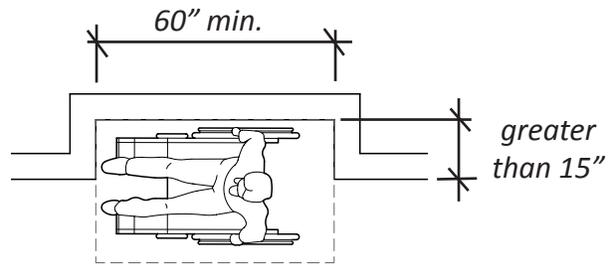
Clear floor space with a parallel approach to the refrigerator



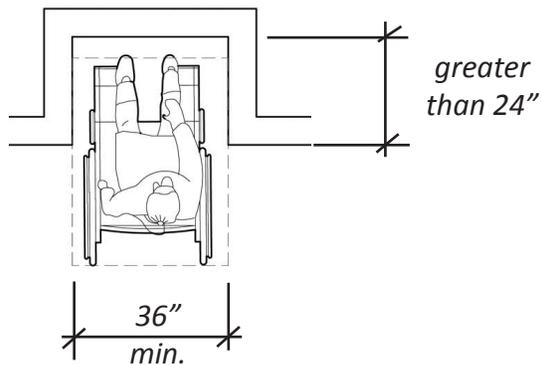
Knee and toe clearance and a forward approach is required at the workspace

Clear floor space conditions

Clear floor space that occurs in an **alcove** has unique requirements for maneuvering. When the approach and clear floor space are within a recess, or have obstructions on all or part of three of its sides, maneuvering clearances are increased beyond those required for a non-alcove approach. The alcove can be created by walls, wall depth, or a furnishing arrangement.

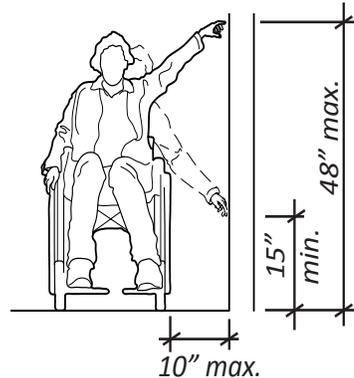


**Alcove maneuvering clearance
parallel approach**



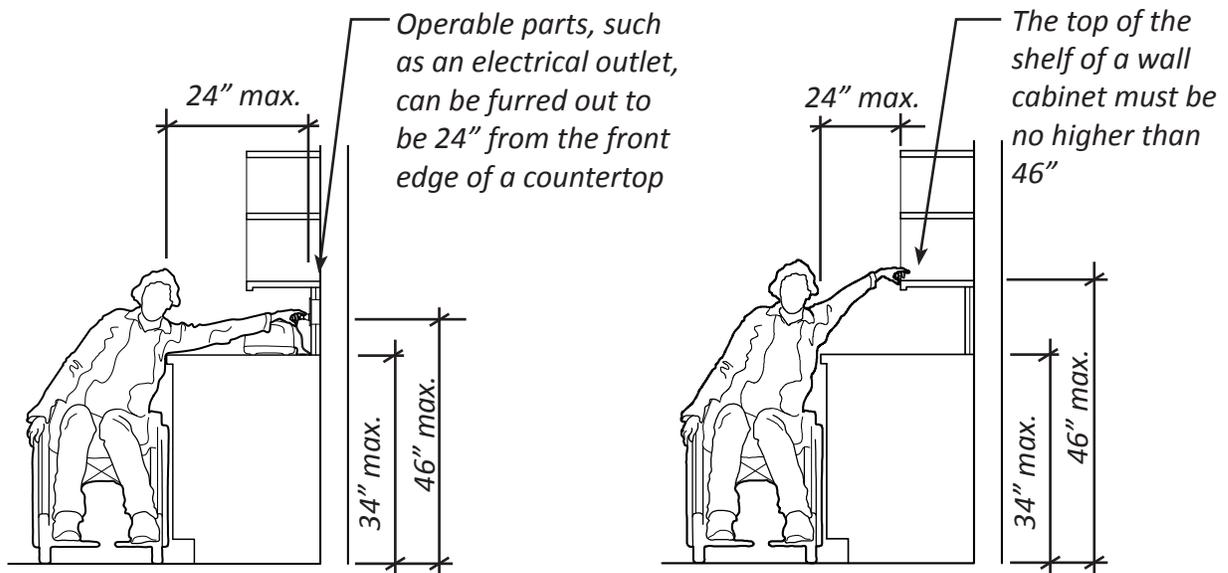
**Alcove maneuvering clearance
forward approach**

Reach ranges set the critical limits for reaching operable parts and accessing storage. They are generally determined by two important factors: the approach or position of the person using a wheelchair, and whether the person must reach over an obstruction such as a countertop. Reach ranges have both high and low limits. Understanding these is essential in the design of an accessible dwelling.



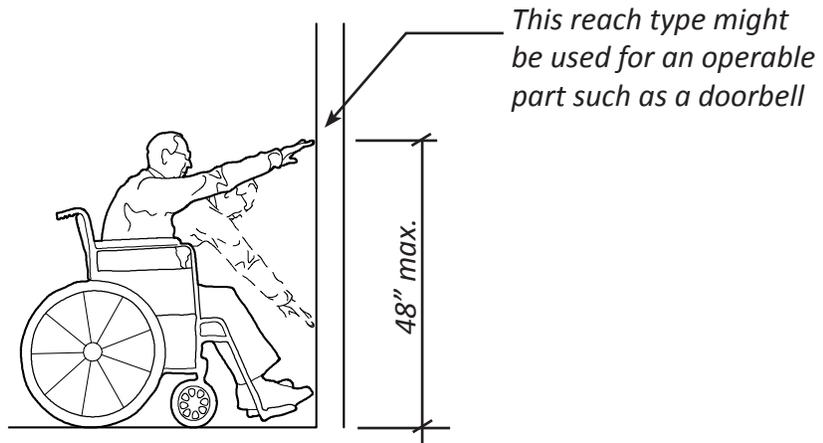
A parallel approach with an unobstructed side reach

A parallel approach with an unobstructed side reach, or a reach over an obstruction shallower than 10 inches, has an upper limit of 48 inches and a lower limit of 15 inches above the floor.



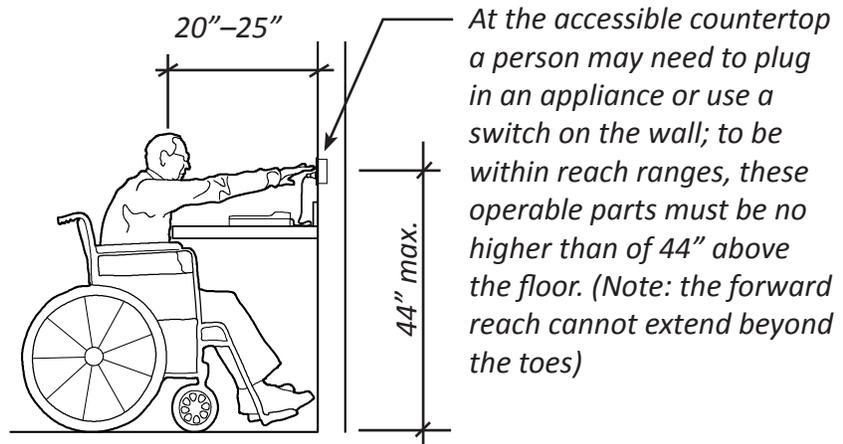
Parallel approaches with side reaches over obstructions

A parallel approach with a side reach over an obstruction that is up to 34 inches high maximum, and a reach depth greater than 10 inches and no more than 24 inches wide, has a height limit of 46 inches above the floor.



An unobstructed forward approach

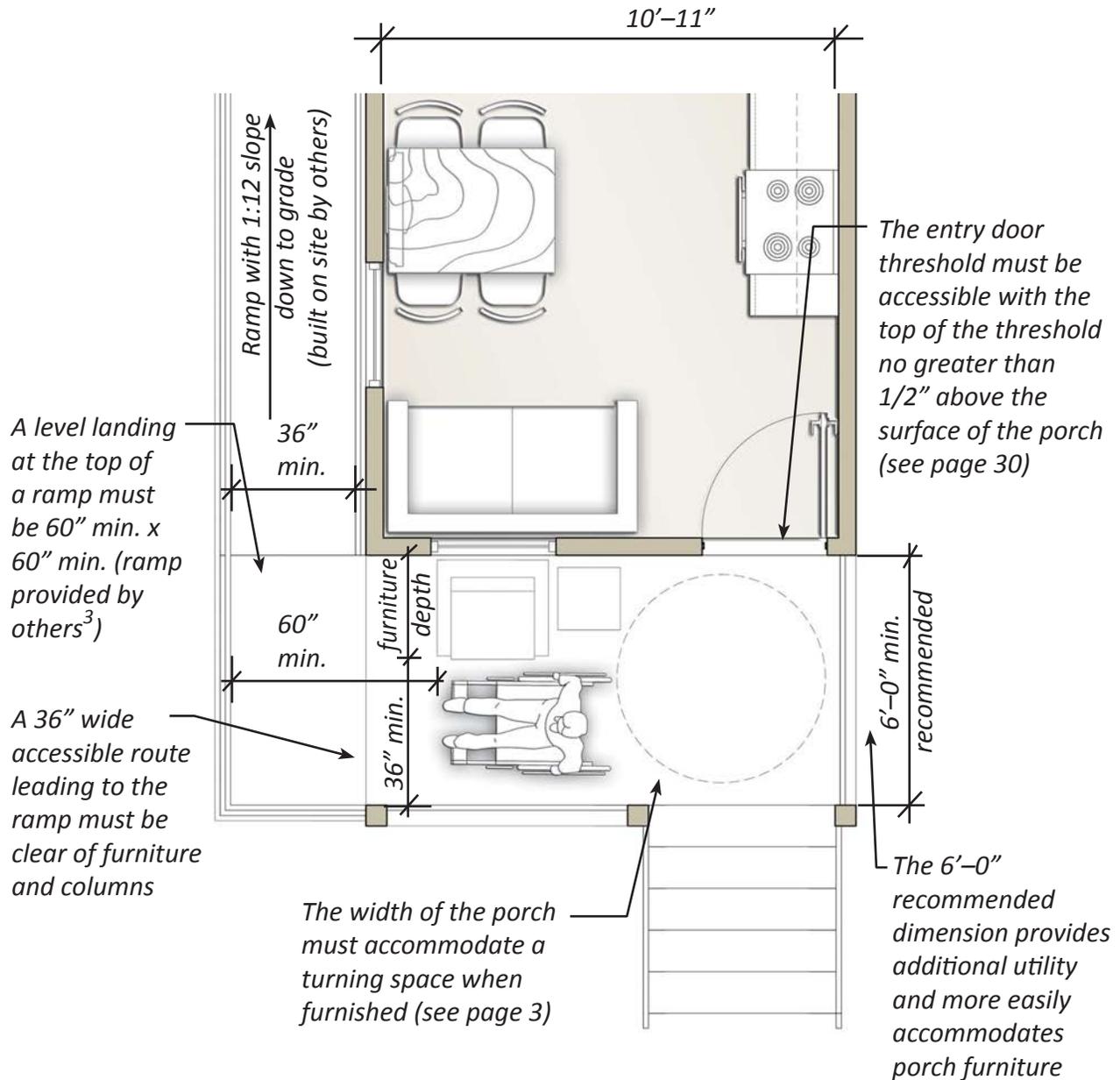
An unobstructed forward approach allows a reach of 48 inches above the floor. This reach can accommodate an obstruction with knee and toe clearance, such as a countertop, as long as it is not greater than 20 inches deep .



A forward approach over an obstruction

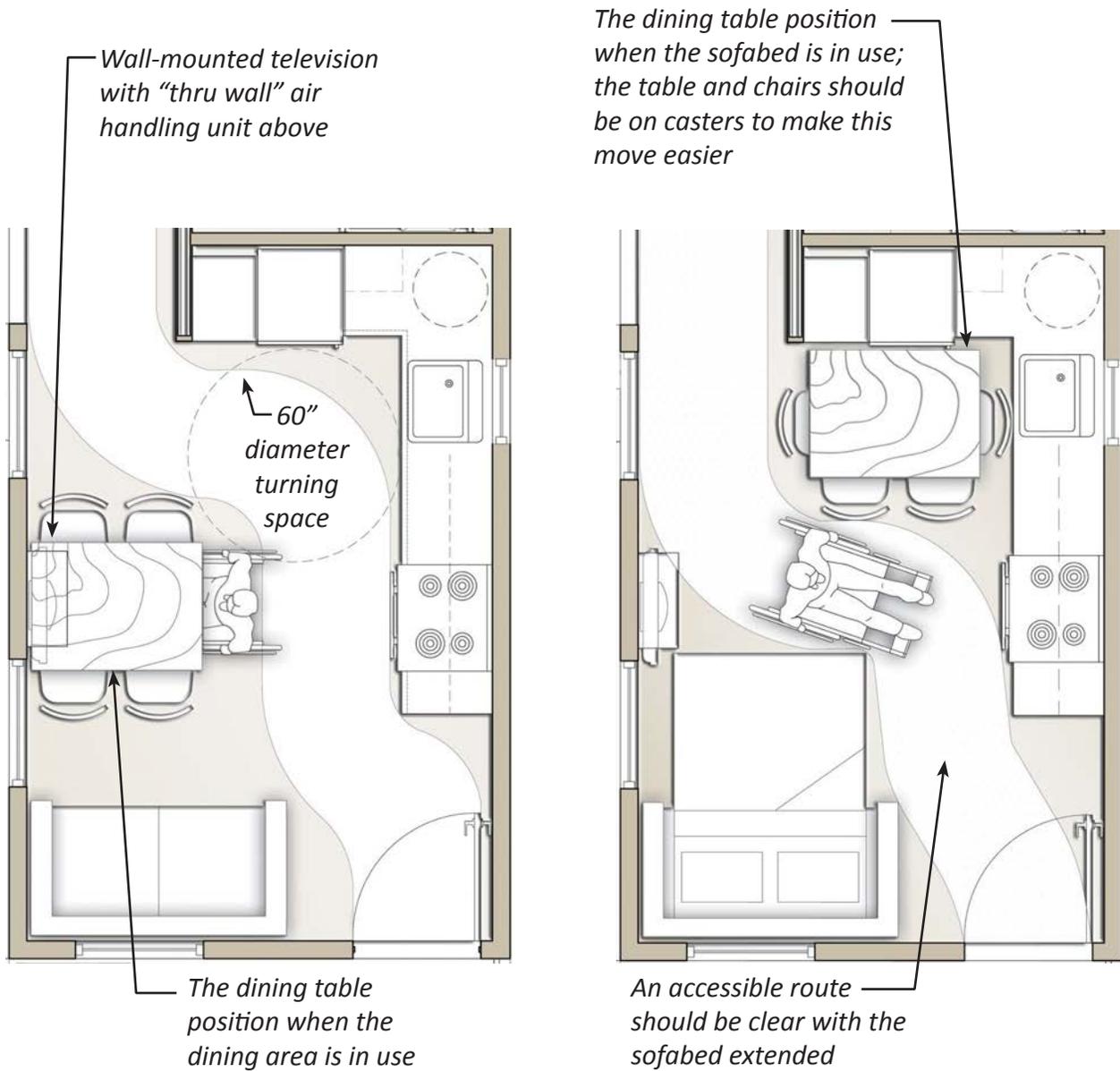
A forward approach over an obstruction that is greater than 20 inches deep and up to 25 inches allows a reach of 44 inches. The obstruction must have knee and toe clearance below.

Front Porches can provide outdoor space that helps relieve the feeling of being in a small dwelling unit. A porch may have a ramp³ leading on to it and it may also be the main entry for the unit. When fully furnished, a porch must provide an accessible route, a turning space, and maneuvering spaces at doors. In addition to being a desirable architectural feature, the roof of a porch can have the added benefit of protecting shallow, accessible thresholds from rain infiltration.



A floor plan of a front porch at an entry door

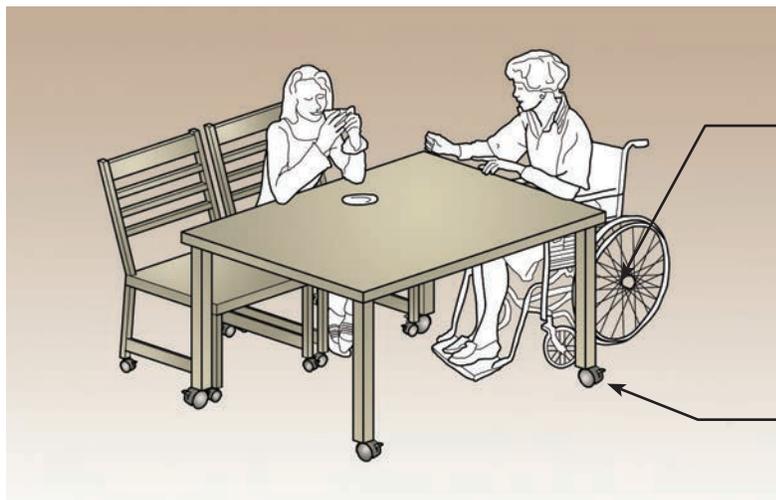
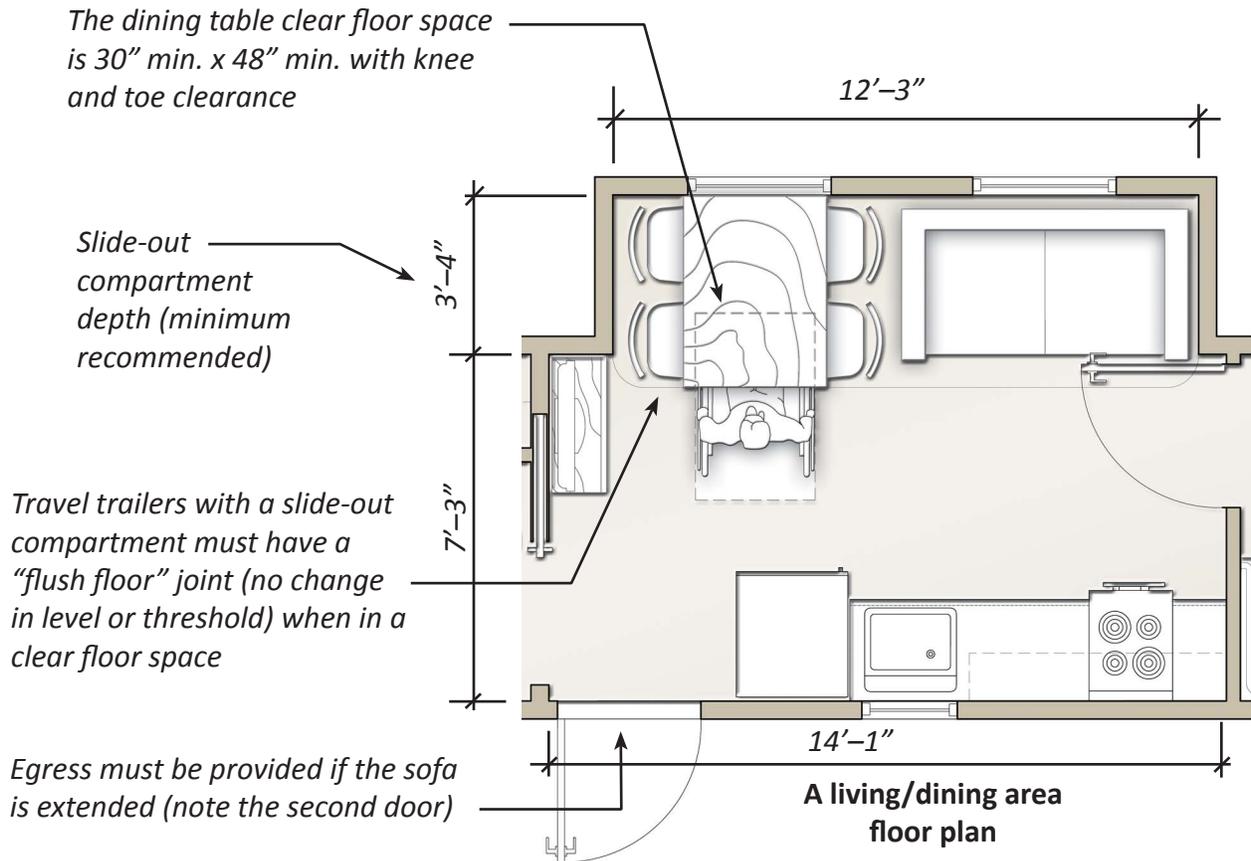
Living and Dining Rooms are usually combined in one space to provide flexibility and multiuse. In the smallest dwellings, a 72-inch-long sofa bed, a coffee table, and a dining table to seat four people may be provided. One important consideration is to plan an accessible route to the entry door with the sofa bed in the extended position, in case emergency exiting is required. The sofa bed is assumed to be for the use of a person without disabilities.



