

## **Universal Design**

### **What is Universal Design?**

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Universal design, also called barrier-free design, focuses on making the house safe and accessible for everyone, regardless of age, physical ability, or stature. Most of us think immediately of ramps and grab bars when we think of accessible housing, but universal design goes far beyond that while remaining largely invisible to the casual observer. In fact, applying universal design concepts such as wider doors and hallways makes a house feel more spacious. Here are some steps you can take to make your house more user-friendly.

### **In the Kitchen**

- Use pulls instead of knobs on cabinets and drawers. These are much easier on arthritic hands.
- Install a contrasting edge-band on countertops. This makes it easier for someone with failing eyesight to see the edge of the countertop. Anyone navigating a dimly lit kitchen for a middle-of-the-night snack will also appreciate this touch.
- Install varied-height cabinets and countertops. This is particularly appreciated in multi-cook families where, say, a very tall parent and a child may be working together to prepare a meal. Countertop heights can also be varied to accommodate particular tasks. For example, bakers value lower countertops for rolling out pastry and kneading dough.
- Consider flexible appliances. Items such as under-the-counter refrigerator drawers make a kitchen more

accessible for someone in a wheelchair. They are still pretty expensive, but the price is certain to drop over time.

Elevating the dishwasher accommodates people in wheelchairs as well as people who may not be able to bend easily. You can even get a sink that raises or lowers at the touch of a button.

- To accommodate a cook who uses a wheelchair, leave open space under the sink, cooktop, and prep counter, opt for higher toe-kicks on the base cabinets, install pull-down shelves in the upper cabinets, and choose a range with controls at the front or to the side of the cooktop (choose a model with a safety lock-out option if there are also young children in the house).



## **In the Bathroom**

- Install countertops with contrasting edge-banding.
- In the tub/shower, choose an adjustable-height showerhead so the showerhead can easily be positioned at a comfortable height for anyone. Use only anti-scald or pressure balancing valves. The very old and the very young, in particular, are susceptible to burns from scalding water.
- Offset shower and/or tub controls to the room side of the enclosure so they can easily be reached from outside the tub or shower.

- Install grab bars or at least install blocking between the studs so that grab bars can easily be added in the future.
- Install vanities of different heights if possible; even men of average height find they have to crouch while shaving at a standard vanity.
- To provide wheelchair access, make sure the doorway is 32 inches wide, install a curb-free shower pan, choose a wall-hung sink with covered pipes, and try to provide a 60-inch clear floor space for turning the wheelchair.

### **Throughout the House**

- Choose lever handles instead of doorknobs.
- Design hallways and doorways that are 32 inches wide or more.
- Avoid changes in floor height, including thresholds.
- Lower switches and raise receptacles so that they can be reached from a seated position.

### **For Further Information**

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#### **Center for Universal Design**

800.647.6777

#### **NKBA**

800.843.6522

*Ask for the Universal Design Guidelines*

#### **U.S. Access Board**

800.872.2253

# UNIVERSAL DESIGN *IN* HOUSING

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## UNIVERSAL DESIGN: The Definition

Universal design is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

The intent of the universal concept is simply life for everyone by making more housing usable by more people at little or no extra cost. Universal design is an approach to design that incorporates products as well as building features and elements which, to the greatest extent possible, can be used by everyone. While accessible or adaptable design requirements are specified by codes or standards for only some buildings and are aimed at benefiting only some people (those with mobility limitations), the universal design concept targets all people of all ages, sizes, and abilities and is applied to all buildings.

What is a universal design feature? Any component of a house that can be used by everyone regardless of their level of ability or disability. Universal features are generally standard building products or features that have been placed differently, selected carefully, or omitted. For example, standard electrical receptacles can be placed higher than usual above the floor, standard but wider doors can be selected, and steps at entrances can be eliminated to make housing more universally usable.

The composition of our population is changing. Many people are surviving permanently disabling accidents and illness and even more are living longer. It would seem logical that the spaces built to accommodate this population must, by necessity, change also.

The building and design industries have responded to this need for change by producing special products and spaces for special groups. But “special” is often synonymous with “expensive”. Specialization leads to complicated building standards and products which, in the end, seldom meet the needs of more than a fraction of those they were meant to help and often seem to stigmatize and separate them further from other people.

Universal design succeeds because it goes beyond specialization. The concept promotes designing every product and building so that everyone can use them to the greatest extent possible – every faucet, light fixture, shower stall, public telephone, or entrance. Universal design is a revolutionary but practical leap forward in the evolution of building and design procedures. When designers and manufacturers seize this concept, universal design will become common, convenient, and profitable.

Excerpted from *Universal Design: Housing for the Lifespan of all People*, by Ron Mace for the U.S. Department of Housing and Urban Development, 1998

# UNIVERSAL

# UNIVERSAL DESIGN Features in Housing

The following list of characteristics are elements, features, ideas or concepts that contribute to or can be components of universal housing. This list is intended as a guide. The features described are those we might look for in universal housing but not all are expected to be included in any given home.

Some are finite recommendations, some are lists of options, and some are scope statements identifying how many particular features must or should be included. Obviously, the more universal design characteristics or features included, the more usable the house.

A key component of universal design is the market appeal it adds to the home because the universal features are integrated into the overall design. Done well, universal design becomes a virtually invisible element.

This list contains structural and non-structural features. Structural features, indicated by ✕, should be considered for new homes and major renovations. Non-structural features, indicated by ○, are less expensive and easier to incorporate into a finished home.

## CHARACTERISTICS

## BENEFITS

### Entrances

#### Stepless Entrances

- ✕ It is best to make all home entrances stepless.
- ✕ More than one stepless entrance is preferred.
- ✕ At least one stepless entrance is essential; if only one, not through a garage or from a patio or raised deck.

