

HOUSING THE ELDERLY: INVESTIGATING SOLUTIONS TO HELP SENIORS AGE IN PLACE

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Abstract

This study evaluated the information in the Americans with Disabilities Act (ADA) to determine if those guidelines would be helpful in the construction of new homes in the U.S. Universal design features and the housing needs of the elderly were compared to see if universal design features as outlined in the ADA could diminish the problems people have with aging in place. A case study was conducted on an existing house with three alternatives explored: a newly constructed house without universal design modifications, a newly constructed house with universal design modifications, and remodeling an existing structure to ensure usability for an elderly homeowner. The research revealed that new construction with modifications was not significantly different in cost than a newly constructed house without universal design features. The remodeling option to meet the requirements for an elderly homeowner proved to be extremely costly. Built environment professionals, such as interior designers and architects, must recognize the needs of the aging population and design houses that adapt to individuals as they age in place.

Introduction

As the population of the U.S. grows older, housing alternatives must be implemented that allow the elderly to have a safe and comfortable living environment. Whether the elderly age in place in their present homes, move into the homes of relatives, or move into retirement or assisted living communities, they should have information to make sound decisions about their own housing solutions. Research has revealed that the majority of older persons would prefer to stay in the homes in which they raised their children, but many found that their houses no longer worked for them. Rather, their homes had become less accessible and safe in their elderly years.

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The purpose of this research was to investigate how aspects of the Americans with Disabilities Act (ADA) could be incorporated into the design of residential structures to accommodate elderly households aging in place. In addition, a case study was conducted to determine the cost differences in using the principles of universal design and the ADA guidelines to modify an existing home or build a new home in which an elderly and/or disabled person could continue to live in a safe housing environment.

The major objective of this study was to investigate accommodations that can be made in new construction and existing houses without major expenditures of capital. If universal design principles were incorporated into all aspects of housing design, it would allow individuals to live in their homes throughout all phases of their lives—young, middle-aged, elderly, and elderly/disabled. Housing would better meet the needs of all people and, in particular, the elderly who desire to age in place

Review of Literature

The ADA (Public Law 101-336) was enacted on July 26, 1990 to eliminate discrimination in the workplace of persons with disabilities or with perceived disabilities. “It is the purpose of this Act to provide a clear and comprehensive national mandate for the elimination of discrimination against individuals with disabilities” (Americans with Disabilities Act, 1990). Unfair treatment of disabled persons often denied the disabled an opportunity for gainful employment. The ADA prohibits discrimination against qualified individuals with disabilities, but it does not require equal or preferential treatment. When an individual with disabilities finds that the disability hinders his or her ability for employment opportunity, the ADA requires employers to offer accommodations that will remove the barriers (Doherty, 2002). Under the ADA, then, accommodations could be made with little hardship and those people with disabilities could be gainfully employed.

The ADA was an extension of the Civil Rights Act of 1964, with the difference in that the ADA requires that accommodations be made to remove any barriers that prevent people with disabilities from full participation in the workforce. The ADA suggests that the foundation of a disability is an environmental or attitudinal barrier. In removing those barriers, the effects of a disability are minimized and equal opportunity is provided to a historically ignored group of people (Null & Cherry, 1998).

The text of the ADA provided concepts to support its enactment as law. It stated that discrimination against people with disabilities is unfair and goes against the spirit of the Constitution. Second, this discrimination is very costly. More than 60 billion dollars is spent through welfare and unemployment programs on a segment of the population that prefers to be independent (U.S. Census Bureau, 2003). Although the ADA does not affect the housing industry, the intent of the law could

influence how a house is designed and how people live in that house. According to Null and Cherry (1998), the major intent of universal design and the ADA is that the environment should adapt to fit people, not people to the environment.

The most recent estimate for persons with disabilities in the U.S. is 49.7 million, which is nearly 19% of the total population (U.S. Census Bureau, 2003). The number of citizens 65 and older in the U.S. is currently 35 million, and this number will continue to grow as the American population ages (U.S. Census Bureau, 2004). More than ever before, the elderly have needs that must be addressed by the housing industry. The U.S. Census Bureau projects the number of 65-plus persons to be more than 53 million by 2020. That will be an increase of 55% from the number present in 1998. The average life span in 1965 was 78; today that has risen to 86. In 1998 the number of persons 85 or older was 4 million. This number is estimated to rise to approximately 6.5 million by 2020 (Warson, 1999).