A living/dining area floor plan with furniture arranged for dining/living room use

The same living/dining area floor plan arranged for sleeping use with the sofa bed extended

Spaces for dining must have floors that are flush with the rest of the areas (elevated dinette platforms block knee and toe clearance thereby preventing residents who use wheelchairs from approaching the dining table). If the table is provided with a clear floor space with knee and toe clearance, a resident using a wheelchair will be able to approach and use the dining surface.



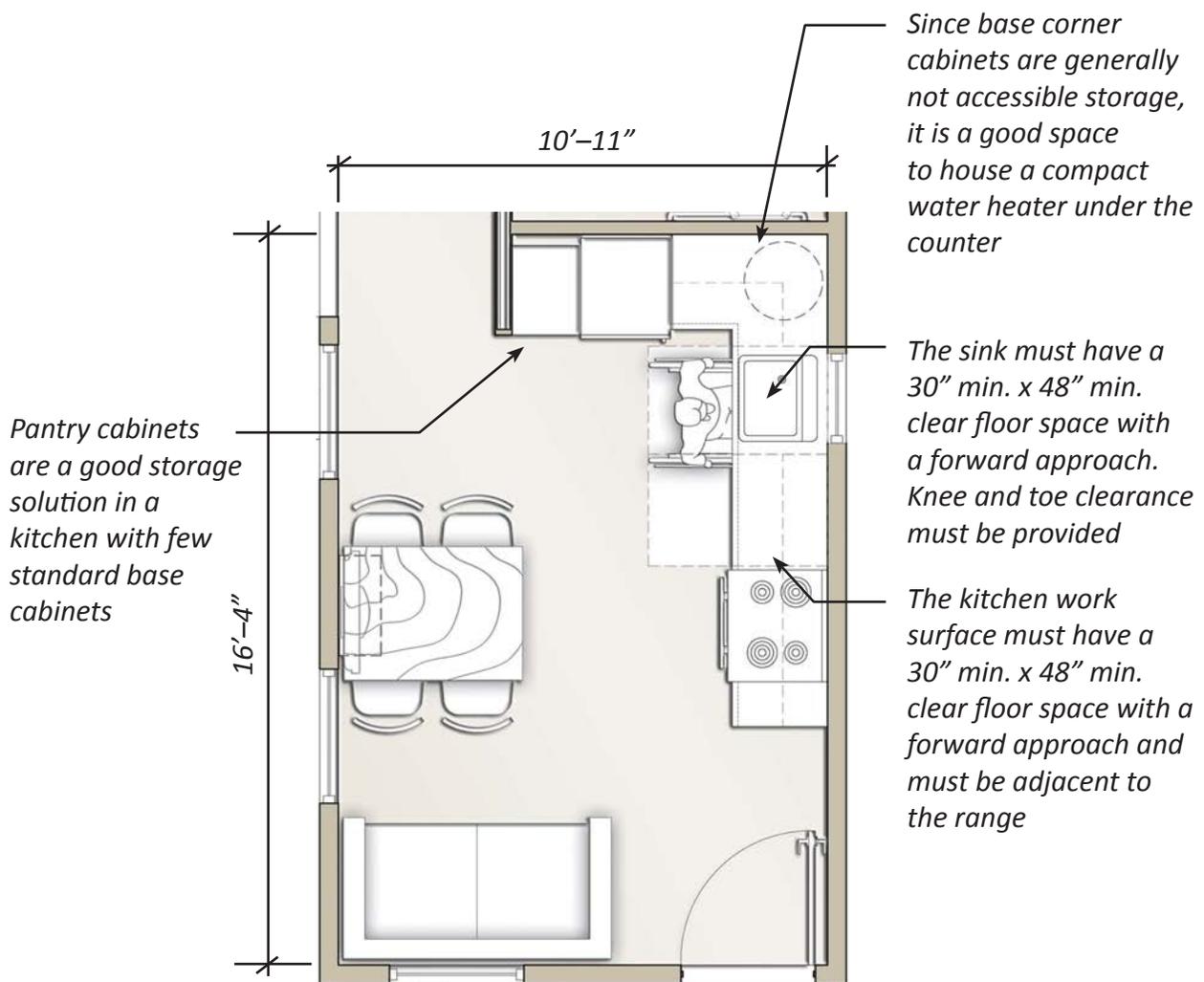
A design that provides adequate knee and toe clearance is required for the dining table ^{1,4}

Casters allow the table and chairs to be easily moved

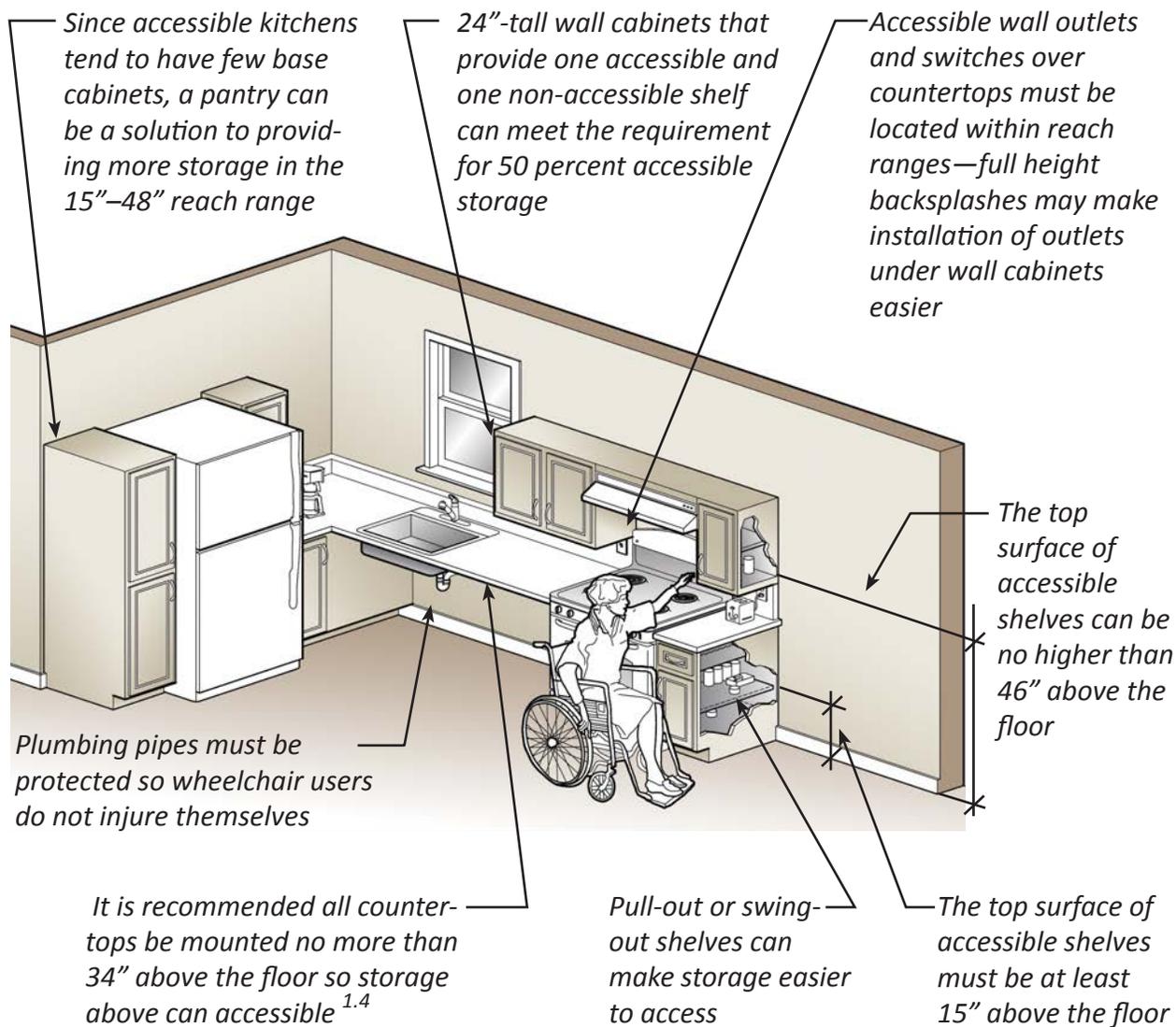
Kitchens can take many shapes, but they all must provide specific clearances and features to be usable by a resident in a wheelchair. Kitchens must have **accessible countertops** mounted at a maximum height of 34 inches above the floor at both the sink and at a 30-inch-wide **kitchen work surface** adjacent to the range.^{1.4} A configuration where the sink is adjacent to the work surface, with a continuous knee and toe clearance underneath these two areas,

is common. Provision of a spray unit and/or gooseneck-type faucet can make dishwashing easier, which is important since most emergency housing does not have a dishwasher.^{1.2}

Reach ranges are important criteria in the design of cabinetry and worksurfaces in an accessible kitchen. Reach ranges (see pages 6 and 7) can determine what types of cabinets are used, the dimensions of the cases, and at what height they are installed in the kitchen.

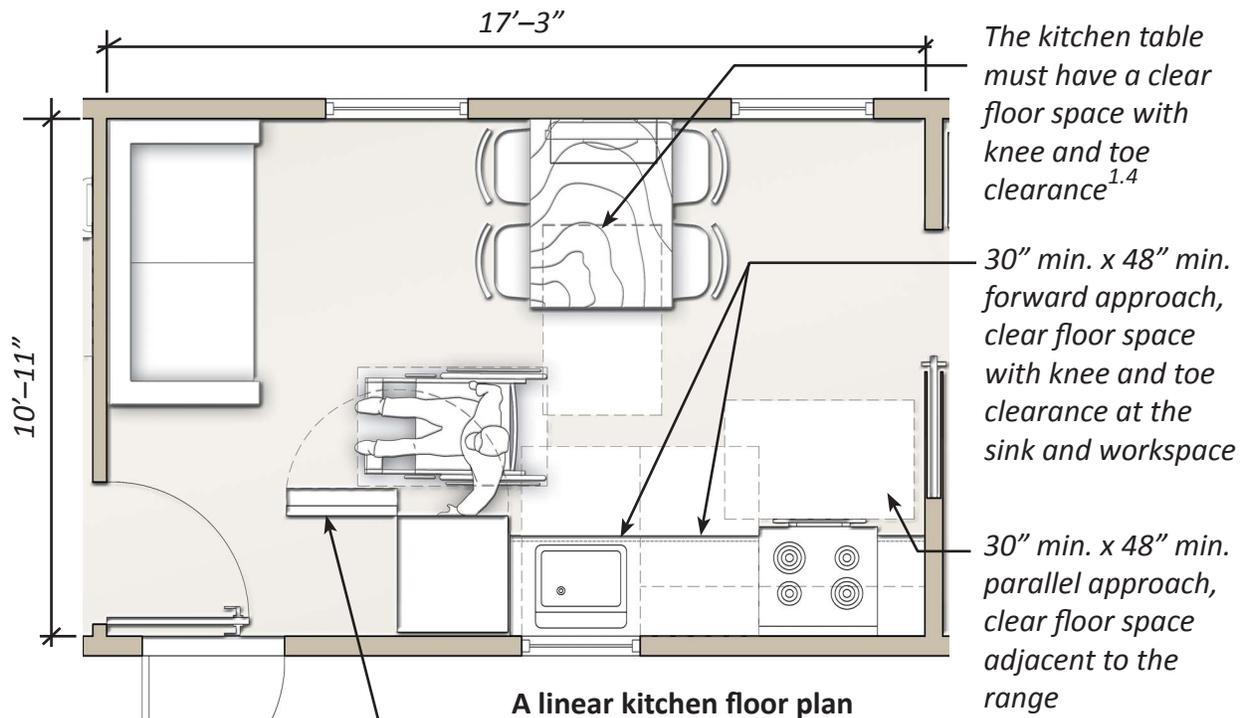


An L-shaped kitchen floor plan



A kitchen with base and wall cabinets

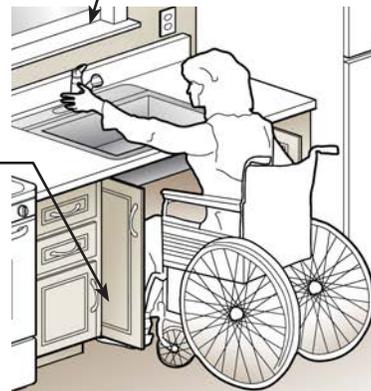
A parallel approach to an accessible countertop allows a side reach extending to 46 inches over a 34-inch-high base cabinet. This is the maximum height the top surface of an accessible shelf in a wall cabinet can be mounted. Any storage in base cabinets that is less than 15 inches above the floor cannot be reached by many persons who use wheelchairs, and is not considered accessible. At least **half of the storage** must be located within accessible reach ranges (storage may be calculated by the linear footage of the shelf face). Any storage located above 36-inch-high countertops is not accessible, since this countertop height exceeds the highest obstruction that a person using a wheelchair can reach over.



Refrigerator doors should swing 180 degrees to allow a parallel approach, clear floor space with a centerline within 24" of the refrigerator centerline

These cabinet doors slide into the sides to provide knee and toe clearances; they can be closed to conceal pipes when not in use

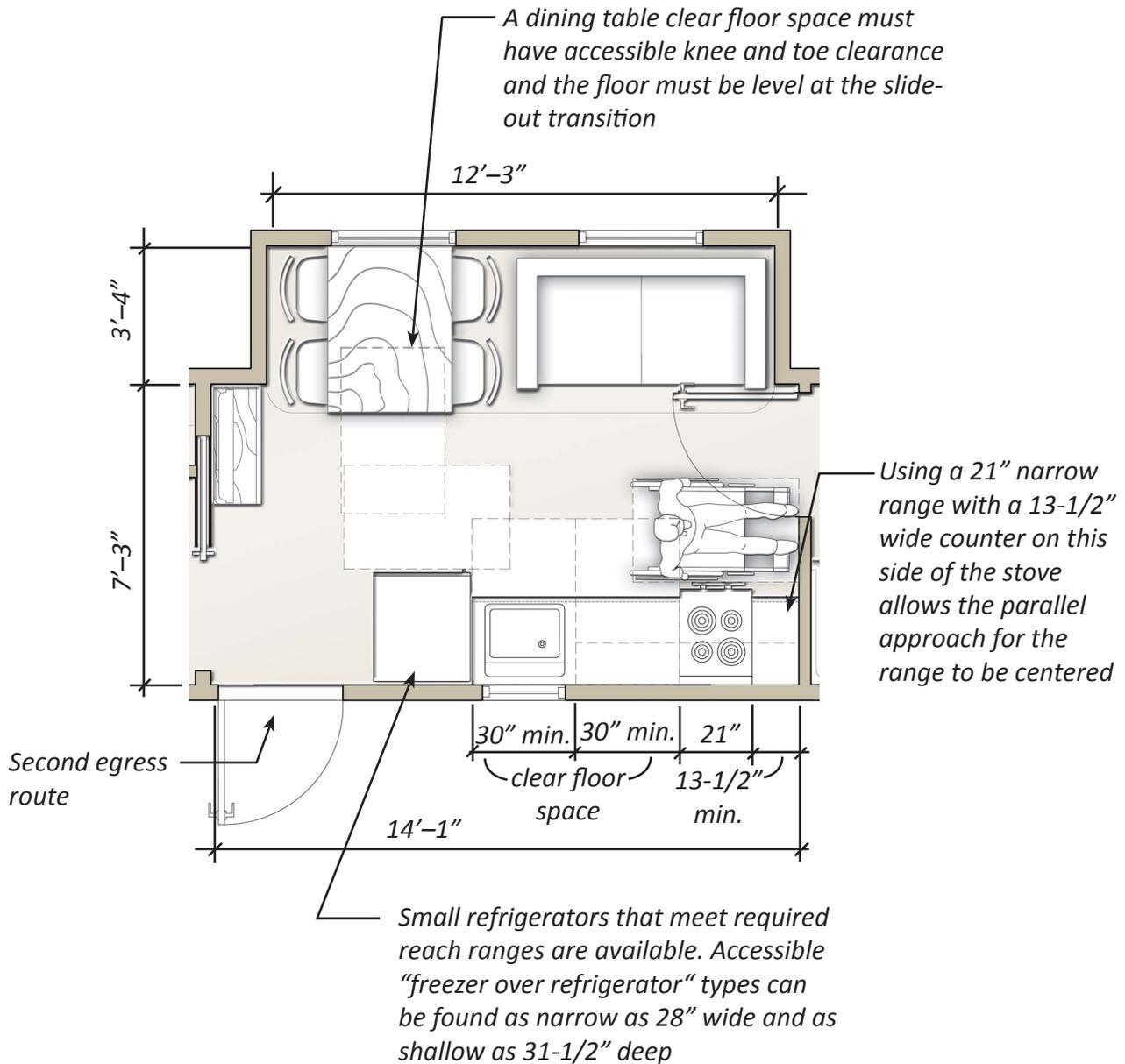
A faucet spray unit makes washing dishes an easier task 1.2



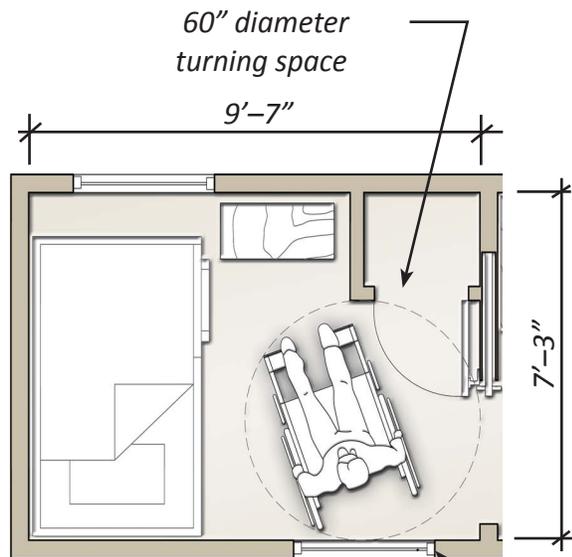
In an accessible kitchen, each appliance requires a **30-inch minimum x 48-inch minimum clear floor space** with a specific approach. The refrigerator and the range must have a parallel approach. A forward approach with knee and toe clearance is required at both the workspace and sink.