#### Site Design Methods for Integrated Stepless Entrances

- ✕ Level bridges to uphill point.
- ✕ Driveway and garage elevated to floor level so vehicles do the climbing.
- ✕ Earth berm and bridge with sloping walk.
- ✕ Site grading and earth work (with foundation waterproofing) and sloping walks at 1:20 maximum slope.
- ✕ Avoid ramps. If ramps are used, integrate into the design.

- Easier to move furniture and appliances in and out.
- Great for baby strollers and bicycles.
- Easier to bring in groceries and packages.
- Safer in wet or icy conditions.
- Easier to clear snow, ice and leaves.
- Easier than steps to repair and maintain.

Slope of route is shallow making travel from parking to door easier.

✕ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

### Other Entrance Features

- ✘ One-half inch maximum rise at entrance thresholds.
- ✘ Minimum 5' x 5' level clear space inside and outside entry door. (Can be smaller if automatic power door provided.)
- ✘ Power door operators whenever possible.
- ✘ Weather protection such as a porch, stoop with roof, awning, long roof overhang, and/or carport.
- Built-in shelf, bench or table with knee space below located outside the door.
- ✘ Full length sidelights, windows in doors, and/or windows nearby.
- Wide-angle viewers and TV monitors.
- Lighted doorbell at a reachable height, intercom with portable telephone link, and/or hardwired intercom.
- Light outside entry door and motion detector controlled lights.
- House number should be large, high contrast, located in a prominent place.

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### Interior Circulation

- ✘ An open plan design.
- ✘ At least one bedroom and accessible bathroom should be located on an accessible ground floor entry level (same level as kitchen, living room, etc.).

✘ Structural Feature

## BENEFITS

- Reduces tripping hazards.
- Dollies and handtrucks move over easily.
- Allows for maneuvering while opening or closing door.
- Provides sheltered space for people while unlocking the door, waiting for a carpool, making deliveries, etc.
- Less weather damage to door finish.
- Provides a place to put packages while opening doors.
- Allows all residents, including children and people using wheelchairs to see who is at the door before opening it.
- Allows visitors to communicate with residents.
- View of approaching visitors.
- Adds general illumination and sense of security.
- Illuminates lockset.
- Eliminates dark approaches to the home.
- Easy for friends and emergency personnel to locate residence.
- Minimizes hallways and doorways and maximizes sight lines.

○ Non-structural Feature

## CHARACTERISTICS

- ✘ Clear door opening width (32" minimum, 34" - 36" wide doors), for all doorways.
- ✘ Flush thresholds at all doorways.
- ✘ Clear floor space (18" minimum) beside door on pull side at latch jamb.
- ✘ Circulation route 42" minimum width.
- ✘ Turning space in all rooms (5' diameter).

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### Vertical Circulation

- ✘ All stairs should be appropriate width and have space at the bottom for later installation of a platform lift, if needed.

If a two-story dwelling:

- ✘ at least one set of stacked closets, pantries, or storage spaces with knock-out floor  
OR
- ✘ a residential elevator with minimum 3' x 4' clear floor area installed at the time of initial construction.
- ✘ Stair handrails to extend horizontally beyond top and bottom risers.

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### Bathrooms

When more than one bathroom is provided, all should meet the following criteria, including bathrooms on the second floor.

- ✘ At least one bathroom must have one of the following accessible bathing fixtures:
  - minimum 5' x 3' (4' preferred), curbless shower  
OR
  - tub with integral seat, waterproof floor, and a floor drain.

## BENEFITS

Improves circulation, especially with many visitors, such as at parties.

Reduces damage to door jambs when moving large furniture or appliances, equipment, ladders.

Provides space to move out of the way of the door swing when pulling it open.

Provides maneuvering room in the hallways and archways.

Easy access between floors.

Becomes shaft for later elevator installation- at a great cost savings.

Steady users at top and bottom of stairs

✘ Structural Feature

○ Non-structural Feature



## CHARACTERISTICS

- ✘ Other bathrooms in the same house may have a tub with an integral seat or a 3' x 3' transfer shower with "L" shaped folding seat and 1/2" maximum lip (curb) in lieu of fixtures described above. When possible, arrange at least one shower control for right-hand use and one for left-hand use.
- ✘ Adequate maneuvering space: 60" diameter turning space in the room and 30" x 48" clear floor spaces at each fixture. Spaces may overlap.
- ✘ Clear space (3') in front and to one side of toilet.
- ✘ Toilet centered 18" from any side wall, cabinet, or tub.
- ✘ Broad blocking in walls around toilet, tub, and shower for future placement and relocation of grab bars.
  - Grab bars should not be stainless steel or chrome. Use colors to match decor.
- ✘ Lavatory counter height 32" minimum.
  - Knee space under lavatory (29" high). May be open knee space or achieved by means of removable vanity or fold-back or self-storing doors. Pipe protection panels must be provided to prevent contact with hot or sharp surfaces.
  - Countertop lavatories preferred with bowl mounted as close to front edge as possible.
  - Wall hung lavatories acceptable with appropriate pipe protection.
  - Pedestal lavatories are not acceptable.

## BENEFITS

- Allows people to sit in tub/shower without needing additional equipment.
- Allows for easy maneuvering to and around toilet.
- Provides space for transfers to and from toilet.
- Allows for custom placement of grab bars after construction without opening wall to add blocking.
- Grab bars make it easier and safer for everyone to get in and out of the tub or shower.
- Grab bars also double as towel bars but are more durable.
- Allows someone to use lavatory from a seated position.

✘ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

- Long mirrors should be placed with bottom no more than 36" above finished floor and top at least 72" high.
- Full-length mirrors are good choices.