These figures are important to the building design industry, especially to those who work with the housing aspect of the industry. With both the disabled and senior populations growing, more effort needs to be placed on how to accommodate the special needs of these individuals. The ADA has required employers to offer accommodations for employment opportunities. Some of these accommodations could be used in the housing industry to allow person of all abilities to be more comfortable and safer in their homes. This law was a giant step forward in the design requirements in the workplace for a portion of the population that had been neglected up to that point. The ADA mandates designers to develop functional requirements for public and commercial spaces for a variety of disabilities (Null & Cherry, 1998).

Aging in place is a rising phenomenon as older Americans express a desire to continue to live in the houses and neighborhoods where they raised their children. They value their independence, are comfortable with their neighbors, and want to continue to live in surroundings with which they are familiar (Hartje, 2004). The U.S. Department of Health and Human Services' Administration on Aging (AOA) encourages the development of housing and communities that allow citizens to age in place. Life expectancy for a person born in 1900 was less than 50 years old. Since that was the case, houses were designed for the 50 and under person (Berger, 2002). Design in the housing industry has not kept pace with the aging of the population.

Built environment professionals need to design houses that will allow aging in place or develop solutions that can be applied to existing houses to make them user friendly as the homeowners age (Catinella, 1999). As a May 2000 AARP study revealed, 82% of those 45 years and older would prefer to stay in their present homes. Only 9% preferred to move to a nursing facility and 4% wanted to move into a relative's home (Benedict, 2001). In another recent survey reported in the *Journal of the American Geriatrics Society*, 30% of people living in the

U.S. would rather die than move into a nursing home. That is strong sentiment for wanting to stay in a familiar home as a person ages (Olson, 1998). Most people change the way they live, rather than change their environment. Wylde stated, "Falling in the bathroom; straining in the kitchen; tripping on the front steps; all are clear signs there's something wrong with the house, not with the person who lives there" (as cited in Harvey, 1996).

Too often as people age, they are forced to give up their homes because the cost of necessary modifications is often prohibitive. Some modifications can be accomplished without undue hardship. If solutions are put in place during the construction phase, the cost is minimal. Instead of changing the way one lives in a house, the house can be changed to accommodate the person or persons who live there. Housing has never been designed to accommodate all the differences in people. If a disability does occur, the house can become an obstacle course rather than a comfortable home (Null & Cherry, 1998).

Universal design simply means that the houses where individuals and families live and the products they use are designed to accommodate people of all physical abilities, not just elderly or disabled persons. Incorporating these design features into the everyday living environment would make living easier for all persons in the house, both present and future (Berger, 2002). Modifications to homes with aging individuals can be made for safety and ease of living in the home. These modifications could include installing grab bars in the bathroom, installing better lighting for diminished vision, placing handrails in strategic places, and replacing hard-to-grasp faucets and doorknobs with lever handles (Harvey 1996). Other modifications could include gently graded walkways, height adjustable closet bars, wider doors and hallways, handheld showerheads, and cabinets with pull out shelves. These options could be added unobtrusively either during new construction or in a renovation project (Berger, 2002).

The Center for Universal Design (1997) located at North Carolina State University's School of Design developed seven principles of universal design:

1. *Equitable use*: The design is useful and marketable to people with diverse abilities.
2. *Flexibility in use*: The design accommodates a wide range of individual preferences and abilities.
3. *Simple and intuitive use*: Use of the design is easy to understand, regardless of the user's experience, knowledge, language skill, or current concentration level.
4. *Perceptible information*: The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
5. *Tolerance for error*: The design minimizes hazards and the adverse consequences of accidental or unintended actions.

6. *Low physical effort*: The design can be used efficiently, comfortably, and with a minimum of fatigue.
7. *Size and space for approach and use*: Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

These principles approach design in a way that is useful for people of all abilities— young and healthy, old and frail, big or small, short or tall (Berger, 2000).