Countertops with base cabinets can have a parallel approach. Though permitted, it is not recommended to use removable cabinetry in disaster relief housing under accessible countertops.^{1.7} Movable storage cabinetry with casters may provide flexible, low storage in kitchens.

Travel trailers, the smallest of the disaster housing types, require creative approaches to provide accessible features. By using small appliances, adequate maneuvering clearances can be provided in the kitchen and the accessible route can remain clear.

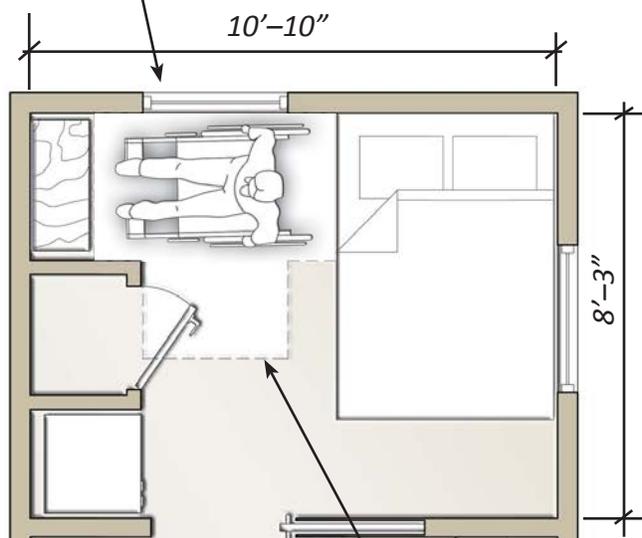


A linear kitchen floor plan



A secondary bedroom floor plan

If a window is on the accessible route it can be accessed by a resident using a wheelchair



A master bedroom floor plan

T-shaped turning space

Bedrooms must provide an accessible route that allows the resident to approach each piece of furniture and to turn around in the room. The accessible route should also provide access to windows which will allow the resident to operate the window^{1.8} for natural ventilation and for an assisted emergency escape.⁶

Since the furnishing arrangement choices are limited in the small spaces of emergency transportable housing, the designer should take actual furniture placement into consideration when planning the accessible route and approaches in a bedroom that may have less than 70 square feet in area.^{1.10} Though not a code requirement, it is recommended that a bed, a small dresser, and a built-in closet be provided in each bedroom. Space for a full-size bed (54 inches wide by 75 inches long) in the **Master Bedroom** is customary, and **Secondary Bedrooms** should accommodate a twin bed (39 inches wide by 75 inches long). The designer should carefully verify minimum bedroom sizes, as some codes require that the smallest bedroom must not be less than 70 square feet in area.⁵

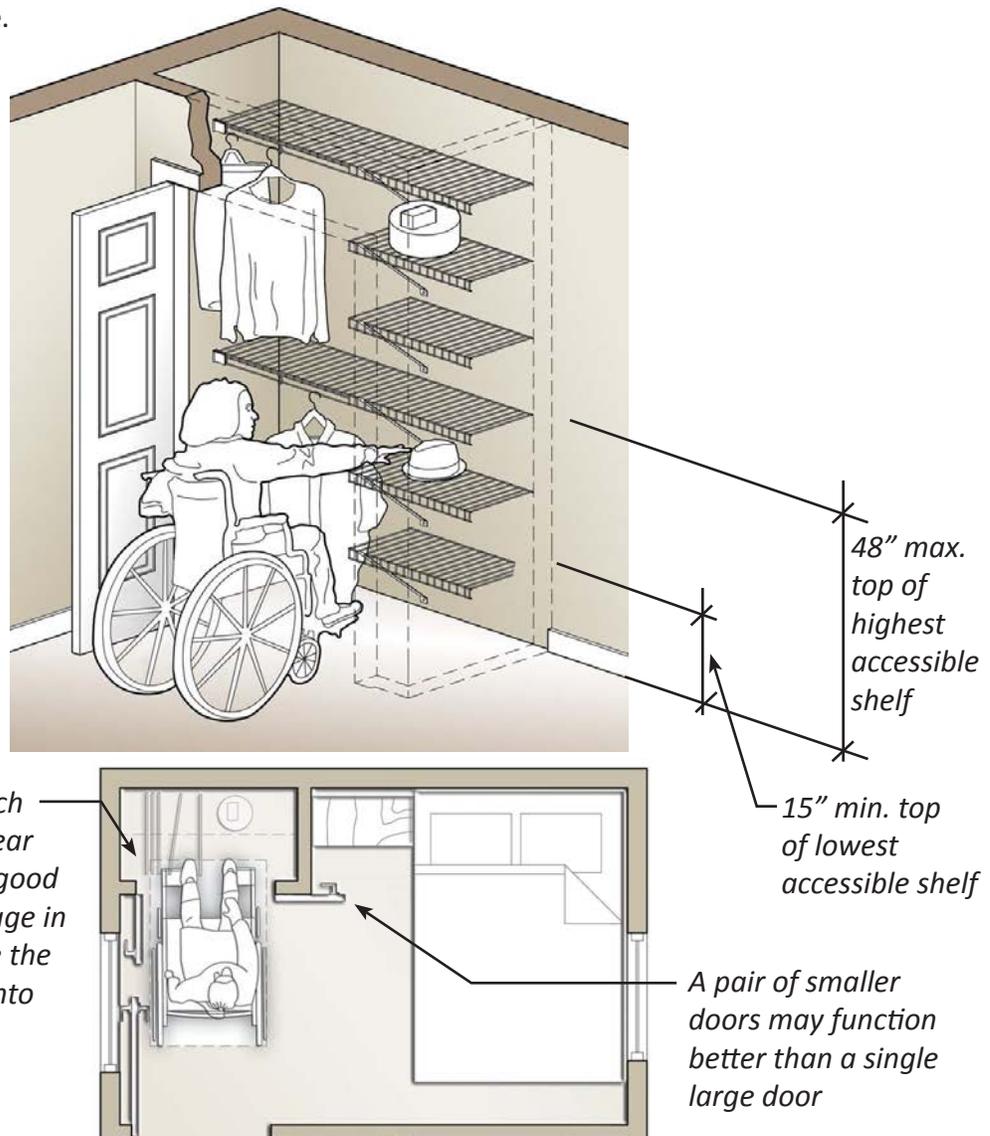
Bunk beds are often used to provide more sleeping area, but it can be difficult for a parent in a wheelchair to reach a sick child in the top bunk. When bunk beds are used in the emergency relief dwelling, the ladder must not obstruct the clear floor area at the lower bed.

Provision of an overhead light with two-way switched controls, positioned at the room entry and at the bedside, is a useful arrangement for a resident who may require the light on while transferring in or out of bed to a wheelchair or assistive device.^{1.12}

Closets are important for the utility of the housing unit and to help differentiate between a “shelter” and a home.

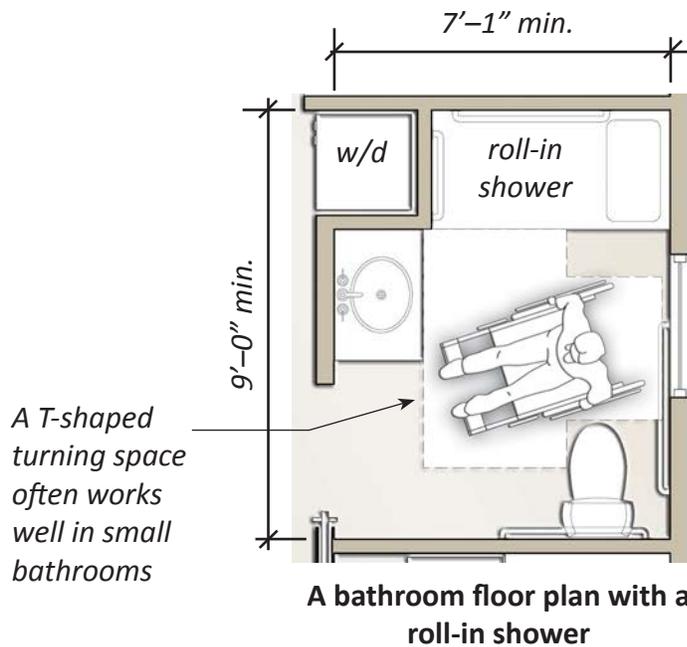
Built-in closet space should be provided in each bedroom. A clear floor space with either a forward or parallel approach to the closet door must be provided. If the door of the closet has a 32-inch clear opening, the resident can pull into the closet for even better access to the storage.

Closet storage in bedrooms must have at least one of each type of storage that is provided (i.e. shelf, hanging pole) within accessible reach ranges (see pages 6 and 7). With this unobstructed forward approach, the maximum accessible reach is 48 inches.

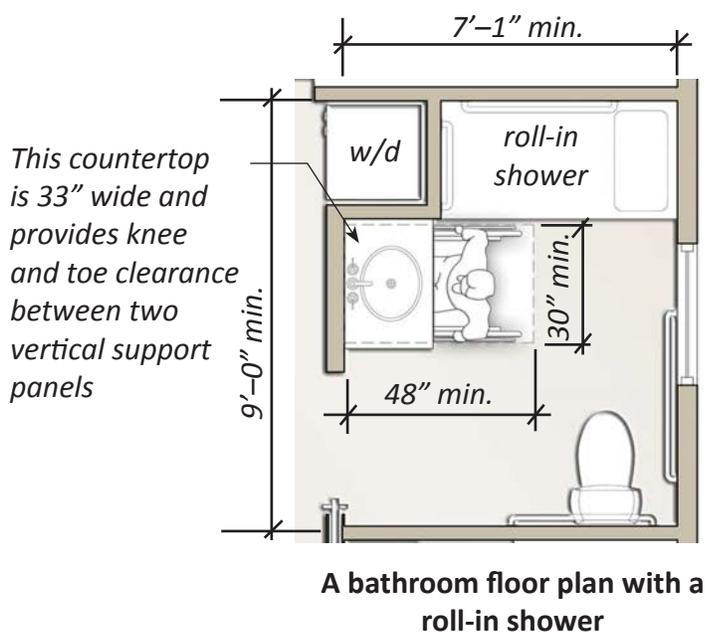


A bedroom closet with a pair of doors

Bathrooms require a large percentage of floor area in small disaster relief dwellings. They must provide a turning space, and specific approaches with clear floor space for maneuvering at each individual fixture. Clear floor spaces may overlap, but doors may not swing into the clear floor space unless there is a 30-inch by 48-inch clear floor space outside of the swing of the door. (Note: the Uniform Federal Accessibility Standards (UFAS) does not allow the door to swing into the clear floor space at any fixture.) The use of a pocket door can alleviate this conflict.

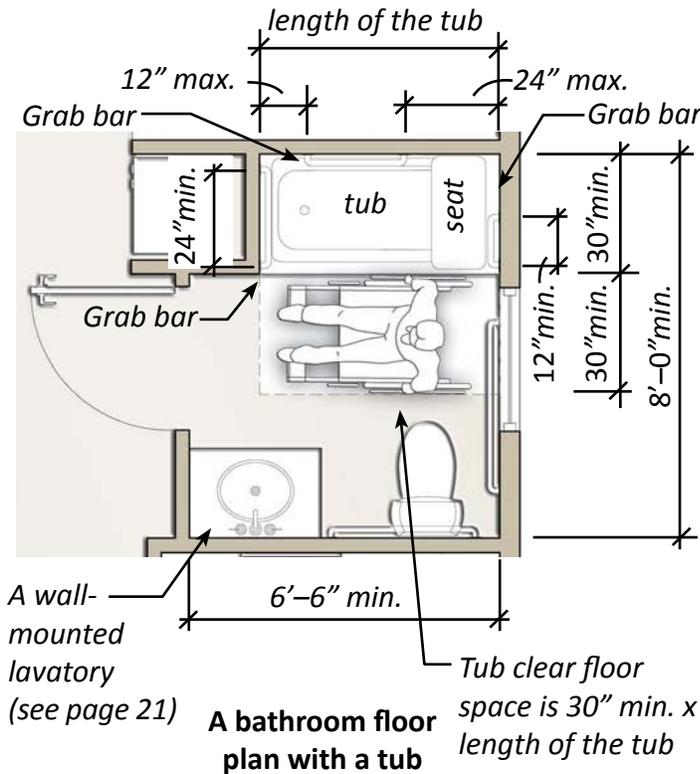


While either type of turning space can be used, a T-shaped turning space often can fit in a smaller bathroom when a 60-inch diameter turning space cannot. This is because its shape fits around the bathroom fixtures.



A 30-inch minimum by 48-inch minimum clear floor space with a forward approach and knee and toe clearance is required below the lavatory. Providing **a countertop at the lavatory is recommended** as it makes it easier for those with and without disabilities to use this fixture. Additionally, if counters are provided in non-accessible disaster relief units, then the accessible units must also be provided with countertops.

Three types of bathing arrangements that may be provided for residents needing accessible fixtures: tubs, transfer seat showers, and roll-in showers. Each requires specific clear floor space and approaches. Locations of grab bars, controls, and shower spray units are also specific depending on which bathing fixture is provided.



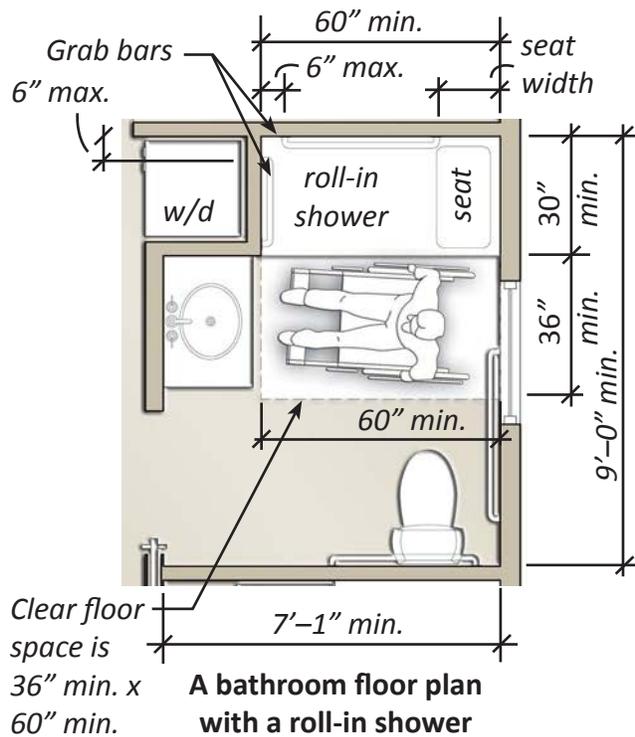
A tub fixture requires a clear floor space of 30 inches x the length of the tub, located adjacent to the long side of the tub. A T-shaped turning space will fit in this bathroom if the lavatory is mounted on brackets (see page 21 for details). Either a permanent or removable seat must be provided in the tub and the type provided determines how grab bars are positioned in the fixture.

In emergency relief dwellings, a **removable seat** (but one that is securable) is commonly provided. The accompanying grab bar requirements are two 24-inch minimum long grab bars on the back wall, one 24-inch minimum long grab bar on the side control wall, and one 12-inch long minimum grab bar on the opposite side wall.

Tub seats can be secured to the back wall of the tub by a hinge or channel. The tub seat can be raised or lowered as needed. A seat with a back may be required for some residents

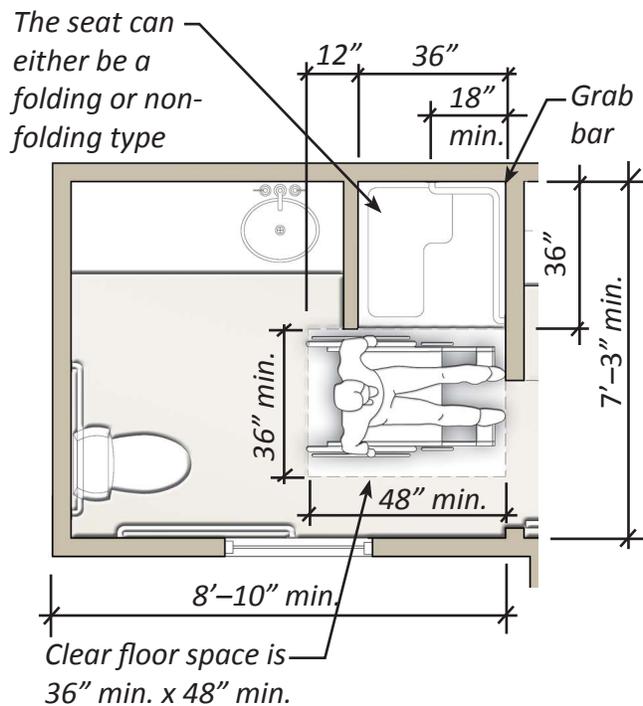


A hinged, removable tub seat



A roll-in shower is another choice when providing bathing fixtures. The shower must be at least 60 inches wide and 30 inches deep. A seat is recommended,^{1,9} though not required, and grab bar locations are dependent on whether one is provided. If a seat is included, it must be a folding type and two grab bars must be provided. If there is no seat, three grab bars must be provided. Grab bars on the back wall must begin 6 inches maximum from the corner, but must not extend above the seat (the length of the grab bars is dependent on the size of the shower compartment.) Also, when a seat is provided, additional controls must be provided within 27" of the seat (see page 36).