### Fixture Controls

- ✕ Offset controls in tub/shower with adjacent clear floor space.
- Single-lever water controls at all plumbing fixtures and faucets.
- Pressure balanced anti-scald valves at tubs and showers.
- Adjustable height, movable hand-held shower head or 60"-72" flexible hose allows easy use by people of all heights.
- Hand-held shower heads in all tubs and showers, in addition to fixed heads, if provided. Single-lever diverter valves if needed.
- Mixer valve with pressure balancing and hot water limiter.

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## Kitchens

- ✕ Space between face of cabinets and cabinets and walls should be 48" minimum.
- Clear knee space (minimum 29" high) under sink (must have pipe protection), counters, and cook tops. May be open knee space or achieved by means of removable base cabinets or fold-back or self-storing doors.

## BENEFITS

- Children and persons seated can use mirror while at sink.
- Reduces water damage to wall finish behind sink.
- Makes it easier to clean behind faucet.
- Makes room seem more spacious.

Allows for easy access from outside the tub/shower reducing reaching and bending, without inconvenience when inside.

- Can be adjusted to the height of each user.
- Helps avoid wetting hairstyle, bandages, casts.

Can be used for back massage, rinsing hair, washing the dog, etc.

Prevents scalding people who cannot move out of the way quickly if water temperature and/or pressure change suddenly.

Saves hot water.

Provides open storage space for serving cart, trash can, recycle bins, etc.

Permits sitting on a stool to work at the sink or cooktop.

✕ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

- ✘ Variable height (28" - 42") work surfaces such as countertops, sinks, and or cooktops. May be mechanically adjustable in 2" increments or be electrically powered, through a continuous range.
  
- Contrasting color border treatment on countertops.
  
- ✘ Stretches of continuous countertops particularly between refrigerator, sink, and stove top.
  
- Adjustable height shelves in wall cabinets.
- Full-extension, pull-out drawers, shelves and racks in base cabinets.
- ✘ Full height pantry storage with easy access pull-out and/or adjustable height shelves.
  
- Front-mounted controls on all appliances.
- Cooktop or range with staggered burners and front or side-mounted controls.
- Glare-free task lighting to illuminate work areas without too much reflectivity.
  
- Side-by-side refrigerator with pull out shelving.

OR

- ✘ Under counter or drawer type refrigerators installed on raised platforms.

## BENEFITS

- Allows tall people to work without excessive bending by bringing work closer to user.
- More usable by children, and shorter adults, so the whole family can help with meal preparation.
- Allows person to work while seated.
- Provides built-in desk in kitchen.
  
- Makes it easier to detect the edge of counters and reduces likelihood of spills.
- Makes it easier to repair damaged edges without matching entire countertop.
  
- Allows sliding of heavy items, and easy, one-level food flow.
  
- Easy reach to all storage space.
- Easier to maneuver large items in and out of cabinets.
- Makes storage at all heights reachable.
- Provides maximum storage capacity
  
- Facilitates easy reach.
- Eliminates dangerous reaching over hot burners reducing the chance of burns and spills.
  
- Allows easy reach of otherwise hard-to-get items.
- Provides optimum access to storage space between 18" and 48" high.

✘ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

- ✘ Built-in oven with knee space beside, set for one pull-out oven rack at the same height as adjacent countertop.
- Drop-in range with knee space beside, top set at 34" above finished floor.
- Dishwasher raised on a platform or drawer unit, so top rack is level with adjacent countertop.
- Single-lever water controls at all plumbing fixtures and faucets.

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### Laundry Areas

- Front-loading washers and dryers, with front controls, raised on platforms.
- ✘ Laundry sink and countertop surface no more than 34" above finished floor with knee space below.
- ✘ Clear floor space 36" wide across full width in front of washer and dryer and extending at least 18" beyond right and left sides. (Extended space can be part of knee space under counter tops, sink, etc.)

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### Storage

- ✘ 50% of all storage should be less than 54" high.
- Adjustable height closet rods and shelves.
- Power operated clothing carousels.
- Motorized cabinets that raise and lower.

## BENEFITS

Transfer dishes from oven to counter without lifting or reaching.

Places racks within easy reach requiring less bending.

Easier to adjust water temperature and volume.

Can operate with a single hand or elbow.

Single-lever controls with fewer parts are less costly to repair, maintain and clean.

Reduces the need to bend, stoop, or lean over to reach clothes.

Easier to access appliances from seated position.

More flexible storage space.

Increased storage space if using double closet rod.

Accommodates height and reach of specific users, including children.

✘ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

## BENEFITS

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### Garages And Carports

- Power operated overhead doors.
- ✘ 8' minimum door height or alternate on-site parking for tall vehicles.
  
- ✘ Extra length and width around cars.
- ✘ Sloping garage floor (with through-the-wall vents at bottom of slope to release fumes) in lieu of stepped entrance with ramp from garage to house interior.
  
- Avoid ramps in garages.

Improved circulation and access to parked cars.

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### Decks

- ✘ Build deck at same level as house floor.
- ✘ Keep deck clear of the house and use slatted decking for positive drainage.

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### Hardware

- lever door handles
- push plates
- loop handle pulls on drawers and cabinet doors—no knobs
- touch latches
- magnetic latches in lieu of mechanical locks

Easy to operate with elbow or knee if hands are full.

Requires little or no strength or twisting.

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### Home Automation

- Motion detector light switches in garages, utility spaces, entrances, and basements.
- Remote controls for selected lights.
- Remote controls for heating and cooling.
- Doorbell intercoms that connect to portable telephones.
  
- Audible and visual alarms for doorbell, baby monitor, smoke detectors, etc.

Alarms noticeable even if person is unable to hear because of other noise or hearing loss.