The following universal design features have been compiled by AARP (2002) to help with the decision about moving or remodeling a home for an elderly relative. These features follow many of the guidelines in the ADA as well as universal design principles. The home may be able to be renovated to allow the older person to live comfortably for several more years.

For Persons with Limited Reach

- Lower shelves three inches from standard height or install pull down shelving in the kitchen and in closets and other storage areas.
- Choose a side by side refrigerator to increase storage available with limited reach.
- Look for side swing ovens and cook tops with easy to reach controls.
- Install hand held shower heads vertically mounted with a sliding bar.
- Place peepholes in the front door at the correct height.
- Use adjustable height rods to put clothes at a height that is easy to reach.
- Include pull-out drawers, bins, baskets, and other organizing devices in closets and kitchens.
- Raise electrical outlets to 27 inches above the floor.

For Persons with Small Hands, Limited Flexibility, or Limited Lifting Abilities

- Choose u-shaped or d-shaped handles for cabinets and drawers that are easier to grasp.
- Replace an old stove with a cook top stove with level burners to ease transferring between burners.
- Install the dishwasher 8 inches higher than normal to reduce bending.
- Install lever faucet handles or single lever faucets which are easier to turn.
- Consider grab bars in the shower, by the toilet, and by the tub to increase safety.
- Use an elevated toilet seat for those who have difficulty sitting or bending.
- Install a bath/shower seat or a transfer bench or bath lift to ease getting in and out as well as eliminating bending to wash feet or shave legs. A walk-in shower is also a solution.

- Install lever door handles that operate easily with a push and are easier to grasp.
- Build a package shelf near the front door to hold packages while opening the door.
- Get in and out of the home more easily and safely by using an automatic garage door opener.
- Replace standard light switches with rocker switches that are easier to use.

For Persons with Limited Mobility

- Install dishwasher eight inches higher than normal to reduce bending.
- Install a bath/shower seat or a tub with a transfer bench.
- Widen doorways and hallways to a minimum of 35 inches.
- Lower door thresholds to one half inch or less. Transition wedges can be used if the threshold is higher.
- Place doors so there is between 18 to 24 inches on the door handle side to allow space to maneuver.
- Make sure the driveway is smooth but not slippery.
- Give sidewalks a textured surface to increase traction and stability.
- Use handrails on both sides of stairways.
- Make stair treads deep enough for the whole foot.
- Install a ramp with handrails on both sides and some sort of edge protection to prevent slipping off the side.

For Persons with Limited Vision

- Increase the wattage of light bulbs.
- Make sure stove controls are clearly marked and easy to see.
- Put lights in the closets.
- Install lights near outside walkways, stairs, and entrances.
- Install lighting on stairs.
- Use nightlights where appropriate.
- Install task lighting, such as under the counter lights over the kitchen counter.

Price Murillo, a gerontologist and nursing home administrator from Arizona, has developed a concept called GerOnomics. This innovative way of looking at home modifications for the aging population can effectively deal with the difficulties of aging. He promotes “human-aging factor design” in the housing environment. These environments are designed for comfort of both the elderly disabled owner and the possible caregiver. The GerOnomics home provides the space necessary to assist the elderly person: wider bathrooms, showers rather than baths, one level houses, and fewer barriers to independent living (Brown, 2002).

Another innovation in the elderly housing arena is a house fitted with devices to help keep track of the elderly homeowner. These are being called “smart houses.” “A Smart House for People with Dementia” is a project from the University of Bath in England. This real house is outfitted with devices that issue verbal warnings to the resident, locate lost items, and turn on the light at night when the person gets out of bed. Many consultants to the housing industry feel that as the population continues to grow older, these and other innovations will become cost effective as the demand for such technology rises (Benedict, 2001).

Method

After examining the ADA, universal design, and the needs of the elderly/disabled, a case study was conducted on an existing house belonging to an elderly homeowner desiring to age in place. The study consisted of analyzing the floor plan, entryways, and circulation patterns of the existing house for accessibility for an elderly/disabled person. Estimates were obtained for new construction of a comparably sized house without any universal design components, new construction with the necessary universal design features that would allow aging in place, and remodeling the existing house to incorporate aging in place features to accommodate the elderly homeowner.