An alternate bathing option (which works well in limited space) is to provide a **transfer type shower**. A transfer type shower requires a seat be provided, and a parallel approach clear floor space extending beyond the compartment on the side with the seat. The shower compartment must have inside clear (exact) dimensions of 36 inches by 36 inches, with a entry opening of 36 inches wide. The control wall must be opposite the seat wall (see page 37) and it must have a grab bar on its entire length. The rear wall must have a grab bar extending 18 inches minimum from the control wall.

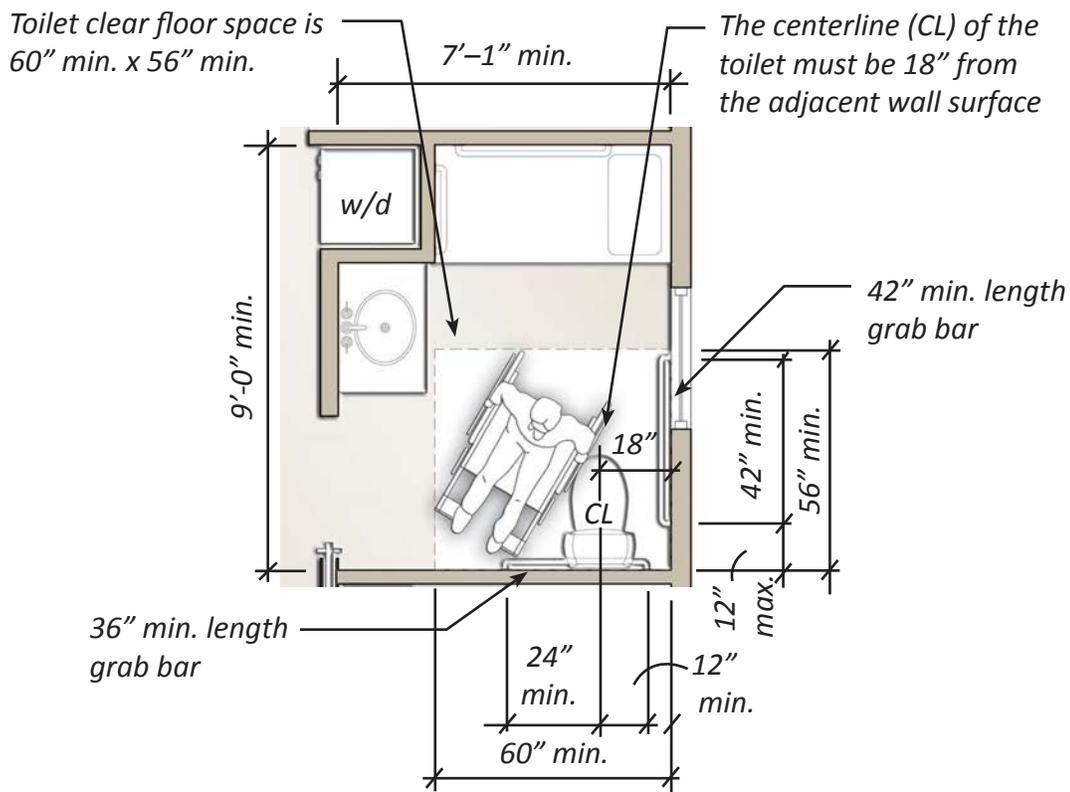


In showers, the threshold must be no greater than 1/2-inch high (see page 38).² It is also important to note that this detail conflicts with the 2-inch minimum height for shower thresholds required by the MHCSS (the HUD Code).²

Toilets (or water closets) require specific clear floor spaces and the size of the clear floor space may vary depending on the location of the lavatory. If the lavatory is outside of the toilet clear floor space, then the size of the clear floor space is 60 inches wide minimum by 56 inches deep minimum. (Note: the Uniform Federal Accessibility Standard (UFAS) requires 66 inches in lieu of 56 inches for a forward approach.) In the

configuration shown, the lavatory can be mounted in a countertop supported by side panels.

The toilet must have a centerline positioned 18" from the side wall surface. A 36-inch minimum length grab bar is required on the rear wall and a 42-inch minimum length grab bar is required on the side wall adjacent to the toilet. See the diagram below for specific positioning of the grab bars.



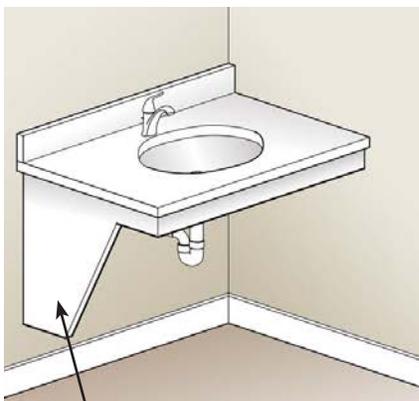
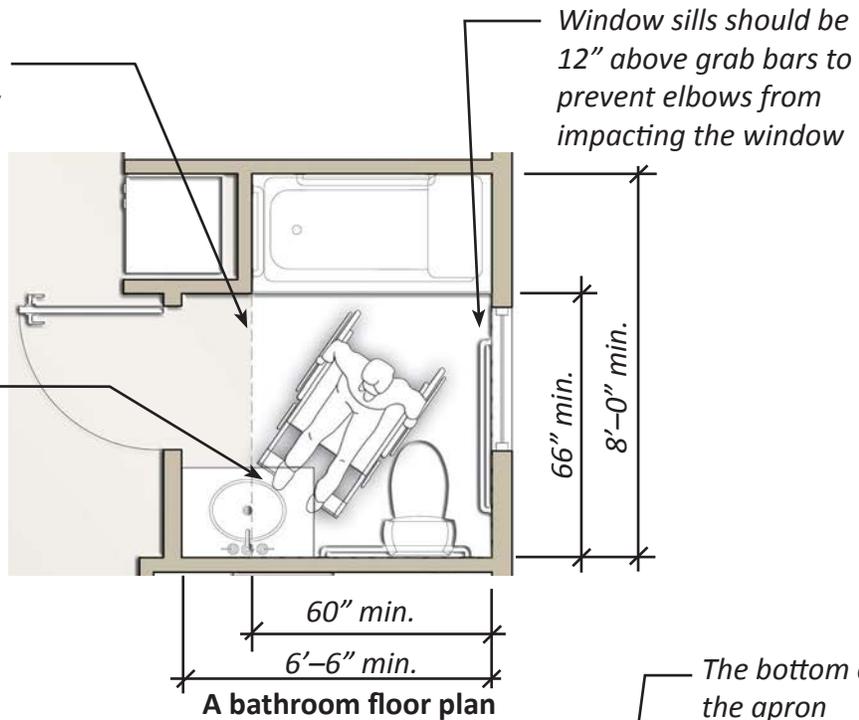
A bathroom floor plan with a roll-in shower

An arrangement where the lavatory is adjacent to the toilet and overlaps the toilet clear floor space is permitted if the depth of the toilet clear floor space is increased to 60 inches by 66 inches. The clear floor space for the toilet can include knee and toe space under the

countertop. This means the countertop must be hung on wall-mounted brackets designed to allow the knee and toe clearance to extend to the wall. This bathroom has limited wall space for mounting grab bars.

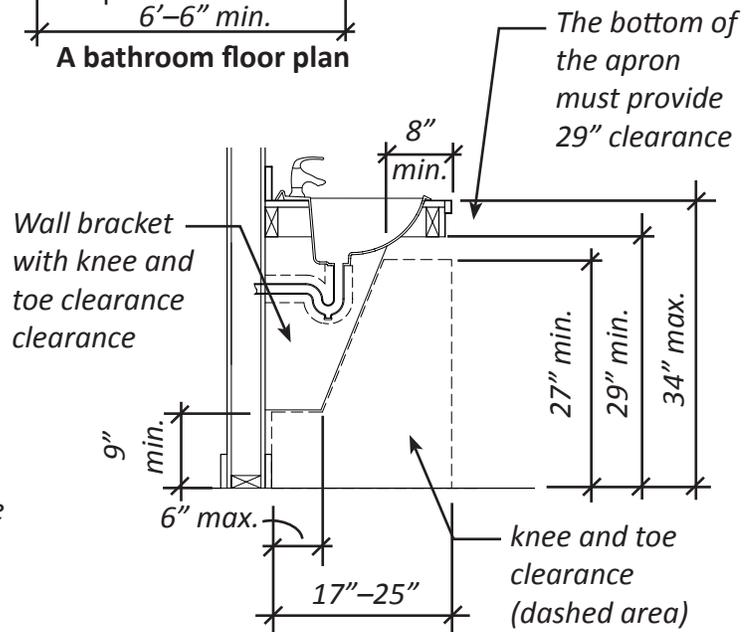
Toilet clear floor space is 66" deep when the lavatory overlaps the space

A lavatory is allowed to overlap the clear floor space for the toilet if the countertop is mounted on wall brackets that allow for knee and toe clearance



Wall bracket with a profile providing knee and toe clearance

Lavatory countertop mounted with a wall bracket

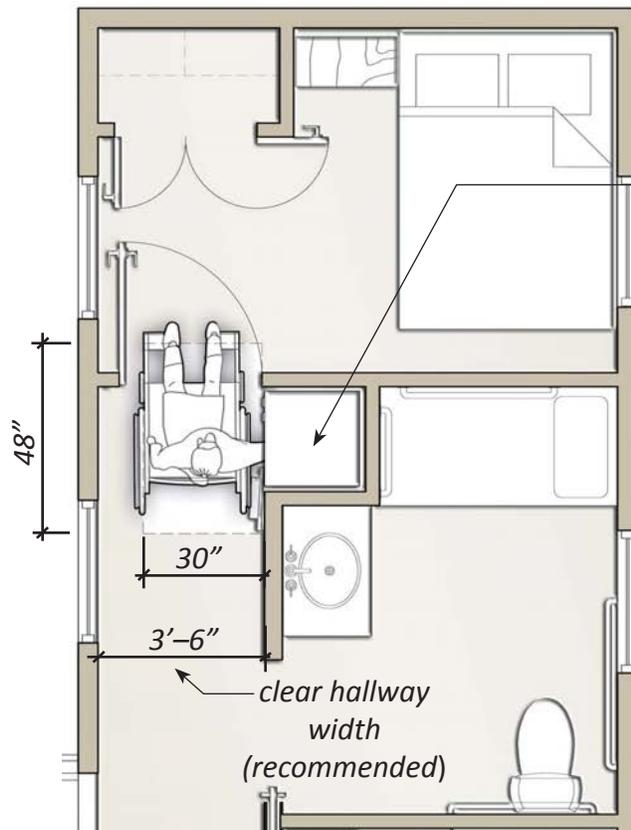


Knee and toe clearances at lavatory countertop

Washer and dryers require a parallel approach and a 30-inch minimum by 48-inch minimum clear floor space centered on each appliance to be usable by a person seated in a wheelchair.⁴ Doors to top-loading machines must not be higher than 36 inches above the floor. Doors to front-loading machines must be between 15 inches and 36 inches above the floor. Also available are small fixtures which combine washing and drying functions in one appliance with a single door opening.⁴

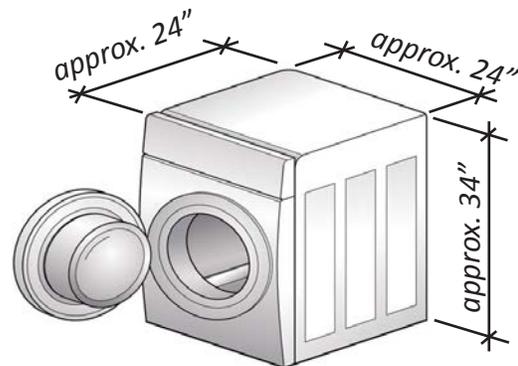
Operable parts, including doors, lint screens, and detergent and bleach compartments, must be within accessible reach ranges (see pages 6 and 7). Some manufacturers provide Braille kits upon request.

“Side-by-side” washer and dryer equipment can be located in a niche off the hallway



A washer/dryer location on a hallway

A small appliance that both washes and dries in a single machine with one door opening, is known as a “combo” unit; it requires less space than a “side-by-side” arrangement and venting is not required by some manufacturers



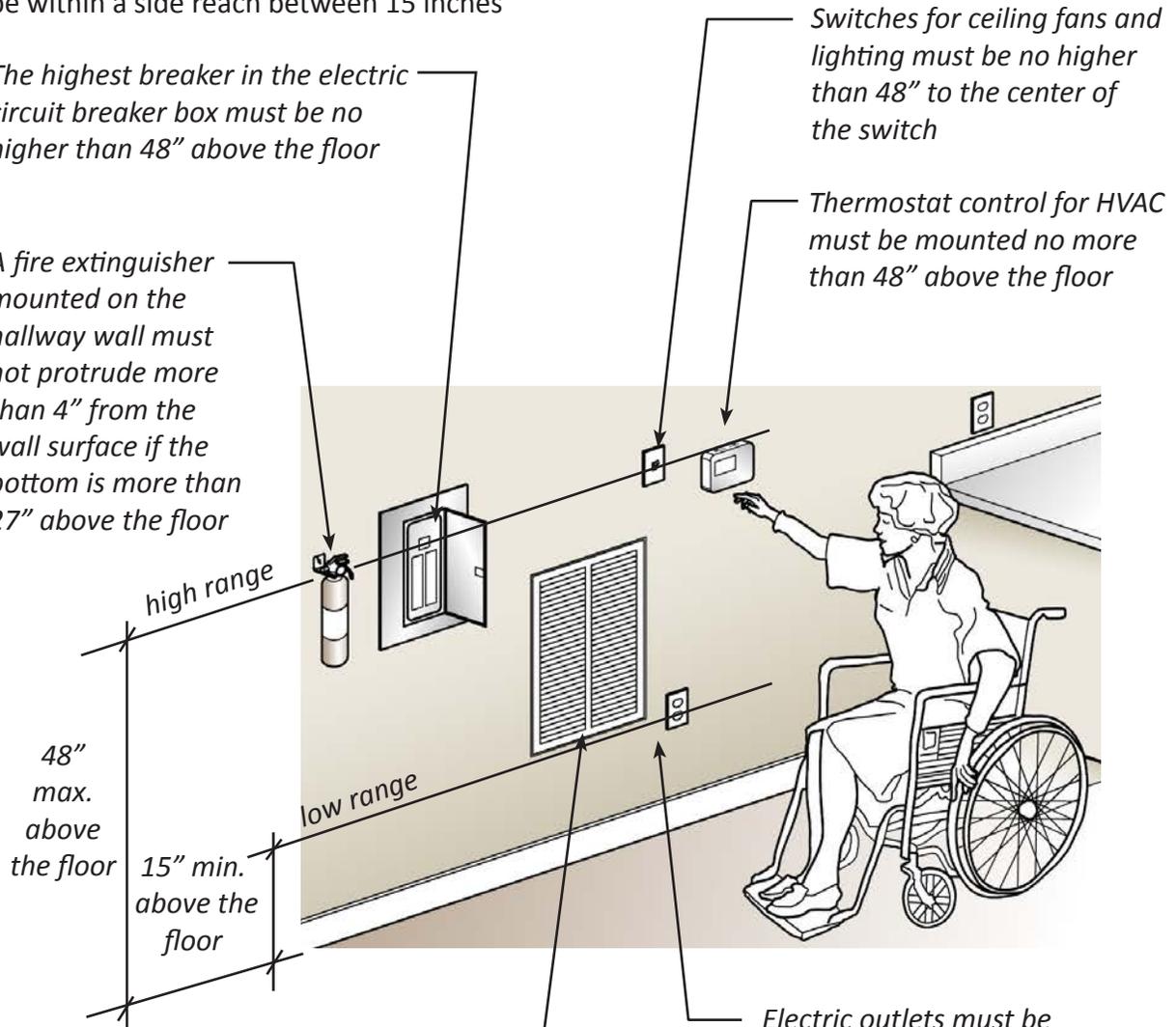
A typical “combo” unit

Utility areas in disaster relief dwellings generally occur in a hallway where a parallel approach by a person in a wheelchair is possible. Thermostat controls, locations for HVAC filters, controls for fans and lighting, as well as the electric panel breaker boxes, must be within a side reach between 15 inches

and 48 inches above the floor (see page 6 and 7 for other reach types and limits). Also helpful are remote controls that can be used at a distance from fixtures such as a mechanical unit, light, fan, or television, when reach ranges are exceeded.

The highest breaker in the electric circuit breaker box must be no higher than 48" above the floor

A fire extinguisher mounted on the hallway wall must not protrude more than 4" from the wall surface if the bottom is more than 27" above the floor



A resident must be able to reach the air filter, which is accessed through the return grill; the grill must be removable with only one hand (no grasping, pinching, or twisting required)

Operable parts and fixtures located on a hallway

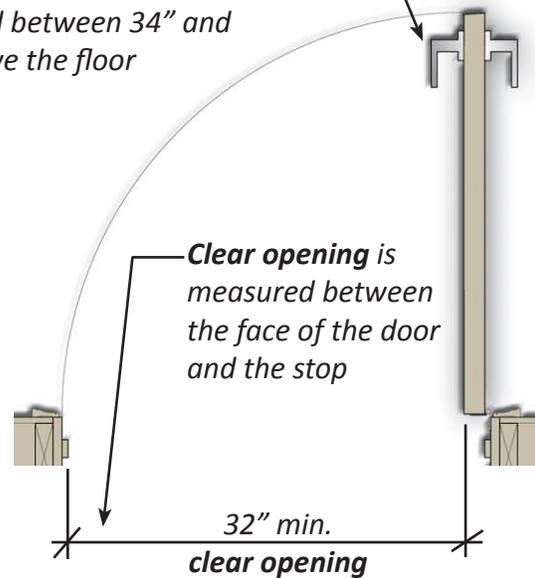
Specific detail elements are critical to creating successful accessible disaster relief dwellings. These features must possess definitive dimensions, sizes, heights, and qualities or the space will not function as intended. A fraction of an inch can make the difference between usability and non-usability for a resident using a wheelchair, and these very important elements should be designed and built with the greatest of care.

Doors are generally either single leaf, sliding, or folding. Accessible doors allowing passage into a space or room must provide **a clear opening width of 32 inches minimum** and must also be a minimum of 80 inches tall.

At a **swinging door**, the actual dimension of the clear opening is measured between the face of the door opened to 90 degrees and the face of the stop. A swinging door larger than 32 inches must be provided because the door's width and stops reduce the clear door opening. It is common to use a 36-inch wide door to provide the required 32-inch clear opening (a 34-inch wide door on "swing clear" hinges may also provide a 32-inch clear opening). The designer must verify that doors provide the required opening.