✘ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

## BENEFITS

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### Light and Color

- Color contrast between floor surfaces and trim. Avoid glossy surfaces.
- Color contrast difference between stair treads and risers.
- Emphasize lighting at stairs, entrances and task lighting.
- Ambient, focused, and variable lighting.
- Contrast between countertops and front edges or cabinet faces.

Allows easy recognition of the junction of floor surfaces and walls.

Allows adjustment to suit demands of task.

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### Switches and Controls

- Light switches 44"- 48" high, and thermostats 48" maximum height.
- Easy-touch rocker or hands free switches. (See Home Automation.)
- Electrical outlets at beds and desks, four-plex boxes each side for computer and electronic equipment as well as personal use equipment.
- Electrical outlets, 18" minimum height.
- ✘ Electrical panel with top no more than 54" above floor located with a minimum 30" x 48" clear floor space in front.

Easier to reach with hands full (e.g. with elbow).

More accessible to children.

Easier to reach without bending and from seated position.

Users are less likely to unplug appliances by pulling on cord.

✘ Structural Feature

○ Non-structural Feature

## CHARACTERISTICS

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### Windows

- ✘ Windows for viewing, 36" maximum sill height.
  
- ✘ Use casement, awning, hopper, or jalousie style windows.
- Use crank operated style and power operators whenever possible.

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### Sliding Doors

- ✘ Exterior sliding doors: drop frame and threshold into subfloor to reduce height of track, or ramp the finished floor to top of track.
- ✘ Interior pocket doors: when fully open door should extend 2" minimum outside doorjamb and be equipped with open-loop handles for easy gripping.
- ✘ By passing closet doors: each panel should create an opening at least 32" clear.

## BENEFITS

Can look out from seated position.

Longer length windows add more natural light and elegance to rooms.

Reduce reaching to open, close, and lock windows.

✘ Structural Feature

○ Non-structural Feature

# UNIVERSAL PRODUCT CHARACTERISTICS

The *Universal Design Product Characteristics* below lists features to consider when selecting home architectural products, appliances and fixtures. Our goal is to promote the selection and use of products that are well designed, attractive, and have easy-to-use features that result in a convenient, comfortable and safe home environment for people of all ages and abilities.

Some features may work well for some needs but may be a problem for others. *For example*, smooth stovetops help many with hand or arm limitations cook more easily and safely by allowing for the sliding of pots on and off the heat element. However, smooth tops may provide insufficient visual cueing for those with vision problems. Few products will have all the features listed. Use this list to select features that best meet individual needs.

CONTROLS	DISPLAY / LABELS	OTHER FEATURES
<b>Microwave Oven</b>		
<ul style="list-style-type: none"> <li>• Raised, cupped or otherwise detectable by touch</li> <li>• Easily programmable settings</li> <li>• Can be used with low effort and with minimum finger use</li> <li>• Minimal programming required</li> </ul>	<ul style="list-style-type: none"> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• 1/4" or larger lettering</li> <li>• Redundant signals, visual and audible alarms</li> </ul>	<ul style="list-style-type: none"> <li>• Microwave/convection combination</li> <li>• No lip at front edge</li> <li>• Lighted interior</li> </ul>
<b>Ranges</b>		
<ul style="list-style-type: none"> <li>• Front or side mounted</li> <li>• Raised, cupped or otherwise detectable by touch</li> <li>• Can be used with low effort and with minimum finger use</li> <li>• Clear relationship to function (<i>how it works and what it operates</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• 1/4" or larger lettering</li> <li>• Redundant signals, visual and audible alarms</li> </ul>	<ul style="list-style-type: none"> <li>• Off set burners</li> <li>• Smooth cook top</li> <li>• "Cool" cook top burners</li> <li>• Automatic shut off function</li> </ul>
<b>Stovetops</b>		
<ul style="list-style-type: none"> <li>• Front or side mounted</li> <li>• Raised, cupped or otherwise detectable by touch</li> <li>• Can be used with low effort and with minimum finger use</li> <li>• Clear relationship to function (<i>how it works and what it operates</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• 1/4" or larger lettering</li> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• Color contrast with counter</li> <li>• Redundant signals, visual and audible alarms</li> </ul>	<ul style="list-style-type: none"> <li>• Off set burners</li> <li>• Smooth cook top</li> <li>• "Cool" cook top burners</li> </ul>
<b>Wall Ovens</b>		
<ul style="list-style-type: none"> <li>• Can be used with low effort and with minimum finger use</li> <li>• Clear relationship to function (<i>how it works and what it operates</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• Large size lettering (<i>1/4" high</i>)</li> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• Redundant signals, visual and audible alarms</li> </ul>	<ul style="list-style-type: none"> <li>• Side hinged door</li> <li>• Mount so one rack is level with adjacent counter</li> </ul>