This existing house is located in Bloomington, Illinois, and consists of two bedrooms, a living room, a dining room, a kitchen, one bathroom, an enclosed porch, an attic, and an unfinished basement (Figure 1). The floor plan of this house does not provide easy access for an elderly homeowner. If the homeowner were to become wheelchair bound, he would need to relocate and be forced to give up the home instead of being able to age in place. With stairs at both the front and back doors, the house would not be accessible to someone with limited mobility. The bathroom would not allow a wheelchair-bound person to access the bathing or toilet facilities. Neither would the space allow any caregiver to help in the bathing activities of an elderly/disabled person.

With modifications, the bathroom in this home could become accessible for an elderly person with disabilities. A new sink cabinet with wheelchair accessibility would allow easier access to the sink. Adding a wall hung toilet would allow better access and cleaning of the bathroom area. Non-slip flooring in the bath would remove any safety hazards that a person with limited mobility might encounter in this room.

The hallway to the bathroom is narrow and would be difficult for a wheelchair-bound person or a person with a walker to navigate. In removing the existing linen closet, the hallway would be wider and therefore easier to manage. The existing hall closet could be rearranged with adjustable shelves and bins to allow for the storage of linen and other items as needed by the homeowner.

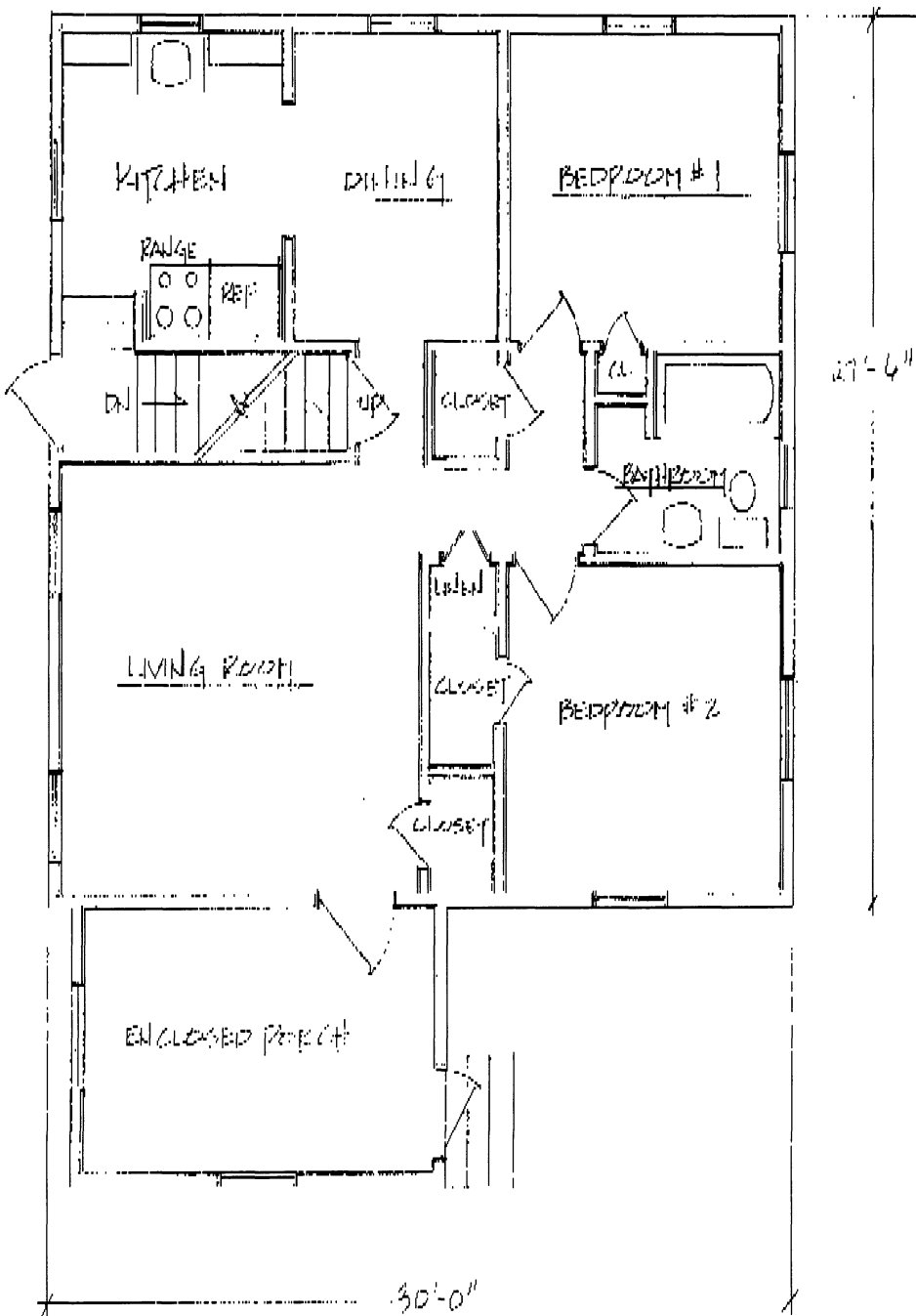


Figure 1. Existing Floor Space

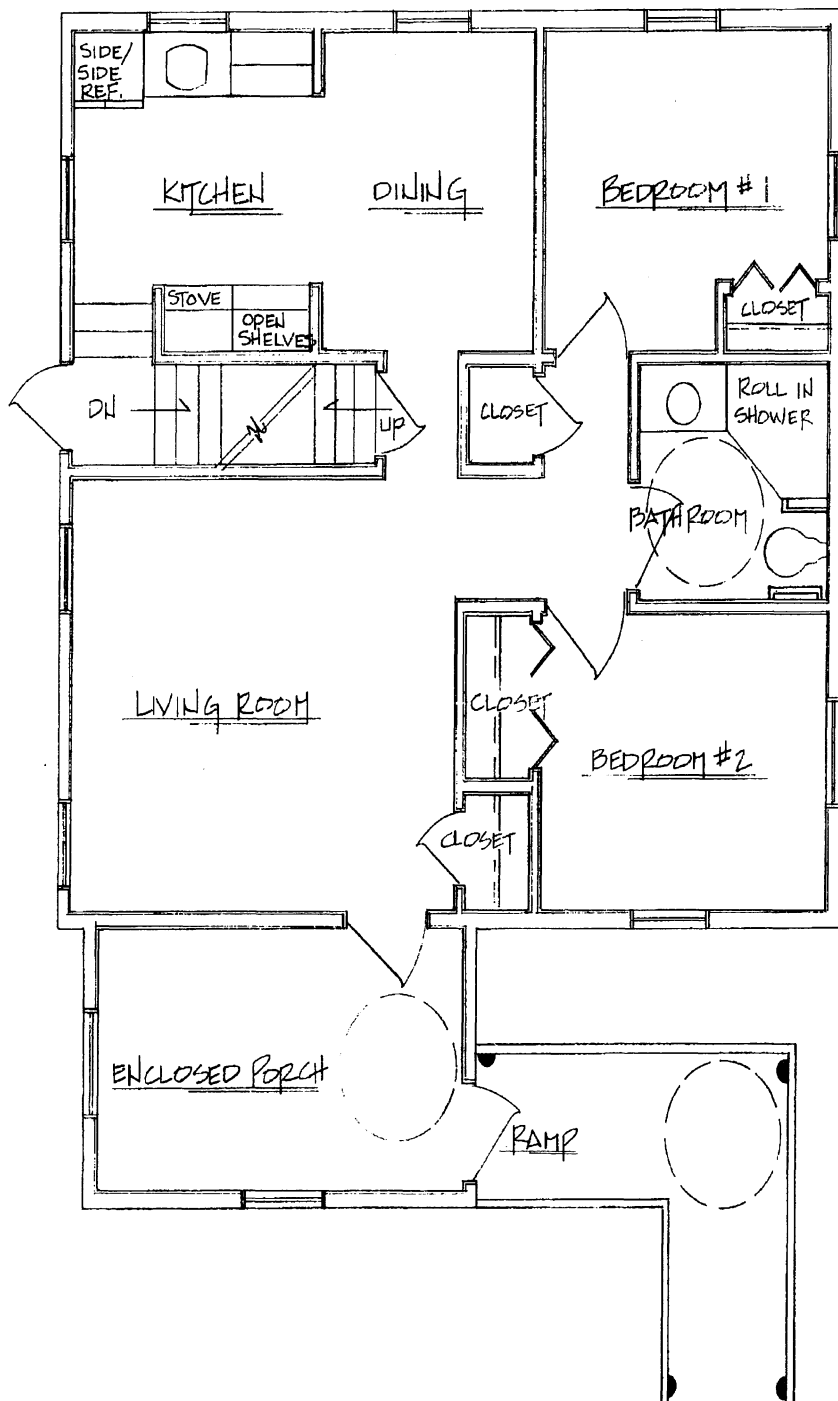


Figure 2. Modified Floor Space