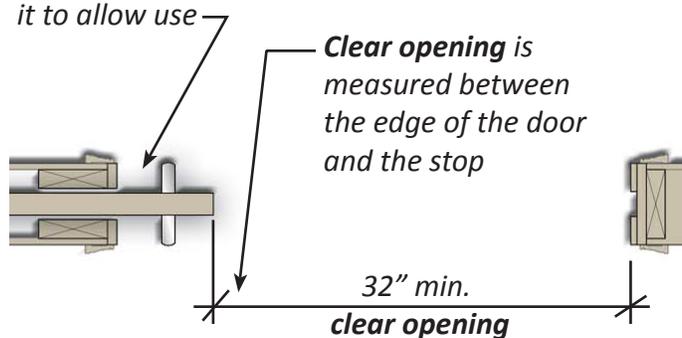
At a **pocket door**, the actual dimension of the clear opening is measured from the edge of the door fully retracted to the face of the stop. The opening with the door fully retracted must have a clear width of 32 inches (this means that the door stop inside the wall must be accurately positioned). See page 27 for more information about pocket doors.

Operable hardware does not affect the clear opening if it projects 4" or less, and is mounted between 34" and 48" above the floor



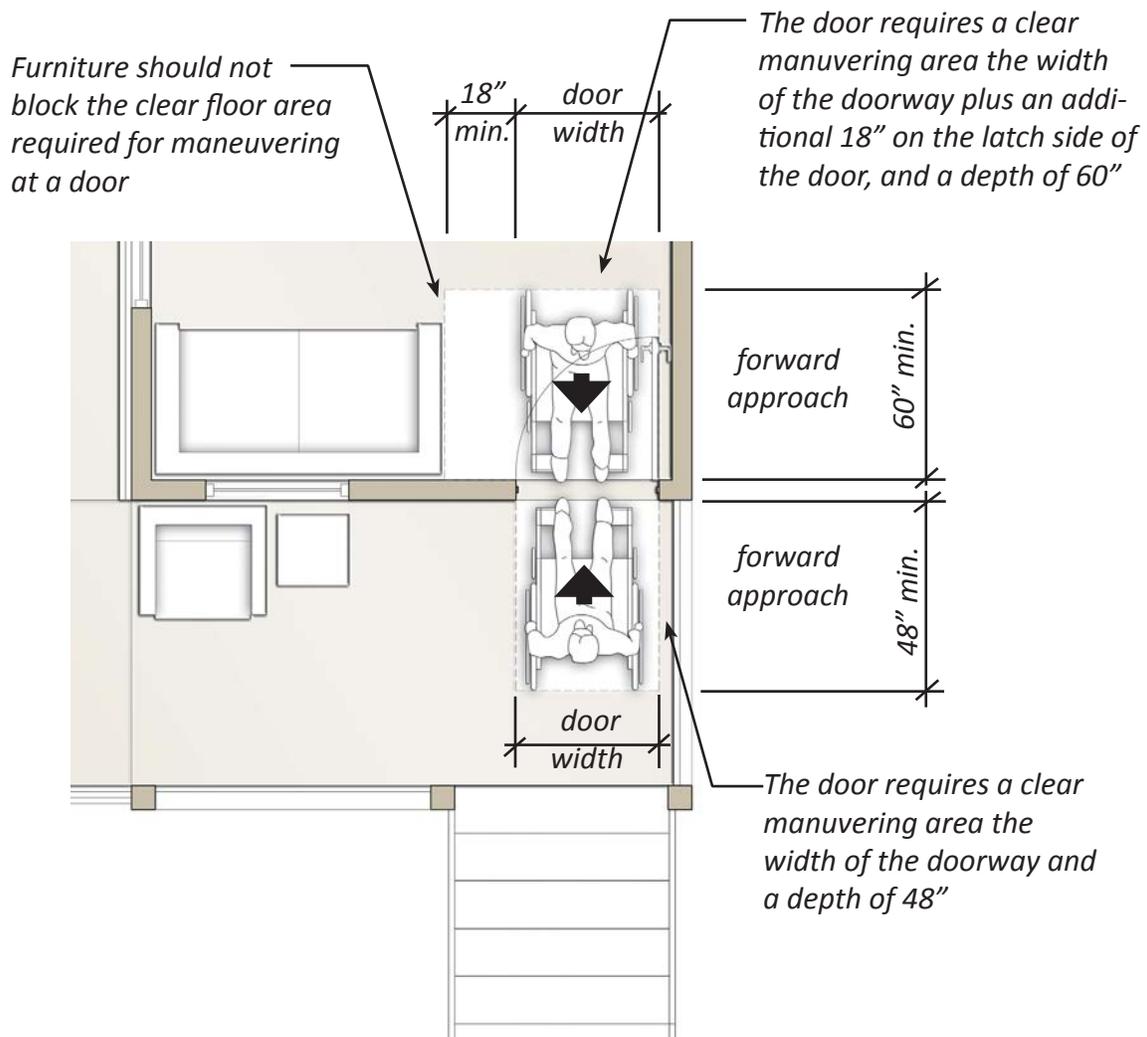
Floor plan of a swinging door

At a retracted door, the hardware must have enough space around it to allow use



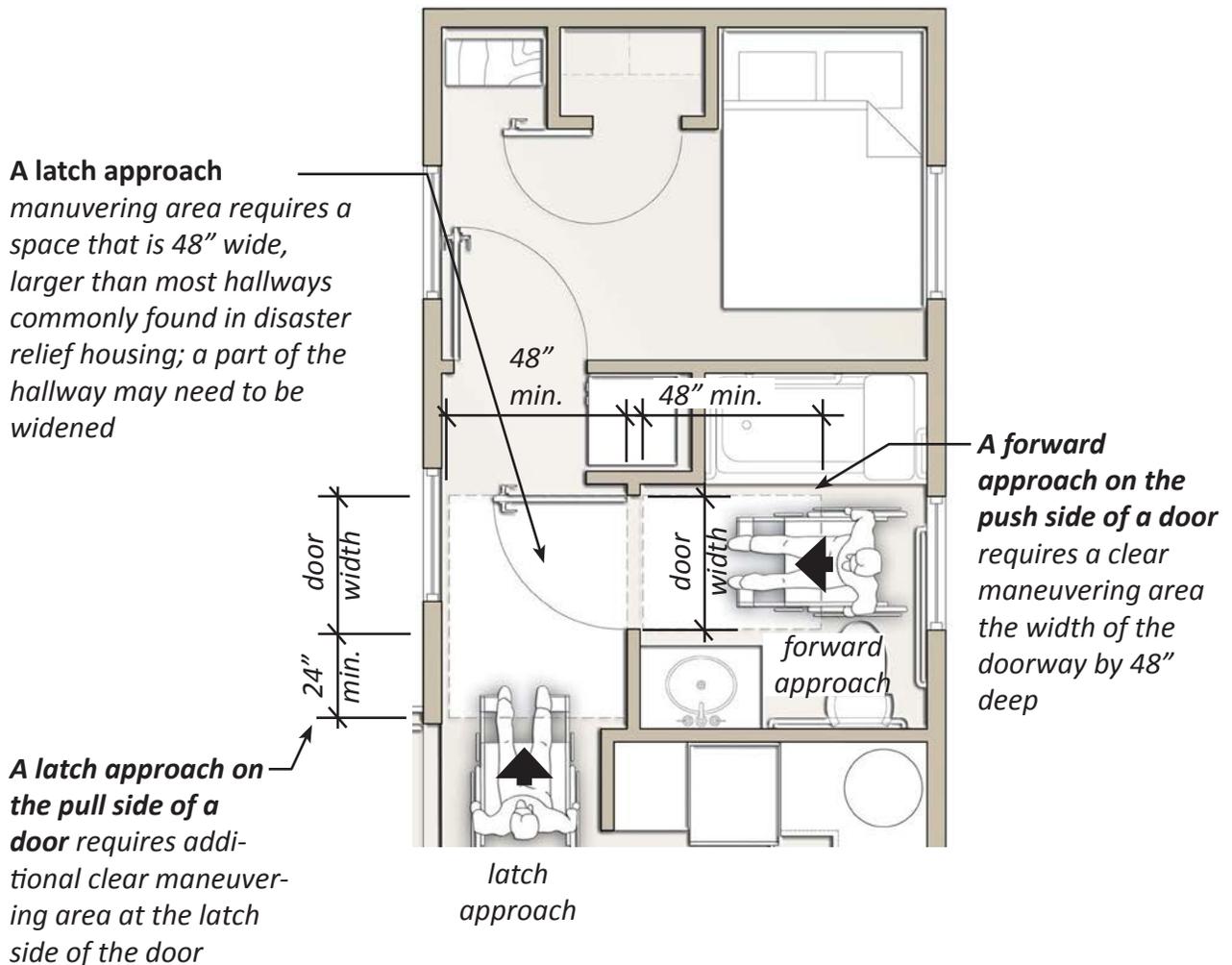
Floor plan of a pocket door

Maneuvering clearances at doors that allow a person in a wheelchair to open the door and enter into the space depend on whether the door is swinging into or out of the space, and on the direction of the approach. Note that outward swinging entry doors may be required by wind zone codes in disaster-prone areas.



Entry door and porch floor plan

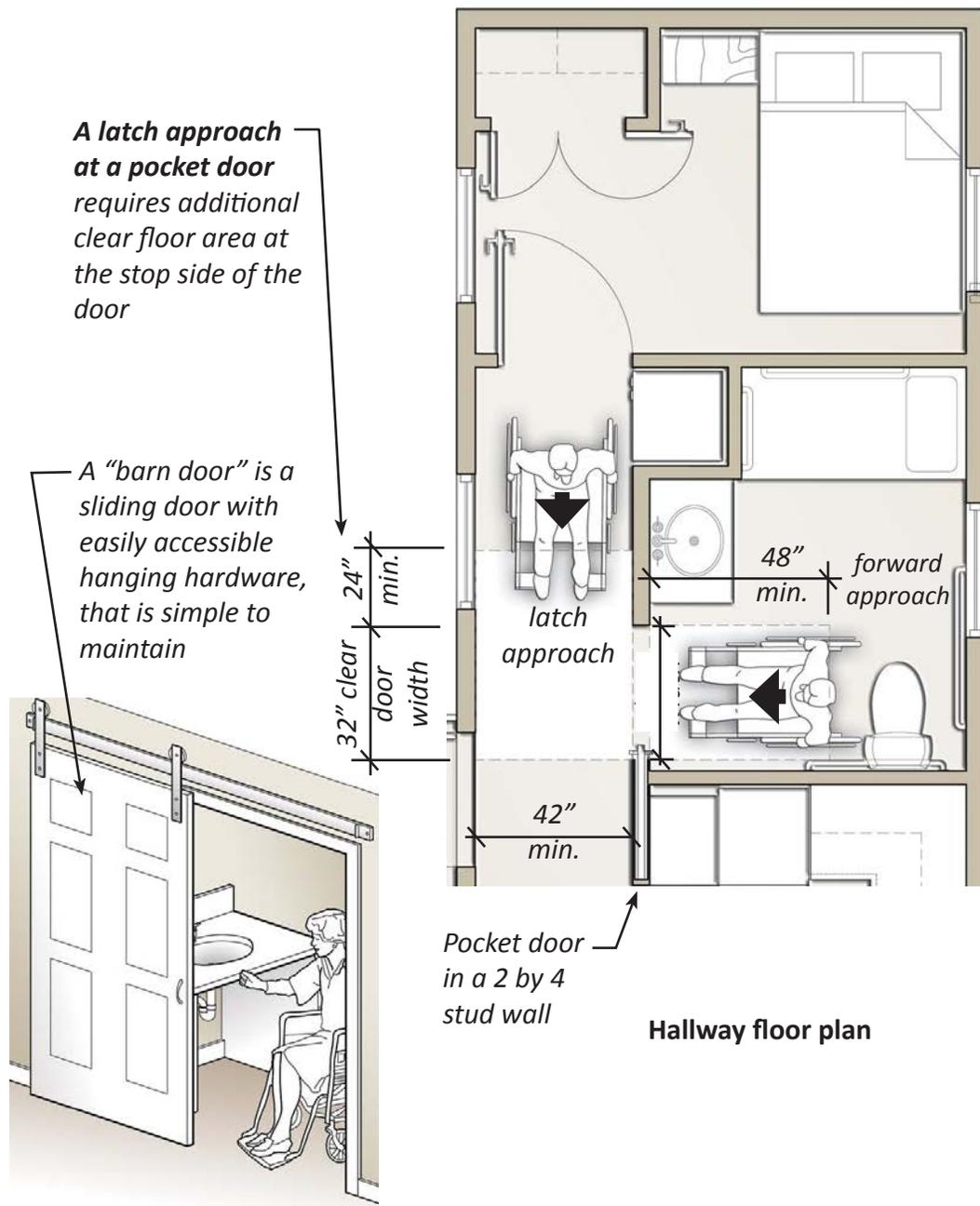
In disaster relief dwellings, a common place for swinging doors to be located is opening onto or off a hallway. Hallway doors require specific clearances depending on which direction they are approached from, and on which side the user is positioned. The hallway or the room must be wide enough to provide the clear maneuvering area required to approach and use the door.



Hallway floor plan

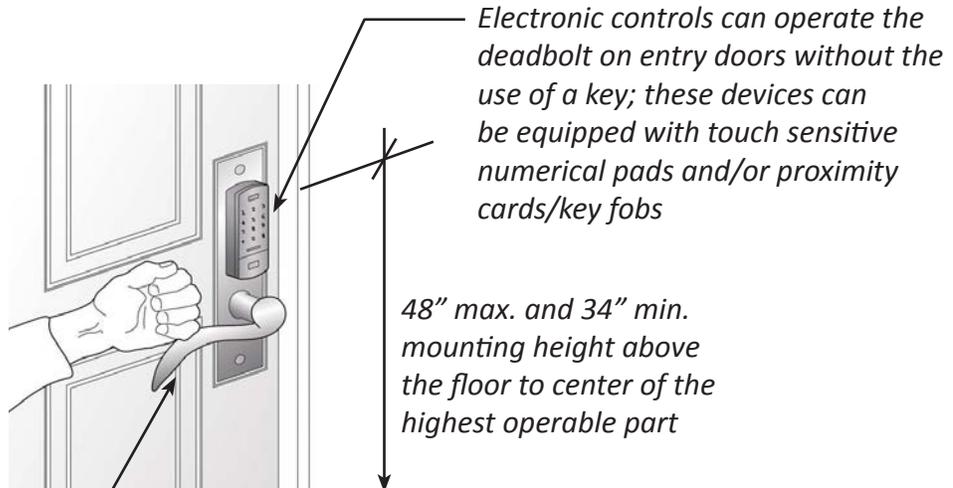
Sliding doors are extremely useful in the small spaces in disaster relief dwellings since they do not require floor space for a door swing. They must be equipped with accessible hardware (such as a “wire pull”) that does not require twisting, pinching,

or grasping and, when in the fully open position, the hardware must be exposed and usable from both sides. Pocket doors should be specified with a heavy duty hanging kit that includes “jump proof” wheels mounted inside a 2 by 4 (min.) stud wall.



Door hardware (including deadbolts) must have specific attributes to be considered accessible. The hardware must operate with the use of only one hand, it must not require tight grasping, pinching, or twisting of the wrist, and it must operate with a maximum force of 5 pounds.

Lever hardware can have these qualities and is commonly used in residential dwellings. The operable parts of the hardware, including deadbolts, must be mounted at a height between 34 inches minimum and 48 inches maximum above the floor.



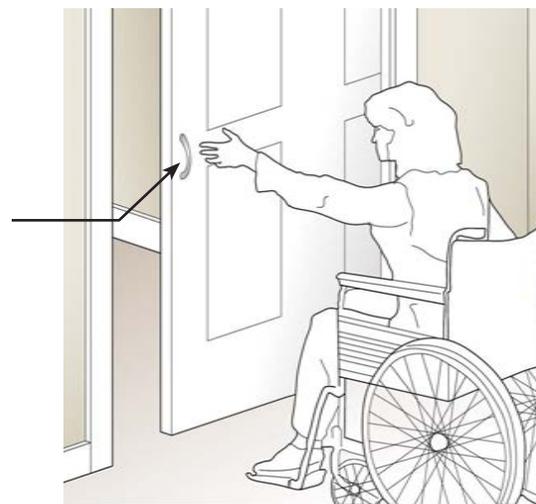
Electronic controls can operate the deadbolt on entry doors without the use of a key; these devices can be equipped with touch sensitive numerical pads and/or proximity cards/key fobs

48" max. and 34" min. mounting height above the floor to center of the highest operable part

Lever hardware allows a resident to operate the latch without grasping or twisting

Accessible dwelling entry door hardware

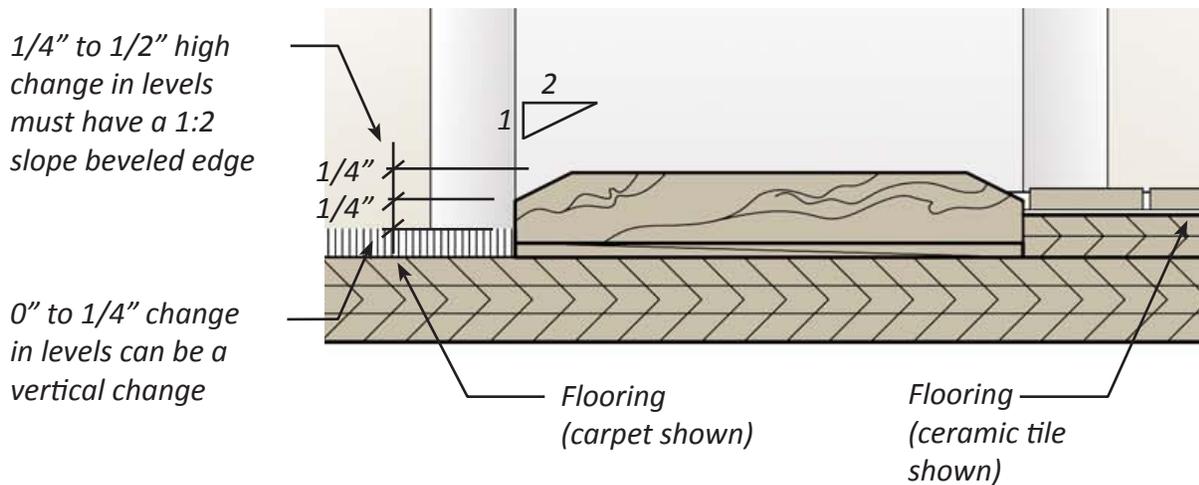
At sliding doors, a wire (loop) pull that is large enough to accommodate a hand's width is an accessible type of hardware that can be used



Resident opening a sliding door

Thresholds that are accessible cannot exceed 1/2-inch in height and must have a specific profile. There are three types of profiles that are accessible. A threshold up to 1/4-inch high can simply be a vertical face and does not require any bevel. Thresholds taller than 1/4-inch, and up to 1/2-inch high can have

a beveled profile that combines a 1/4-inch vertical face with 1:2 sloped beveled edges and a flat top. The last type of threshold is a ramp type threshold, which is sloped for its entire length at a 1:12 slope or less (see page 31 for this profile).