# Universal Product Characteristics

CONTROLS	DISPLAY / LABELS	OTHER FEATURES
<b>Refrigerator</b>		
<ul style="list-style-type: none"> <li>• Handles that can be used with low effort and with minimum finger use</li> <li>• Full height handles</li> <li>• Reachable interior controls</li> </ul>	<ul style="list-style-type: none"> <li>• 1/4" or larger lettering</li> <li>• High contrast graphics (<i>white on black</i>)</li> </ul> <p>Interior lights place to illuminate objects from the front</p>	<ul style="list-style-type: none"> <li>• Easy adjustable shelves</li> <li>• Side-by-side or freezer- under style</li> <li>• Pull out shelves or adjustable shelves</li> <li>• 180° Opening doors</li> <li>• Under counter drawer type units</li> <li>• Beverage dispenser</li> </ul>
<b>Dishwasher</b>		
<ul style="list-style-type: none"> <li>• Raised, cupped or otherwise detectable by touch</li> </ul> <p>Can be used with low effort and with minimum finger use</p> <ul style="list-style-type: none"> <li>• Minimal programming required</li> <li>• Clear relationship to function (<i>how it works and what it operates</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• 1/4" or larger lettering</li> <li>• Redundant signals, visual &amp; audible alarms</li> </ul>	<ul style="list-style-type: none"> <li>• Under counter drawer type unit</li> <li>• Height adjustable racks</li> <li>• Raised 6" or more for easy access</li> </ul>
<b>Clothes Washer</b>		
<ul style="list-style-type: none"> <li>• Front mounted controls</li> <li>• Raised, cupped or otherwise detectable by touch</li> <li>• Can be used with low effort and with minimum finger use</li> <li>• Clear relationship to function (<i>how it works and what it operates</i>)</li> </ul>	<ul style="list-style-type: none"> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• 1/4" or larger lettering</li> <li>• Redundant signals, visual &amp; audible alarms</li> <li>• Interior lights</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller sizes can be easier to reach into</li> <li>• Front loading</li> <li>• Minimal programming</li> <li>• Side hinged</li> <li>• Front detergent loading</li> <li>• Raised 6" or more for easy access</li> </ul>
<b>Clothes Dryer</b>		
<ul style="list-style-type: none"> <li>• Front mounted controls</li> <li>• Raised, cupped or otherwise detectable by touch</li> <li>• Can be used with low effort and with minimum finger use</li> </ul>	<ul style="list-style-type: none"> <li>• High contrast graphics (<i>white on black</i>)</li> <li>• 1/4" or larger lettering</li> <li>• Redundant signals, visual &amp; audible alarms</li> <li>• Interior lights</li> </ul>	<ul style="list-style-type: none"> <li>• Easy to understand instructions</li> <li>• Smaller sizes can be easier to reach into</li> <li>• Side hinged</li> <li>• Front lint screen</li> <li>• Raised 6" or more for easy access</li> </ul>
<b>Kitchen Cabinets (base cabinets)</b>		
<ul style="list-style-type: none"> <li>• Loop or touch latch hardware</li> <li>• Smooth operating, full extension slides on drawers and pull-out shelving</li> </ul>	<ul style="list-style-type: none"> <li>• Interior lights</li> <li>• Intermittent glass doors</li> </ul>	<ul style="list-style-type: none"> <li>• Pull-out shelves/pantry</li> <li>• Pull-out cutting boards</li> <li>• Lazy Susan in corners</li> <li>• 9" toe space option</li> <li>• Base cabinet heights from 27 1/2" to 40 1/2"</li> <li>• Formaldehyde-free construction</li> <li>• Open storage racks</li> </ul>

# Universal Product Characteristics

CONTROLS	DISPLAY / LABELS	OTHER FEATURES
<b><i>Kitchen Cabinets (Upper cabinets)</i></b>		
<ul style="list-style-type: none"> <li>• Loop or touch hardware</li> </ul>	<ul style="list-style-type: none"> <li>• Glass doors on wall cabinets</li> <li>• Interior lights</li> </ul>	<ul style="list-style-type: none"> <li>• Formaldehyde-free construction</li> <li>• Pull down shelving or adjustable height installation</li> <li>• Open storage racks</li> </ul>
<b><i>Kitchen Sinks</i></b>		
<ul style="list-style-type: none"> <li>• See "faucets"</li> </ul>	<ul style="list-style-type: none"> <li>• Color contrast with counter</li> </ul>	<ul style="list-style-type: none"> <li>• Shallow 6 1/2 - 7 1/2"</li> <li>• Rear mounted drain</li> <li>• Disposal or two-basin sink</li> </ul>
<b><i>Bathroom Sinks</i></b>		
<ul style="list-style-type: none"> <li>• See "faucets"</li> </ul>	<ul style="list-style-type: none"> <li>• Color contrast with counter</li> </ul>	<ul style="list-style-type: none"> <li>• Shallow 6 1/2 - 7 1/2"</li> <li>• Rear mounted drain</li> </ul>
<b><i>Faucets</i></b>		
<ul style="list-style-type: none"> <li>• Single levers, crosses or loops</li> <li>• Non-slip textures</li> <li>• Easy to control flow rate</li> <li>• Easy to adjust temperature</li> <li>• Peddle operated option</li> <li>• Motion sensing activation</li> <li>• Side mounted</li> </ul>	<ul style="list-style-type: none"> <li>• Easy to distinguish hot from cold with letters and color</li> <li>• Color contrasting handles</li> </ul>	<ul style="list-style-type: none"> <li>• Built-in spray or pull out spray</li> </ul>
<b><i>Grab Bars</i></b>		
<ul style="list-style-type: none"> <li>• Non-slip surface</li> <li>• Comfortable diameter for user</li> </ul>	<ul style="list-style-type: none"> <li>• Color contrast with wall</li> </ul>	<ul style="list-style-type: none"> <li>• 1/4 - 1 1/2" diameter</li> <li>• Available in many colors</li> <li>• Maximum 1 1/2" gap between wall and bar</li> </ul>
<b><i>Toilets</i></b>		
<ul style="list-style-type: none"> <li>• Can be used with low effort and with minimum finger use</li> <li>• Flush control on open side</li> <li>• Motion sensing auto flush</li> </ul>	N/A	<ul style="list-style-type: none"> <li>• 17" - 19" seat height option</li> <li>• Elongated bowl</li> <li>• Bidet features</li> <li>• 18" to center of bowl from sidewalk</li> </ul>
<b><i>Shower/Tub Mix Valves</i></b>		
<ul style="list-style-type: none"> <li>• Adjustable temperature levels</li> <li>• Easy to grip handle</li> <li>• Hand held shower with pause button on hand unit</li> <li>• Off set control mounting</li> </ul>	<ul style="list-style-type: none"> <li>• Easy to distinguish hot from cold with letters and color</li> <li>• Temperature display</li> </ul>	<ul style="list-style-type: none"> <li>• Anti-Scald features</li> <li>• Pressure balanced</li> <li>• Pre-set temperature settings</li> <li>• 69" minimum hand shower hose length</li> </ul>