In changing the bathroom, bedroom “one” would lose the existing small closet. A new closet would be added with bi-fold doors, adjustable rods and shelves, and bins for various types of storage. The closet in bedroom “two” would be made slightly smaller by enlarging the hallway. The door opening would be made larger to accommodate bi-fold doors, adjustable rods and shelves, and storage bins. The doors in both bedrooms would be enlarged to allow for wheelchair and walker access.

The kitchen would be difficult to work in for an elderly person. By changing the lower cabinets to cabinets with pull out shelves, accessibility would be improved. Providing open storage shelves and a counter next to the stove would allow for easier transition from the stove to a counter area. New handles on the cabinet doors would make the kitchen area easier for anyone to use. Non-slip flooring in the kitchen area would create a safer environment. Lighting would be added under the counters for better visibility on the counter top surface.

In modifying this home to be accessible, all the doorknobs would need to be replaced with accessible lever handles for ease of use for people with limited use of their hands. The carpeting throughout the house would be low pile for ease of walking and wheelchair use. A new ramp would be built to the enclosed front porch with lighting and rails along the sides of the ramp so the homeowner can easily enter the home.

Results

Modifications can be made to this home to provide for the needs of an elderly person desiring to age in place (Figure 2). Following is a list of modifications to create a more user-friendly environment.

- Add wheelchair ramp to enclosed porch entrance. Rails are needed along ramp for ease of use and safety. Add lights to noted areas on ramp for safety.
- Enlarge bathroom.
- Add roll-in shower for wheelchair access that has a transfer seat and grab bars.
- Add wall hung toilet. Add grab bars next to toilet.
- New sink cabinet with wheelchair clearance underneath.
- Medicine/storage cabinet placed above sink.
- Enlarge bathroom door to 3 feet.