1/4" to 1/2" high change in levels must have a 1:2 slope beveled edge

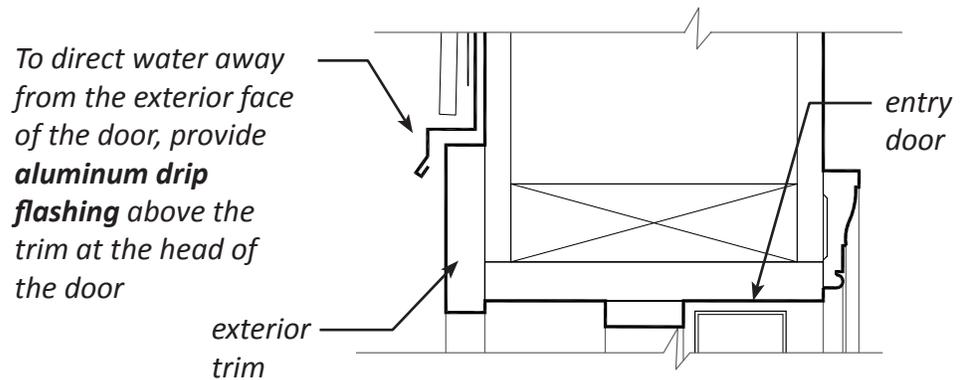
0" to 1/4" change in levels can be a vertical change

Flooring (carpet shown)

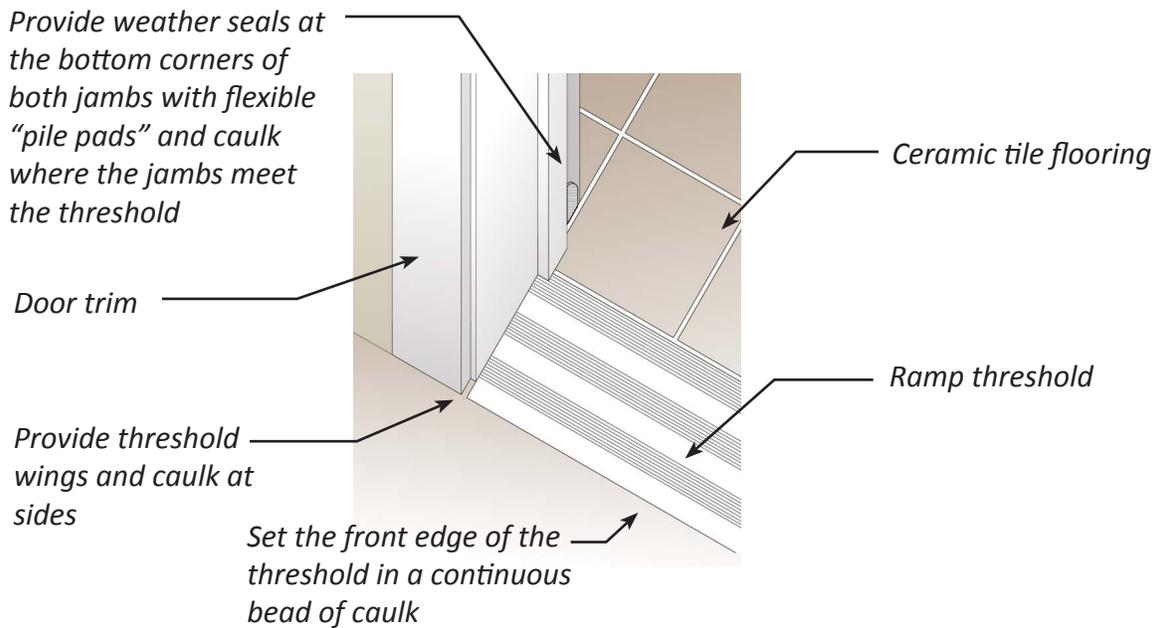
Flooring (ceramic tile shown)

Beveled interior door threshold

Exterior entry doors with low accessible thresholds present a challenge in protecting against water infiltration. Required emergency exit doors must have an accessible threshold.⁶ The best choice is an exterior door that is under an overhanging roof, such as on a front porch. This will help prevent water intrusion from driving rain conditions. Other measures include providing a rain diverter or a gutter on the roof above the door to reduce the amount of water dripping onto the accessible threshold. Including a number of thoughtful construction details will improve water resistance for exterior accessible thresholds.^{1.1}

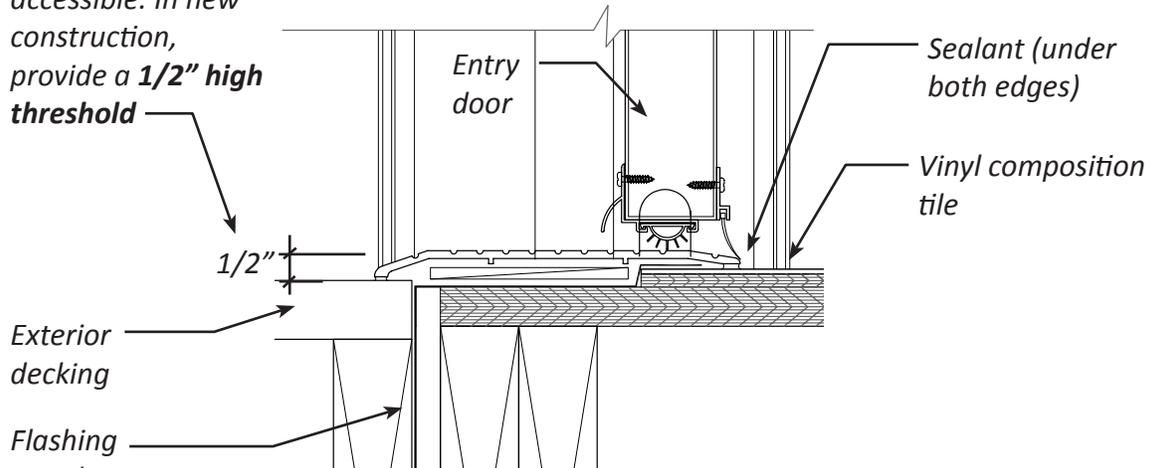


Typical door head detail with cementitious siding and trim

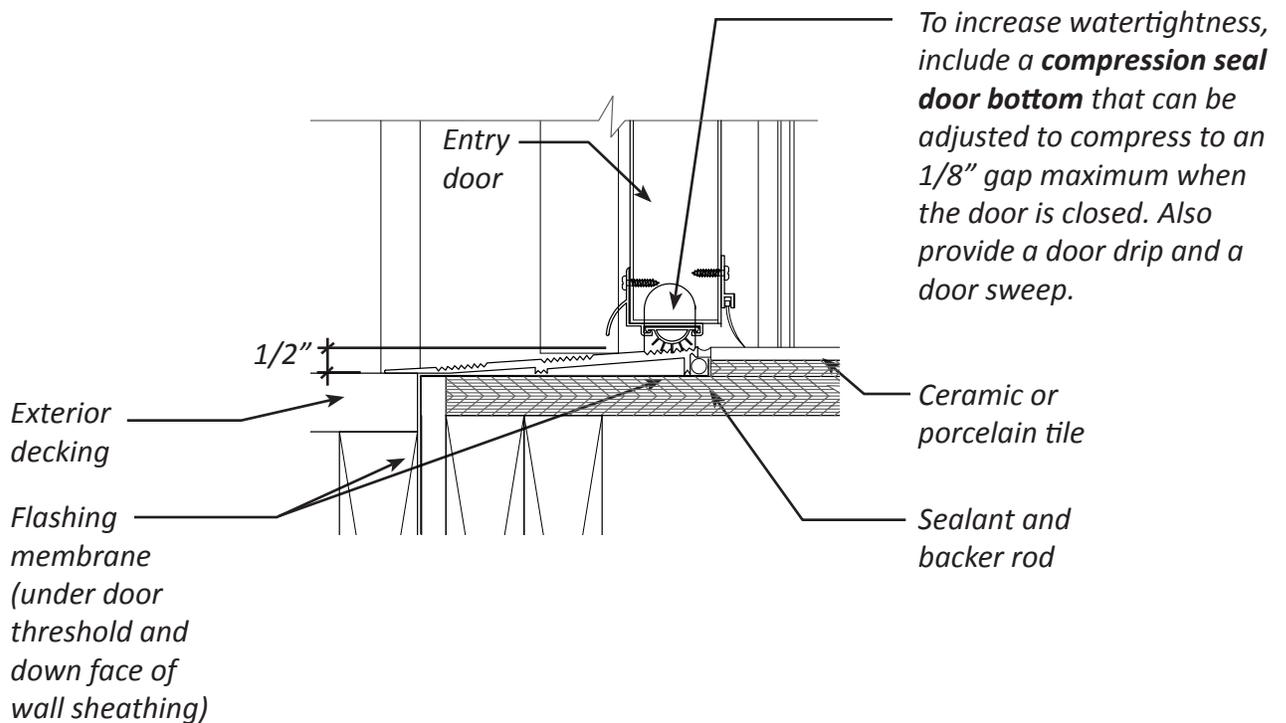


Door sill detail with low ramp type threshold

Provide the highest threshold that is accessible. In new construction, provide a **1/2" high threshold**



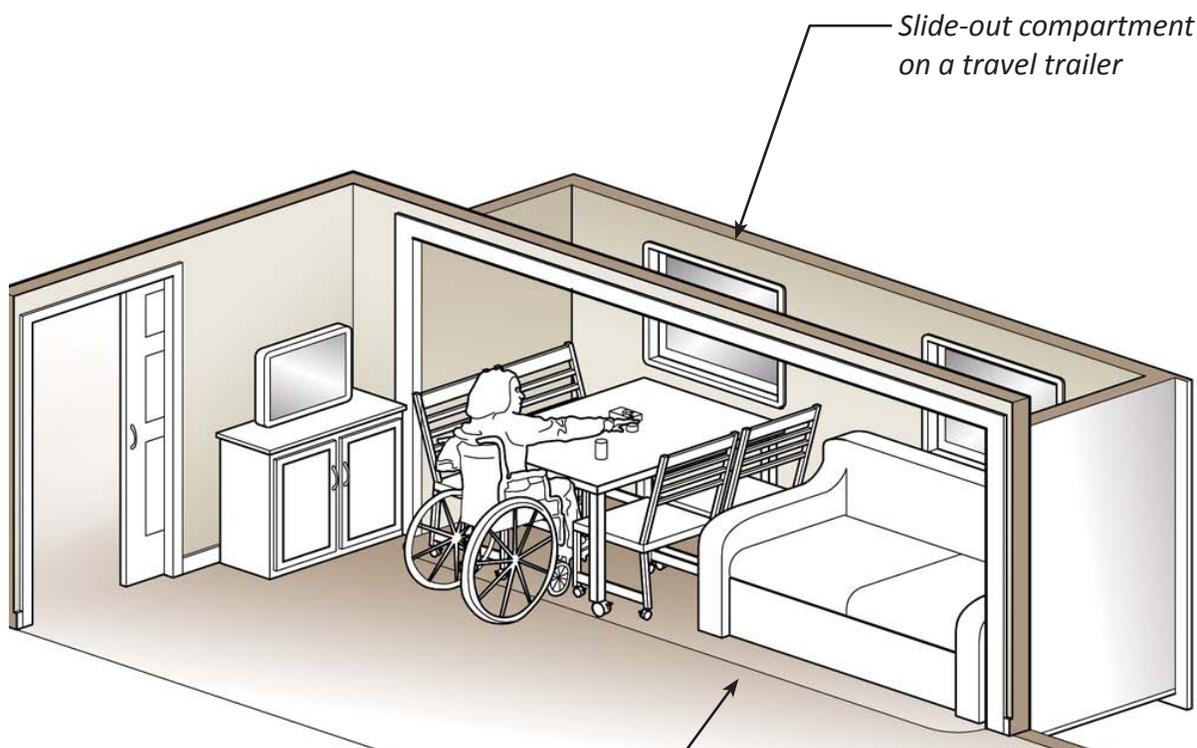
Saddle threshold detail at transition between exterior decking and interior vinyl composition tile flooring



Ramp threshold detail at transition between exterior decking and interior tile flooring (from Tile Council of North America 150-07)

Level changes in spaces create difficulties not only for persons in wheelchairs but also for the general population. The maximum vertical change in floor surfaces that can occur without becoming a barrier is 1/4-inch. A change of surfaces greater than 1/4-inch, but less than 1/2-inch is allowed with a beveled 1:2 slope. Level changes are not permitted in clear floor spaces, and level changes greater than 1/2-inch in other areas are not allowed without a ramp, so it is recommended to avoid these conditions.

Floor surfaces must have finishes that are level, firm, and slip-resistant. Surfaces such as tile, linoleum, and wood laminate flooring are good choices in accessible disaster relief dwellings. Carpet is not recommended in disaster relief housing;^{1.3} however, if provided, it should be **glued down directly** to the underlayment or have a **firm** cushion or pad. Carpet pile must be no greater than 1/2-inch high level loop types, which wear well without padding.



Slide-out compartment on a travel trailer

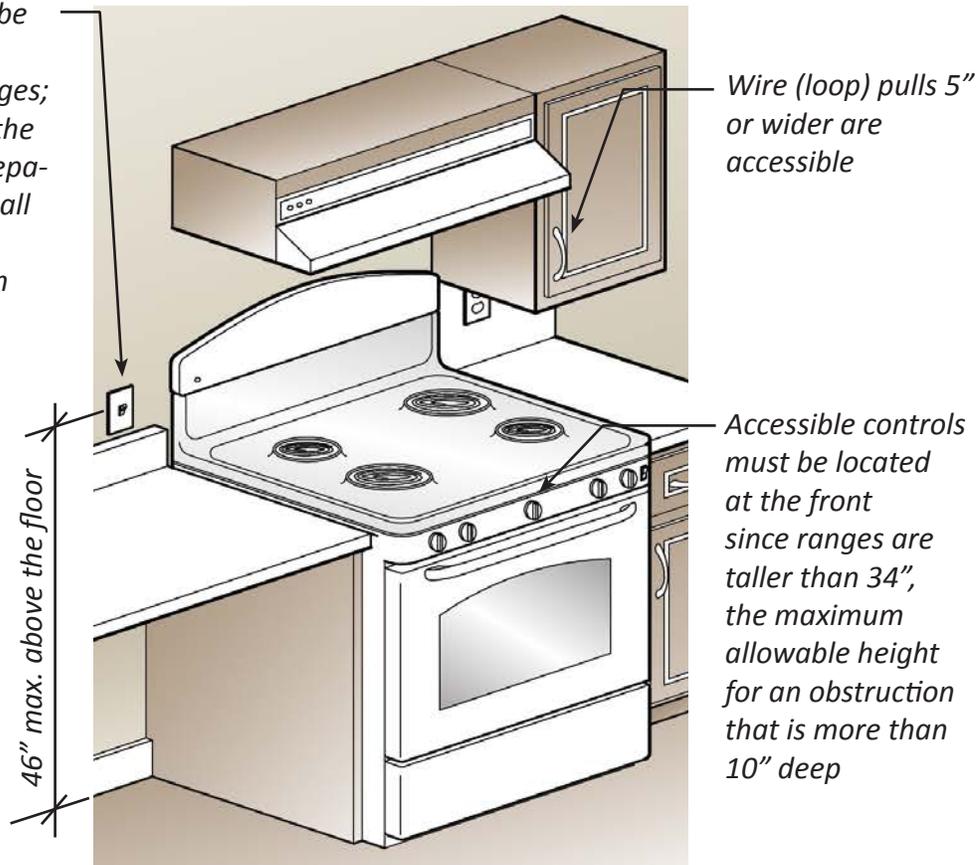
Floors in travel trailers must have a flush floor condition at the joint that occurs when the slide-out is extended and the edge of the carpet that overlaps the joint must be secured

Inside a travel trailer with a slide-out compartment^{1.6}

Operable parts of appliances in accessible dwellings must have specific characteristics and be mounted within accessible reach ranges (see pages 6 and 7). Switches, controls for appliances, and electrical outlets are all examples of operable parts found in disaster relief housing. Operable parts must be usable with one hand, cannot require tight grasping, pinching, or twisting of the

wrist, or require more than 5 pounds of force to operate. Touch pads are considered accessible controls if located within reach ranges. Fittings such as knobs are not accessible, but wire pulls (5-inch minimum width recommended) and levers may be used if they are easy to operate. Some manufacturers provide Braille kits for appliance controls upon request.

Hood controls must be located within accessible reach ranges; this requires wiring the hood controls to a separate switch on the wall behind a countertop that is 34" maximum above the floor



Kitchen range with hood wired to accessible switch

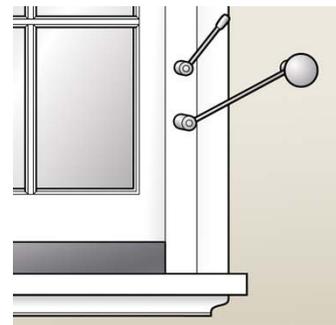
Operable parts of windows are required to be within accessible reach ranges (see pages 6 and 7) by the Uniform Federal Accessibility Standards (UFAS).¹⁻⁸ Windows provide important natural ventilation and emergency egress in disaster relief homes. A clear floor space with either a parallel or forward approach on an accessible route must be

provided adjacent to the window. Operable parts must be mounted at 48 inches maximum above the floor. Window hardware to open the window, as well as any hardware for blinds or curtains, must be usable with one hand without tight grasping, pinching, or twisting of the wrist and operable with a maximum force of 5 pounds.

Hardware on tall double hung windows can be above the accessible reach ranges; adding a transom can reduce the height of the window and lower the location of the operable hardware



Resident opening a double hung window. Other types of windows such as horizontal sliding or awning types may be used



Assistive hardware, like the lever system shown above, is specifically designed to make opening windows easier, can be added to windows from a variety of manufacturers and can be mounted within accessible reach ranges

Locking hardware that is easy to use is available; the latch release shown here requires the user only to apply light pressure on the mechanism for the window to lock or unlock

Blocking must be included in bathroom walls at specific heights to support accessible grab bars. A common blocking technique is to use either a 2 by 10 board or 3/4-inch thick plywood mounted between the studs and under the gypsum board wall surface. Sixteen gauge metal sheet blocking is also another choice. All blocking must be able to withstand a 250-pound load applied to the grab bar in any direction. Since interior walls in many units can be 2 by 3 studs, it is advisable to plan plumbing locations so as not to

conflict with the blocking, or to increase wall thickness to accommodate blocking materials.

There are several types of grab bar installations that require blocking in an accessible bathroom. At the toilet, blocking should be installed at a height spanning from 32 inches to 40 inches above the floor on both the side and rear wall, for a distance of 48 inches and 60 inches from the corner respectively. Other grab bar locations at showers and tubs also require blocking (see pages 36 and 37).