# Universal Product Characteristics

CONTROLS	DISPLAY / LABELS	OTHER FEATURES
<b>Home Automation</b>		
<ul style="list-style-type: none"> <li>Remote control</li> <li>Large button hand held unit</li> <li>Easy to set relationship between transmitter and receiver</li> <li>Limited number of buttons</li> </ul>	<ul style="list-style-type: none"> <li>High contrast graphics (<i>white on black</i>)</li> <li>1/4" or larger lettering</li> <li>Redundant signals, visual and audible alarms</li> </ul>	<ul style="list-style-type: none"> <li>Remote sensing</li> <li>Computer, TV or phone access</li> <li>Voice activation</li> </ul>
<b>Closet</b>		
<ul style="list-style-type: none"> <li>Lighted rocker switch outside of door or door activated switch</li> <li>Loop or lever handles</li> <li>Fold back door hinge hardware</li> <li>Door jamb switch</li> <li>Lit Switch</li> </ul>	<ul style="list-style-type: none"> <li>Interior lights mounted to illuminate contents from behind user</li> </ul>	<ul style="list-style-type: none"> <li>Lighted closet interior</li> <li>Adjustable height closet rod <i>or</i> rods mounted at two heights</li> <li>Adjustable closet shelving/rod system</li> <li>Recessed floor track</li> <li>Walk in capability</li> </ul>
<b>Door Handles</b>		
<ul style="list-style-type: none"> <li>Lever type 5" long</li> </ul>	N/A	<ul style="list-style-type: none"> <li>Smooth edges</li> <li>Lever handle turns back to door</li> </ul>
<b>Windows</b>		
<ul style="list-style-type: none"> <li>Can be opened with one hand, closed fist</li> </ul>	<ul style="list-style-type: none"> <li>Hardware color contrasting with casement</li> </ul>	<ul style="list-style-type: none"> <li>Can be fitted with power opener</li> <li>Casement/awning type</li> <li>Locks and cranks no higher than 44"</li> </ul>
<b>Door Lockset</b>		
<ul style="list-style-type: none"> <li>Large deadbolt handle</li> <li>Easy to turn</li> <li>Mortise style (<i>integral latch and lock</i>)</li> <li>Lever handle</li> </ul>	<ul style="list-style-type: none"> <li>Easy to see, night lit</li> <li>"Locked" indicator</li> </ul>	<ul style="list-style-type: none"> <li>Remote electrical operation</li> </ul>
<b>Light Switches</b>		
<ul style="list-style-type: none"> <li>Rocker panel or touch controls allow low-effort use</li> <li>Mounted between 44" to 48"</li> </ul>	<ul style="list-style-type: none"> <li>Color contrast with wall</li> </ul>	<ul style="list-style-type: none"> <li>Glow-in-the-dark or lighted for night use</li> <li>Motion detecting features increase safety</li> </ul>
<b>Lifts or Elevator</b>		
<ul style="list-style-type: none"> <li>Controls on both sides of cab</li> <li>Controls no higher than 44"</li> <li>Can be used with low effort and with minimum finger use</li> <li>Raised, cupped or otherwise detectable by touch</li> </ul>	<ul style="list-style-type: none"> <li>High contrast lettering</li> <li>Redundant signals - visual and audible cues</li> <li>Raised or Braille lettering</li> </ul>	<ul style="list-style-type: none"> <li>At least 32" X 48" interior floor space</li> <li>Automatic opening doors</li> <li>Backup power source</li> <li>Emergency phone system</li> </ul>



## Center for Universal Design – UD Housing Bibliography

### Accessible Home Design: Architectural Solutions for the Wheelchair User



Thomas D. Davies, AIA; and Kim Beasley, AIA  
66 pages, 1999, ISBN 0929819101, \$22.95

Offers practical advice to help wheelchair users and their families identify design options and become better informed when they approach architects, builders and contractors to discuss new homes or renovations to existing residences.

Available from:  
PVA Distribution Center  
P.O. Box 753  
Waldorf, MD 20604-0753  
301-932-7834  
1-888-860-7244 (toll free)  
[www.pva.org](http://www.pva.org)

### The Accessible Housing Design File



Barrier Free Environments, Inc  
224 pages, 1997, ISBN 047128436X, \$85.00

Covers the special design and construction considerations of environments for people with mobility impairments, as well as visual and hearing impairments.

Available from:  
John Wiley & Sons  
Consumer Accounts  
10475 Crosspoint  
Indianapolis, IN 46256  
1-877-762-2974 (toll free)  
[www.wiley.com](http://www.wiley.com)

### Building for a Lifetime: The Design and Construction of Fully Accessible Homes

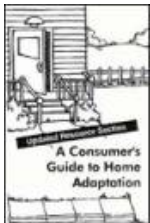


Margaret Wylde, Adrian Baron-Robbins, and Sam Clark  
304 pages, 1994, ISBN 1561580368, \$44.95

Provides design and construction details that will help you choose an appropriate site, select hardware and appliances, build or remodel kitchens and bathrooms.

Available from:  
Taunton Press  
63 S Main St  
P. O. Box 5506  
Newtown, CT 06470  
1-800-888-8286  
[www.taunton.com](http://www.taunton.com)

### A Consumer's Guide to Home Adaptation



Adaptive Environments  
52 pages soft cover, 1995, \$12.00

Illustrated worksheets highlight potential problems and solutions. Included is information on how to work with contractors, sketches of construction detail for common home adaptations, typical costs, annotated funding and other resource listings.