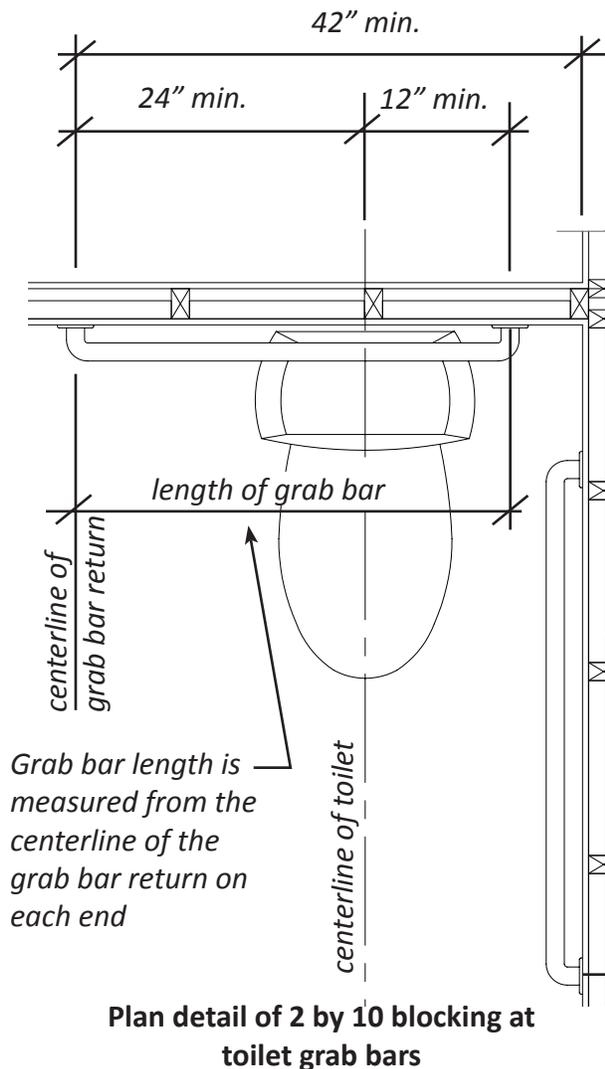
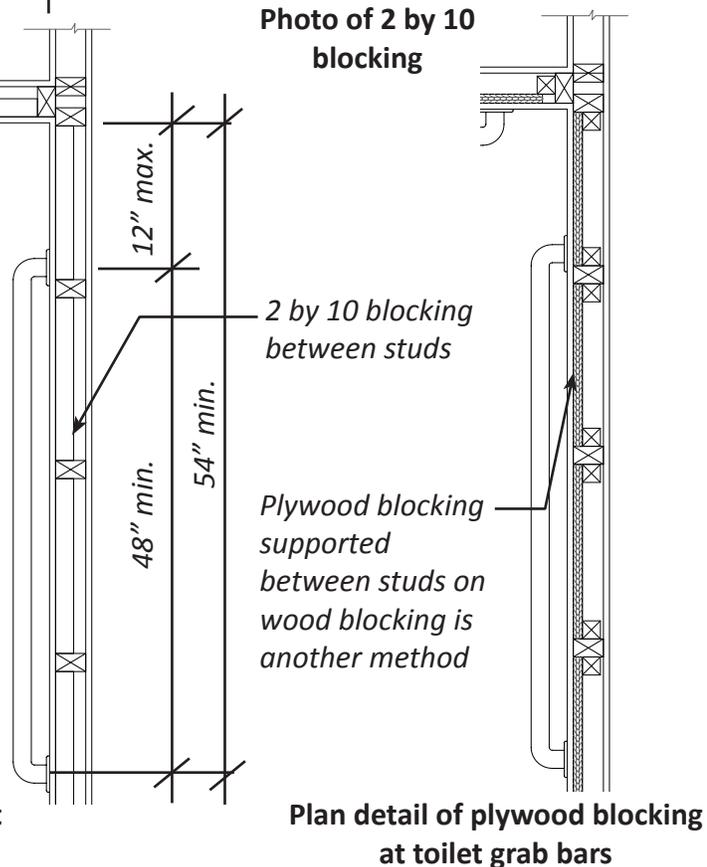
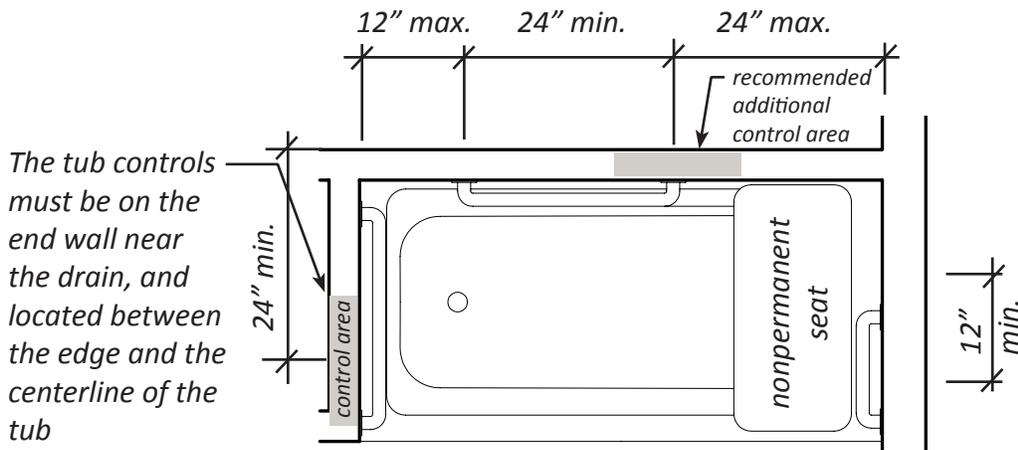


Photo of 2 by 10 blocking

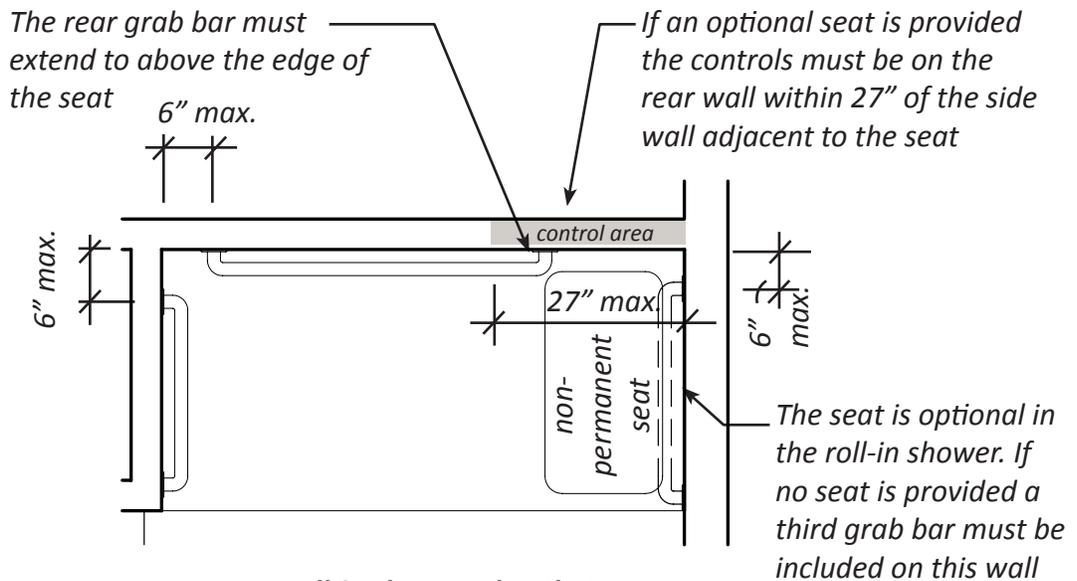


Each of the bathing options has **grab bars** located specific to the type of fixture. These grab bars require blocking similar to the toilet grab bars illustrated on the previous page. Control areas are specific to each bathing option and must be coordinated with the placement of the grab bars. Controls can be no higher than 48 inches above the floor. If an adjustable height shower head on

a vertical bar is used, it must also be coordinated with grab bars so as not to obstruct their use. The provision of two shower head fixtures in a roll-in shower or bath tub with a seat allows for flexibility for both standing or sitting users. Shower spray units must deliver water that is 120°F (49°C) maximum.



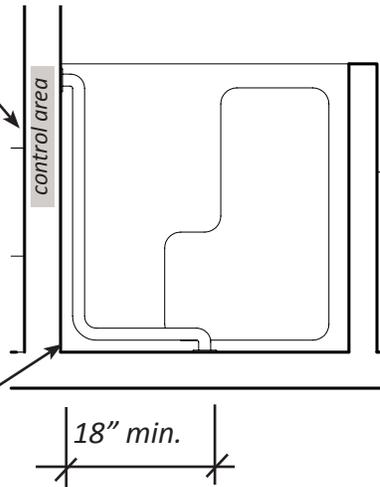
A tub plan that requires three grab bars



A roll-in shower plan that requires two grab bars

The control area must be located on the wall opposite the seat, from the edge to the centerline of the fixture

Grab bars with 90 degree turns are acceptable and available



A transfer shower requires grab bars on two walls

The required location for shower controls for a tub is on this end wall

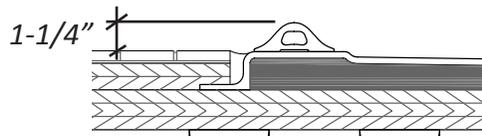
Adding a second (optional) set of shower controls creates a flexible arrangement for many types of bathers



A variety of grab bars and shower heads make bathing options easy to use for residents requiring accessibility features. This shower includes a seat that folds up, and two shower head/control areas with adjustable height shower heads

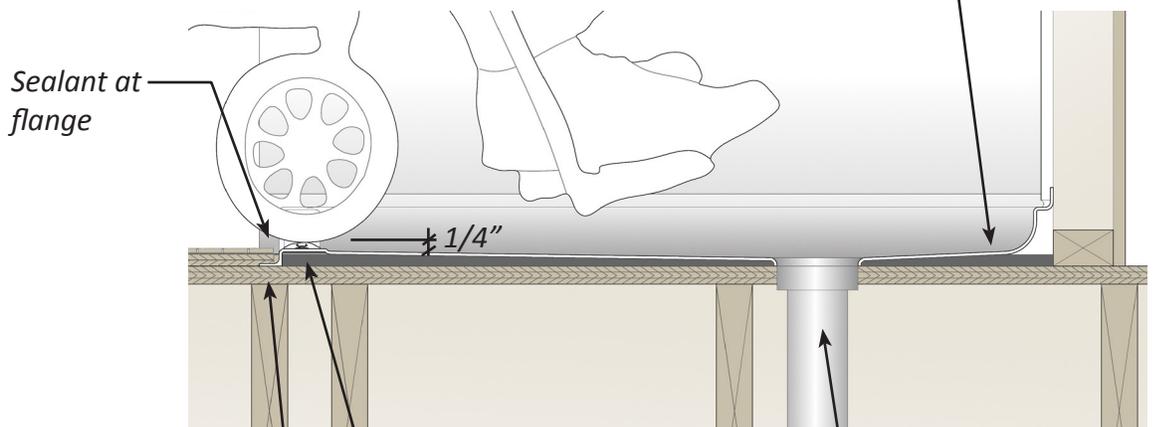
Thresholds in accessible showers must be 1/2" high or less (note that this conflicts with some manufactured housing codes).² In roll-in type showers, this means that the shower floor will have a low slope and water may escape the threshold onto the bathroom floor. Possible solutions are providing, throughout the bathroom, a watertight, seamless, non-slip sheet flooring or grouted tile floor surface with integral cove, using a shower pan specifically designed for accessible showers and/or providing a compressible threshold.

A compressible threshold typically is as tall as 1-1/4", but it can compress to 1/4" tall when rolled over



Detail of a compressible shower sill

A shower pan designed for accessibility will have floor surfaces that slope no greater than 1:48 and must be solidly filled underneath to prevent deflection



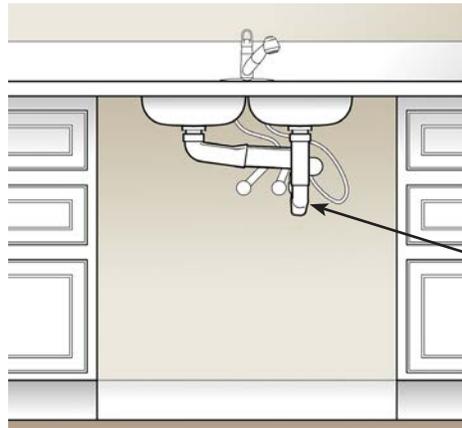
A flange increases watertightness of the shower pan installation. Provide blocking below the edge

A wheelchair rolling over a compressible threshold reduces in height, and then springs back to retain water

The drain in a roll-in shower should be located at the back of the fixture

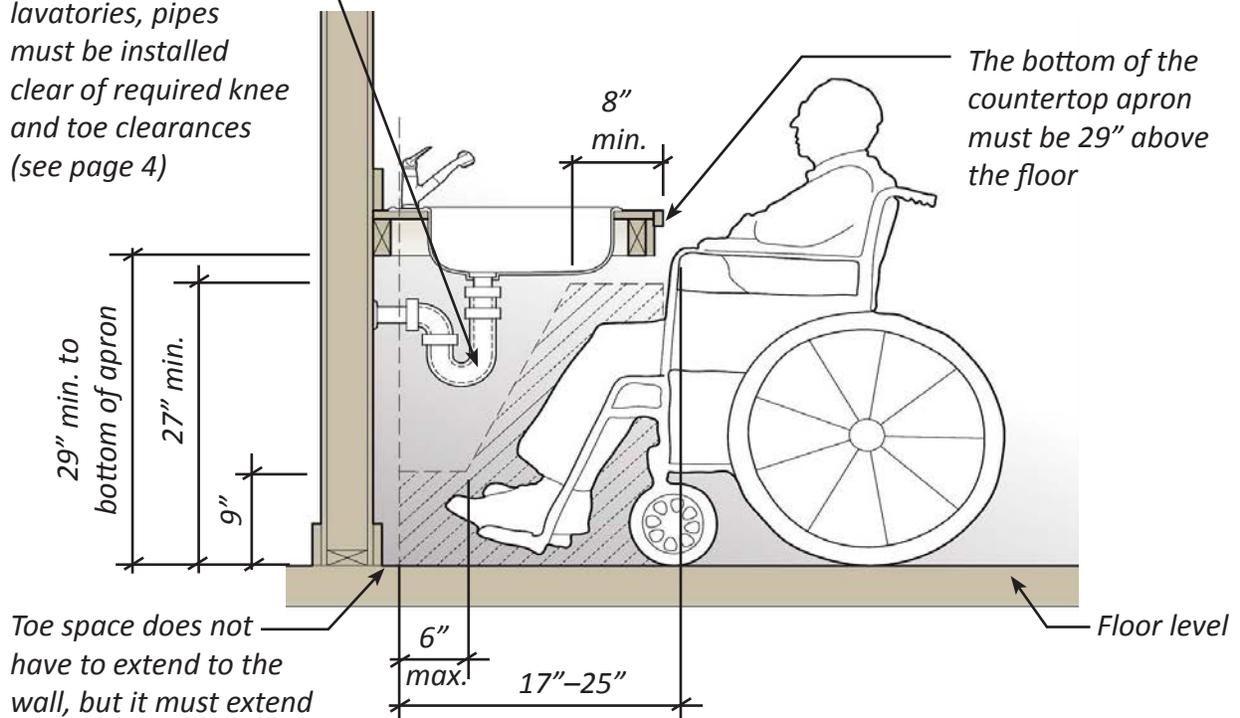
A person using a wheelchair and entering a roll-in shower with a compressible sill

Pipe protection is required to protect residents who use wheelchairs from contact with hot water pipes and abrasive or sharp surfaces under all sinks and lavatories. Accessible sinks must have the drain opening at the rear of the sink so that pipes and protection are plumbed beyond the knee clearance. If a garbage disposal is installed, it must also not intrude into the knee and toe clearance.



View of clear area under a kitchen sink

At kitchen sinks and lavatories, pipes must be installed clear of required knee and toe clearances (see page 4)



The bottom of the countertop apron must be 29" above the floor

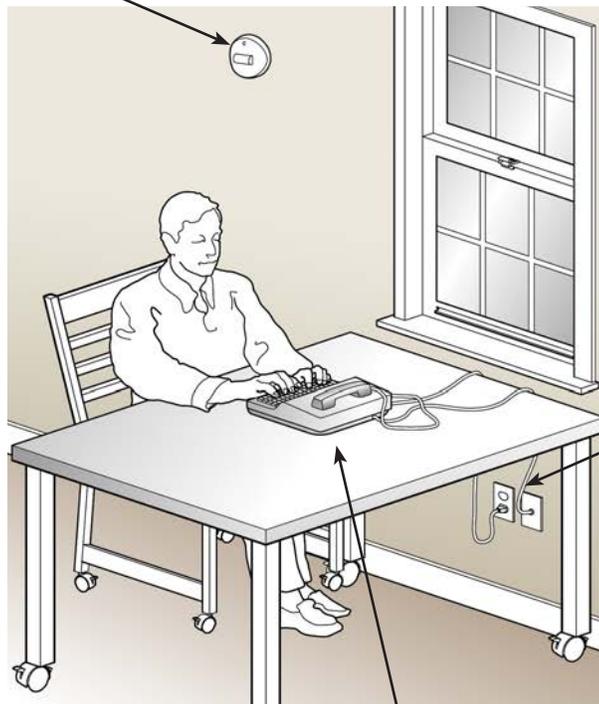
Toe space does not have to extend to the wall, but it must extend to depth of the controls

A resident using a kitchen sink with knee and toe clearance

There are a number of features can be included in disaster relief housing that make accessible dwellings more functional for those with **visual and/or hearing impairments**. These items include visual alarms or vibration alarms for smoke detectors and doorbells, and providing electrical outlets near telephone connections so a resident may plug in a TTY (Text Telephone) or TDD (Telecommunications Device for the Deaf). Some items, such as the visual alarms, can be installed in dwellings upon request.

Accessible weather alert systems are recommended in disaster relief dwellings.^{1.11} A NOAA Weather Radio (NWR) can be configured to set off an alarm for weather events through special output devices that are usable by individuals with hearing or vision impairments. These devices may include bed shakers, pillow vibrators, sirens, strobe lights, or other alert systems that may already be in place in the dwelling, such as a doorbell or smoke detector system.

When provided, the alert light from the visual alarm must be visible from all spaces when doors are closed



Duplex electrical outlet near the telephone connection

A TTY (Text Telephone) or TDD (Telecommunications Device for the Deaf) requires a duplex electrical outlet near the telephone connection

A resident using a Text Telephone (TTY)

Product Resources

The following resources are provided to assist users of this document in locating products to use in creating accessible disaster relief housing. These resources are examples only, and the list is by no means complete as many other products share similar accessible features. No endorsement of these products or manufacturers is given or implied by this publication.