Available from :  
Adaptive Environments  
374 Congress St, Ste 301  
Boston, MA 02210  
617-695-1225 V/TTY  
[www.adaptenv.org](http://www.adaptenv.org)

## Creating the Not-So-Big House

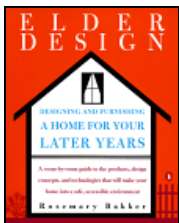


Sarah Susanka  
264 pages, 2000, ISBN 1561583774,  
\$34.95 hardcover, \$24.95 soft cover

An up-close look at 25 houses from all over America designed according to Not So Big principles; includes a rich variety of styles – from a tiny New York apartment to a Southwestern adobe, a traditional Minnesota farmhouse, and a cottage community in the Pacific Northwest.

Available from:  
Taunton Press  
63 S Main St  
P. O. Box 5506  
Newtown, CT 06470  
1-800-888-8286  
[www.taunton.com](http://www.taunton.com)

## Elderdesign: Designing and Furnishing a Home for Your Later Years



Rosemary Bakker  
202 pages soft cover, 1997, ISBN 0140258094, \$14.95

With this handbook, you can learn how to turn the home you love into a safe and attractive residence for the rest of your life.

Available from:  
[www.elderdesign.homestead.com/elderdesign.html](http://www.elderdesign.homestead.com/elderdesign.html) or  
[www.amazon.com](http://www.amazon.com)

## Fair Housing Act Design Manual



Barrier Free Environments, Inc.  
295 pages, 1996, rev 1998, \$5.00

Presents technical guidance to help designers and builders meet accessibility requirements for the Fair Housing Act; includes information on accessible building entrances, usable bathrooms and kitchens, environment controls, accessible common use areas and also contains a product resource guide.

Available from:  
The Center for Universal Design  
[www.design.ncsu.edu/cud](http://www.design.ncsu.edu/cud)  
or, U.S. Dept of Housing  
Free download at:  
[www.huduser.org/publications/destech/fairhousing.html](http://www.huduser.org/publications/destech/fairhousing.html)

## How to Build Wheelchair Ramps for Homes

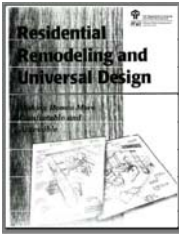


James Williams and Bob Zimmerman  
66 pages, 1993, \$15.00

A manual of design and construction for modular wheelchair ramps; includes information about ramps and long-tread low-riser steps to improve safe home accessibility.

Available from:  
Metropolitan Center for Independent Living  
1600 University Ave  
St. Paul, MN 55704  
612-646-8342  
Free Download  
[www.wheelchairramp.org](http://www.wheelchairramp.org)

## Residential Remodeling and Universal Design: Making Homes More Comfortable and Accessible



U.S. Department of Housing and Urban Development  
1996, \$15.00

Provides technical guidance on selecting and installing universal features during home remodeling or renovation.

Available from:  
HUD User  
P. O. Box 6091  
Rockville, MD 20849  
1-800-245-2691  
1-800-483-2209 (TDD)  
Free download at :  
[www.huduser.org/publications/destech/resid.html](http://www.huduser.org/publications/destech/resid.html)

## Universal Designed Smart Homes for the 21<sup>st</sup> Century



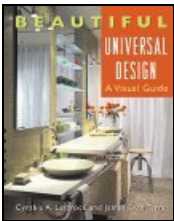
Charles Schwab  
128 pages, 2005, ISBN 097485591X, \$19.95

A catalog of home plans that incorporate Green Building practice and some solar features as well as being universal.

Available from:  
Schwab Publishers  
1820 Grant Street  
PMB 5015  
Bettendorf, IA 52722-4927  
563-359-7524  
[www.universaldesignonline.com](http://www.universaldesignonline.com)

## Items Out of Print

### Beautiful Universal Design – A Visual Guide



Cynthia Leibrock and James Evan Terry  
224 pages, 1999, ISBN 0471293067, **Out of print**

An idea resource that combines coverage of full design installations with an in-depth examination of exterior landscaping and approach to interior finishes, furnishings, and signage.

Out of print.  
Available used from:  
[www.amazon.com](http://www.amazon.com)

Published by:  
John Wiley & Sons  
Consumer Accounts  
10475 Crosspoint  
Indianapolis, IN 46256  
1-877-762-2974  
[www.wiley.com](http://www.wiley.com)

## The Healthy House



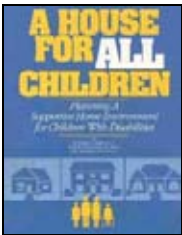
John Bower  
448 pages, 2001 update, ISBN 0963715690, **Out of print**

An encyclopedic reference guide for all building components, from foundations to roofing, for homeowners, builders, and designers who are concerned about indoor air quality and occupant health. New release contains three times as much information as the 1989 edition.

Out of print.  
Available used from:  
[www.amazon.com](http://www.amazon.com)

Published by:  
The Healthy House Institute  
430 N. Sewell Rd.  
Bloomington, IN 47408  
Phone/fax 812-332-5073  
[www.hhinst.com/books/eos.html](http://www.hhinst.com/books/eos.html)

## A House for All Children: Planning a Supportive Home Environment for Children With Disabilities



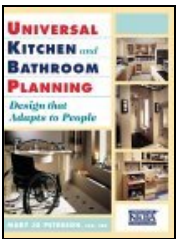
Richard Olsen, B. Lynn Hutchings, Ezra Ehrenkrantz  
112 pages, 2000, **Out of print**

Provides guidelines for the physical environment, the social and emotional needs of the child and the family, and experiences of 68 parents and 12 children who were interviewed.