Appliances

ADA compliant refrigerator

Model W4TXNFWQ

GE Appliances

1.800.626.2005

http://www.geappliances.com/design_center/ada_compliant/ada_compliant_refrigerators.htm

Door Thresholds

ADA compliant #102A saddle and

#236A ramp thresholds

Zero International

415 Concord Avenue

Bronx, NY 10455

718.585.3230 or 1.800.635.5335

<http://www.zerointernational.com>

Plumbing Fixtures

ADA compliant lavatory 0455.221US

*American Standard Cadet FloWise Right
Height Elongated Pressure Assisted Toilet
2467.100*

American Standard

P.O. Box 6820

1 Centennial Plaza

Piscataway, NJ 08855-6820

1.800.442.1902

<http://www.americanstandard-us.com>

Moen Salora single control 7570 Series

Kitchen Faucet with Sprayer

Moen US

25300 Al Moen Drive

North Olmsted, Ohio 44070

1.800.Buy.Moen (1.800.289.6636)

Showers and Shower Pans

*Barrier free shower pan SP6032BF34 and
other ADA compliant shower enclosures*

Clarion Bathware

44 Amsler Avenue

Shippensburg, PA 16254

1.800.576.9228

<http://www.clarionbathware.com/showers.html>

Window Hardware

Smart Touch Window Lock

Milgard Manufacturing Inc.

1010 54th Ave East

Tacoma, WA 98424

1.800.MILGARD (1.800.645.4273)

<http://www.milgard.com/milgard-advantages/smarttouch-window-lock.asp>

Window Ease Activator and Latch

Window Ease

5505 Barranca Oso Ct NE

Albuquerque, NM 87111

505.856.6632

<http://www.windowease.com>

Compressible Shower Water Dams

StayDry Systems
6790 Greig Court
Brentwood Bay, BC
Canada V8M 2G4
1.866.944.0449
<http://www.staydrysystems.com/products/collapsible-shower-water-dam/>

Door Pile Pads

Black Self Adhesive Pile Pads
Service Partners
1029 Technology Park Drive
Glen Allen, VA 23059
877.700.9525
<http://www.service-partners.com>

Digital Locks

Samsung high security electronic deadbolt lock
Samsung Electronics
85 Challenger Road
Ridgefield Park, NJ 07660
1.800.SAMSUNG (726.7864)
<http://www.samsung.com>

Pocket Door Hardware

11PD pocket door hardware set
Johnson Pocket Door Hardware
2100 Sterling Avenue
Elkhart, IN 46516
574.293.5664
<http://www.jhusa.net/pdindex.aspx>

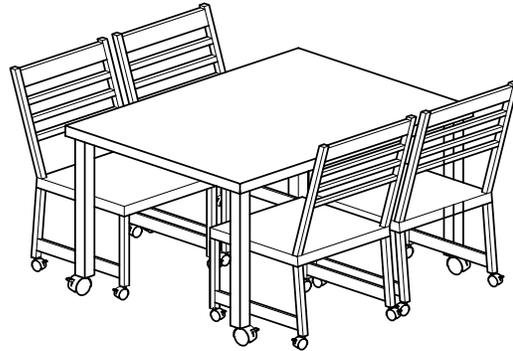
Washer/Dryer Combos

WM3534 front load All In One Washer/Dryer
LG Appliances
1000 Sylvan Avenue
Englewood Cliffs, NJ 07632
1.800.243.0000
<http://www.lg.com/us/washer-dryer-combos>

Furniture Examples

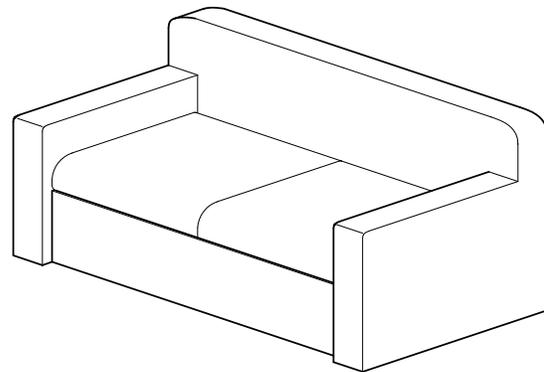
Dining table for four

Criteria: 36" wide x 48" deep x 34" maximum height, knee and toe clearance provided for accessible seating on end (see page 4 for dimensions), provide casters on table legs and chairs



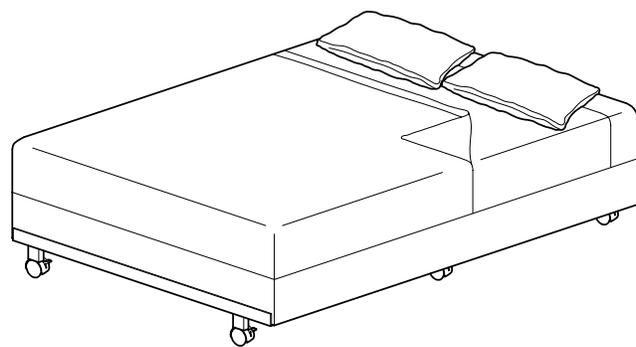
Sofa with pull out double bed

Criteria: 69" wide x 36" deep with extendable double bed 52" wide x 72" long



Beds

Criteria:
 Full/double 54" wide x 75" long
 Twin 39" wide x 75" long
 metal bed frame



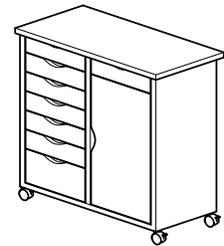
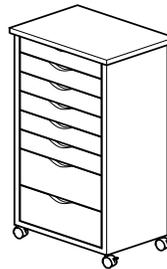
Bedroom Dresser/Storage

Criteria: At least one of each type of storage facility located within reach ranges (see pages 5 and 6), accessible hardware, provided with casters

Models:

Stanton 7 plus 1 Drawer Double Storage Cart with Door 33-1/2" high x 29" wide x 14" deep

Stanton 6 plus 2 Storage Cart 41" high x 20" wide x 14" deep

**Manufacturer:**

Home Decorators

8920 Pershall Road

Hazelwood, MO 63042

Phone: 1.877.537.8539

<http://www.homedecorators.com>

Credits

This document was created by Mark J. Mazz, AIA, and Loreen H. Arnold, AIA LEED AP, for the U.S. Department of Housing and Urban Development (HUD) Office of Policy Development and Research (PD&R) . Throughout the process of creating this publication, many contributed to the research and knowledge base necessary to create relevant accessible design details for emergency housing building types. Dana Bres of PD&R originally conceptualized the need for such a guide as a result of his personal experience with Hurricane Katrina emergency response efforts, and he provided invaluable insight and support to the authors throughout the process of developing these recommendations and details. Renee Catacalos was the editor for the project team, providing professional reviews to ensure quality and consistency in the publication. In addition, the authors would like to acknowledge the following groups and organizations for their assistance:

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DeZineWorks

1. **In October 2008, The Emergency Transportable Housing Federal Advisory Committee (“The Committee”)** to the U.S. Access Board developed recommendations intended to assist the Board to develop new rules or revise its existing requirements for the design and construction of emergency transportable housing subject to the Americans with Disabilities Act (ADA) and the Architectural Barriers Act (ABA). The Committee recommendations were approved by the U.S. Access Board in 2011. The Committee was formed in response to needs for accessible emergency housing which were identified subsequent to the Gulf Coast hurricanes in 2005, particularly Hurricanes Katrina and Rita. While the entire report can be accessed at <http://www.access-board.gov/eth/report.htm>, certain items are of particular relevance to this publication and warrant highlighting.

1.1 Unit thresholds at entrances: The Committee felt the need to reinforce that entry door configurations on all units need to be designed to satisfy the maximum 1/2-inch elevation difference. Some manufacturers of emergency transportable housing units include a lip on the bottom edge of the face of the door. This practice will likely result in a ramp landing positioned more than the allowable 1/2-inch maximum below the threshold. While the types of doors typically used in recreation vehicles can be problematic because they contain a lip which extends below the threshold, manufacturers can use more typical residential doors and thereby provide a compliant unit entrance.

1.2 Kitchen sinks and water spray units: The Committee proposed adding a new requirement for a water spray unit at the kitchen sink. Performing tasks such as dish washing is difficult for individuals with limited reach and since emergency transportable housing units are rarely provided with dishwashers, a gooseneck design and water spray units could make dishwashing easier for individuals with disabilities.

1.3 Carpet: The Committee proposed adding a new requirement prohibiting the use of carpet in emergency transportable units. Carpet is more difficult to maintain than other floor finishes and vacuum cleaners, which may not be readily available in times of emergency, are needed to clean carpet. The limited amount of storage space to store a vacuum cleaner coupled with the need to handle the vacuum cleaner makes it a less desirable option in emergency housing units. Other types of floor finishes can be cleaned using mops, cloths, or other readily available items. The Committee also discussed the additional effort needed to move a wheelchair on carpeted surfaces. A third discussion item concerned the use of synthetic materials in carpet systems that may have an impact on indoor air quality issues.

1.4 Kitchen work surface: The Committee recommended allowing the supplied kitchen table to substitute for the required kitchen work surface. The kitchen table would need to meet the following criteria:

- (a) a kitchen table complying with 902 is provided within the kitchen;
- (b) all kitchen countertops are 34 inches high maximum; and
- (c) an electrical outlet is provided at a location within reach of the table.

The Committee noted that space is limited in emergency transportable housing units and questioned whether requiring such a dedicated work surface with knee space beneath it in a kitchen which already has very little kitchen storage would further limit options for accessible storage. The Committee noted that, unlike most other housing, emergency transportable housing units often are provided with furnishings in place. In particular, a kitchen table generally is provided as a part of the unit and is located within the kitchen area. When not used for dining, the kitchen table can be used for food preparation if it meets accessibility criteria. The Committee recommended an exception to 2010 ADA Standards Section 804.3 where a kitchen table complying with 2010 ADA Standards Section 902 is provided within the kitchen.

Committee members were also concerned that the work surface in the kitchen is the only countertop at 34 inches maximum. Countertops at this height permit a reach over an obstruction where accessible elements are located on the wall behind the counter and they facilitate use of the counter surface. Committee members agreed that where all countertops are at the same height occupants with mobility impairments find it easier to move items along the countertops, including those that may be too hot to handle. While the Committee agreed with the concept of exempting the work surface when an accessible kitchen table is provided, they agreed to make the exception contingent on providing all countertops at 34 inches high maximum.

Committee recommendations for the exception that the supplied table could substitute for the required kitchen work surface will not be permitted until the recommendations are incorporated into accessibility standards for Section 504 and ADA. However to the preparers' knowledge, this exception has been used without objection in travel trailers.

1.5 Electrical outlets at countertops: Exception 3 to 2010 ADA Standards Section 205.1 requires only one convenience outlet provided above a kitchen countertop uninterrupted by a sink or appliance to be accessible where two or more outlets are provided. The Committee questioned the necessity of this exception to the general rule that all outlets in a kitchen must be accessible, particularly given that emergency transportable housing units do not generally provide numerous convenience outlets. The Committee recommended that all non-dedicated electrical outlets over kitchen

counters be within reach because there are fewer outlets in emergency transportable housing than in other residential units.

1.6 Floor levels in slide-outs: Accessible routes and accessible spaces cannot have changes in level greater than 1/2-inch (beveled) and 1/4-inch (vertical). Therefore, the joint between the unit floor and the slide-out floor must essentially be flush. Also, the joint cover must be stable, firm, and slip resistant. The Committee reiterated that the joint between the main floor and the slide-out floor must be compliant. Additionally, they recommended that slide-outs could be used only if manufacturers warranted that there is no need to cycle the slide-out after set-up.

1.7 Removable cabinets: The Committee determined that in order to provide maximum flexibility the normal compliment of exceptions for adaptable features in residential units should not be extended to emergency housing units. If accessible features are in place, deployment of the units will be more rapid and occupants will not have to wait for needed and appropriate accommodations. The Committee recommended not permitting removable cabinets under lavatories, sinks, and kitchen workspaces.

1.8 Windows: The 2010 ADA Standards exempt windows from being required to be accessible in residential units. By not addressing windows in their report, the Committee chose to leave the residential exemption in place. In UFAS Section 4.34, the residential section, there is no reference to either UFAS Section 4.1.3 (6) or UFAS Section 4.12, which exempt windows from being required to be accessible. Therefore operable parts on residential windows must be accessible.

1.9 Roll-in showers: The Committee recommended requiring a seat in all roll-in showers provided in emergency transportable housing units. FEMA noted that in its recent experience more than 80 percent of occupants with mobility-related disabilities requested roll-in showers and that their current practice is to provide roll-in showers with folding seats in accessible units.

1.10 Furnishings: The Committee discussed the impact of furniture on accessible routes and clearances. Although room shape, door arrangement, and furniture layout all can have significant impact on accessibility within a bedroom, in rooms complying with the various regulations, the furniture, accessible route, maneuvering clearances, and required turning space can be arranged so that all are usable if the designer thoughtfully lays out the bedroom and closet doors. Unfortunately, there is no requirement specifying the minimum bedroom size for emergency transportable housing units. Therefore, ensuring that required maneuvering space at doors and turning space is usable becomes much more difficult in such units where bedrooms

often are smaller than 70 square feet. Therefore, the Committee has addressed this concern by recommending a new requirement prohibiting the accessible route, maneuvering clearances, and turning space from overlapping space provided for a bed and a dresser. The Committee notes that such a requirement could cause designers to be more cognizant of the needs of individuals with disabilities as they lay out rooms and furniture. FEMA requires a minimal set of furniture be provided with all dwelling units to the occupants. Therefore, the accessible unit must include the provided set of furniture when evaluating accessible design considerations.

1.11 Weather alert systems: The Committee discussed HR 2787, a bill introduced in the U.S. Congress that would amend the National Manufactured Housing Construction and Safety Standards Act of 1974 to require that weather radios be installed in all manufactured homes manufactured or sold in the United States. The Committee believes that the information provided by a weather radio must be equally accessible to individuals who either cannot hear the audible alert or who cannot read a viewable text alert. As a result, they recommended a provision be added to the guidelines to require both audible and visual output. Where weather radios are installed in a unit, their controls must comply with most requirements in Section 309 for operable parts, including reach range. However, the proposal does not apply 2010 ADA Standards Section 309.4 to the controls on weather radios because certain controls on units currently available cannot comply with requirement that they be operable with one hand; not require tight grasping, pinching, or twisting of the wrist; and require no more than 5 pounds force.

1.12 Lighting controls: The Committee discussed adding a new requirement so that lighting controls are reachable from a bed. Space within bedrooms in emergency transportable housing units is very confined. Therefore, the occupant may not be able to reconfigure furniture to provide a lamp or a nightstand with a lamp adjacent to the bed. This change will improve the safety of individuals when transferring to or from a mobility device onto a bed. Emergency transportable housing unit bedrooms usually have ceiling lights operated by wall switches placed near the door. An individual with a disability is likely to require the light on when transferring into and out of bed. While making the transfer, the light switch located at the door (most typical location) is out of reach. The Committee noted that bedrooms in emergency transportable housing units generally do not provide excess space for nightstands where a bed lamp could be located. To resolve this issue, the Committee recommended a requirement for a secondary means to control the overhead light after transferring to the bed.

Endnotes

2. **Shower thresholds:** HUD granted “alternate construction approvals” for the 1/2-inch shower thresholds for up to 11,000 homes for individuals with disabilities between 2008 and 2010. This applied to HUD Code manufactured housing.

3. **Accessible ramps:** This document does not address ramps, as the focus of this publication is on the manufactured housing and not the accompanying site-built elements created upon installation of the dwelling. HUD may choose to add an appendix on accessible ramps to this document at a future date.

4. **Washers and dryers:** Where washers and dryers are not installed, but a hook-up is included, a space must be provided to house the appliances for future installation. This location must be accessible and must not obstruct any accessible path or clear floor spaces in the accessible dwelling unit.

5. **Minimum bedroom sizes:** The Manufactured Home Construction and Safety Standards (MHCSS) requires rooms designed for sleeping purposes to have a minimum gross square foot floor area as follows:

- (1) All bedrooms shall have at least 50 square feet of floor area.
- (2) Bedrooms designed for two or more people shall have 70 square feet of floor area plus 50 square feet for each person in excess of two.
- (3) Every room designed for sleeping purposes shall have accessible clothes hanging space with a minimum inside depth of 22 inches and shall be equipped with a rod and shelf.
- (4) Bedrooms shall have no clear horizontal dimension less than 5 feet not including areas with a ceiling height of less than 7 feet.

6. **Number and type of required exits on disaster relief housing:** The number of required exit doors is directly dependent on the size of the dwelling. In smaller dwellings (400 square feet or less) such as travel trailers and park model homes, two exit facilities are required but only one of these exit facilities must be a door (the second exit facility may be a properly sized window). Dwellings larger than 400 square feet are required by the MHCSS (HUD Code) and NFPA 501 to have two exits that are doors. The 2010 ADA Standards use the IBC 2003 edition for addressing the accessible “means of egress” (see comparison chart on page 52).

Code/Standard	Number of exit facilities from building that must be doors	Number of exit facilities from each bedroom	Is a common path to remote exits permitted?	Req. number of means of egress*	Number of direct exterior emergency escapes from each space
24 CFR 3280–MHCSS (HUD Code), current as of April 16, 2010	2	2	Yes, with certain restrictions	not addressed	not addressed
ANSI A119.5 , 2005 edition: Recreational Park Trailer Standard	1	2	In bedroom, only if one exit is within 24” of the bed	not addressed	not addressed
NFPA 1192 , 2005 edition: Standard on Recreational Vehicles (Travel Trailers)	1	2	In bedroom, only if one exit is within 24” of the bed	not addressed	not addressed
IRC 2009 (a Model Building Code)	1	not addressed	not addressed	1 from building	1 from building

* An exit facility is not a “means of egress.” A “*means of egress*” is the path from any point inside the building to the public way. Therefore, an accessible means of egress requires an accessible route from any point in the building to the public way, that is an area of refuge inside the building, or to the accessible exterior door, and down a ramp to public place a distance from the building. The IBC, UFAS, and the 2010 ADA Standards use the “means of egress” concept. The manufactured home, park model, and travel trailer standards address only the point at which one exits the building, that being the door or window. UFAS and the ADA Standards require the accessible entrance to be an accessible exit. The 2010 ADA standards require an additional accessible emergency exit only when the building code requires two or more means of egress, which the manufactured home, park model, and travel trailer standards do not. Additionally, where UFAS and the 2010 ADA Standards require hardware on certain windows to be accessible, they do not require exit facilities that are not doors to be accessible.