Out of print.  
Available used from:  
[www.amazon.com](http://www.amazon.com)

Published by:  
New Jersey Institute of  
Technology  
University Heights  
Newark, NJ 07102-1982  
973-586-3097  
973-596-8443 fax

## Universal Kitchen and Bathroom Planning



Mary Jo Peterson  
382 pages, 1998, ISBN 0070499802, **Out of print**

A practical guide to designing accessible kitchens and bathrooms for single and multi-family residences as well as planned communities.

Out of print.  
Available used from:  
[www.amazon.com](http://www.amazon.com)

Published by:  
McGraw Hill Order Services  
P. O. Box 545  
Blacklick, OH 43004  
1-800-722-4726  
[books.mcgraw-hill.com](http://books.mcgraw-hill.com)

Last updated 2/21/06





## ***Center for Universal Design “Housing Resource List”***

This selected list of Web sites will help you find information on topics related to universal design and accessibility as related to housing.

### **Floor Plans & Home Design**

#### [AARP Home Design](#)

[http://www.aarp.org/families/home\\_design/](http://www.aarp.org/families/home_design/)

#### [Architectural Designs](#)

<http://www.architecturaldesigns.com/>

#### [B 4 You Build](#)

<http://www.b4ubuild.com/>

#### [Charles Schwab Universal Design Smart Homes](#)

<http://www.universaldesignonline.com/pages/764806/index.htm>

#### [Design Basics](#)

<http://www.designbasics.com/home/index.asp>

#### [Housing Zone](#)

<http://www.housingzone.com/>

#### [Southern Living-House Plans](#)

<http://www.housingzone.com/>

#### [Universal Design.com](#)

<http://www.universaldesign.com/>

### **Housing Checklists**

#### [AARP Housing Checklists](#)

[http://www.aarp.org/families/home\\_design/rate\\_home](http://www.aarp.org/families/home_design/rate_home)

#### [American Federation for the Blind, Environment Safety Checklist](#)

<http://www.afb.org/section.asp?SectionID=26&TopicID=144&DocumentID=191>

#### [Canadian Safety Council, Home Adaptation Checklist](#)

<http://www.safety-council.org/info/seniors/adapt.html>

#### [Kansas State University, Creating Accessible Homes](#)

<http://www.oznet.ksu.edu/library/HOUS2/MF2213.pdf>

### **Manufactured / Affordable Housing**

#### [Affordable Comfort](#)

<http://www.affordablecomfort.org/>

#### [Affordable Housing Design Advisor](#)

<http://www.designadvisor.org/>

#### [Cardinal Homes](#)

<http://www.cardinalhomes.com/buyer/aboutus.aspx>

#### [Dept. of Housing and Urban Development- Manufactured Housing](#)

<http://www.hud.gov/offices/hsg/sfh/mhs/mhshome.cfm>

#### [Excel Homes](#)

<http://www.excelhomes.com/>

#### [Habitat for Humanity International](#)

<http://www.habitat.org/default2.aspx>

#### [Housing Assistance Council](#)

<http://www.ruralhome.org/>



[Fleetwood Homes](http://www.fleetwoodhomes.com/lifestages/index.asp)

http://www.fleetwoodhomes.com/lifestages/index.asp

[Journal of Manufactured Housing](http://www.journalmfdhousing.com/)

http://www.journalmfdhousing.com/

[The Homestore](http://www.thehomestore.com/universal/whyuniversal.html)

http://www.thehomestore.com/universal/whyuniversal.html

[Manufactured Housing Institute](http://www.mfghome.org/default.asp)

http://www.mfghome.org/default.asp

[Mod-U-Kraf](http://www.mod-u-kraf.com/pages/accessible.html)

http://www.mod-u-kraf.com/pages/accessible.html

[National Affordable Housing Network](http://www.nahn.com/)

http://www.nahn.com/

[Rebuilding Together](http://www.rebuildingtogether.org/)

http://www.rebuildingtogether.org/

## **Organizations**

[Advanced Design Institute](http://www.advanceddesign.org/)

http://www.advanceddesign.org/

[American Institutes of Architects](http://www.aia.org/)

http://www.aia.org/

[American Society of Interior Designers](http://www.asid.org/)

http://www.asid.org/

[HomeSight](http://www.homesight.org)

www.homesight.org

[National Association of Home Builders](http://www.nahb.org/)

http://www.nahb.org/

[National Association of the Remodeling Industry](http://www.nari.org/)

http://www.nari.org/

[National Kitchen and Bath Association](http://www.nkba.org/)

http://www.nkba.org/

[Project Action](http://projectaction.easterseals.com/site/PageServer?pagename=ESPA_homepage)

http://projectaction.easterseals.com/site/PageServer?pagename=ESPA\_homepage

## **Research**

[The Aware Home](http://www.awarehome.gatech.edu/)

http://www.awarehome.gatech.edu/

[Center for the Built Environment](http://www.cbe.berkeley.edu/)

http://www.cbe.berkeley.edu/

[MIT Age Lab](http://web.mit.edu/agelab/)

http://web.mit.edu/agelab/

[NAHB Research Center](http://www.nahbrc.org/)

http://www.nahbrc.org/

## **UD & Home Modifications**

[Adaptive Environments](http://www.adaptenv.org/)

http://www.adaptenv.org/

[Center for Inclusive Design and Environmental Access](http://www.ap.buffalo.edu/idea/)

http://www.ap.buffalo.edu/idea/

[Concrete Change -- Visitability](http://www.concretechange.org/)

http://www.concretechange.org/

[Nat. Research Center on Supportive Housing & Home Modifications](http://www.homemods.org/)

www.homemods.org/

[Remodeling Online](http://www.remodeling.hw.net/)

http://www.remodeling.hw.net/

[Whole Building Design Guide](http://www.wbdg.org/design/accessible.php)

http://www.wbdg.org/design/accessible.php

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