- All non-slip flooring to be used.
- Remove window in bathroom.
- Add ceiling exhaust fan with light fixture.
- Remove hall linen closet to enlarge hallway.
- Rearrange existing hall closet to accommodate linen, as well as other types of storage.
- Add small closet to bedroom one, bi-fold doors, and adjustable rods and bins for a variety of storage needs.

- Remove existing closet door in bedroom two and enlarge opening. Add bi-fold doors and adjustable shelves and bins for a variety of storage needs.
- Remodel kitchen.
- Remove existing cabinets.
- Move refrigerator to other corner.
- Add side by side refrigerator for ease of use.
- New stove with easy access controls.
- New cabinets next to stove.
- Open shelves over cabinets for storage.
- Use pull out shelves in lower cabinets.
- Use u-shaped handles on cabinet doors and drawers.
- New lever handles on sink.
- Enlarge doorway to dining room.
- New non-slip flooring in kitchen.
- Install under cabinet lights for better visibility on counter tops.
- Change all door handles to levers for ease of use.
- New low pile carpeting throughout house for ease of walking and wheelchair use.

These modifications would provide a safe environment for a homeowner to continue to live in his or her home even in the event of becoming disabled. According to a Bloomington area contractor, the cost estimate for this remodeling project would be between \$50,000 and \$66,000 depending on the quality of the new cabinets and fixtures used in the remodeling project. This figure could be cost prohibitive for an elderly homeowner to stay in her or his home.

The estimate from an area contractor for the cost per square foot for new construction in September of 2003 would have been approximately \$110. The cost to build the same house used in the case study without modifications would be \$99,142. The cost per square foot to build this house with the necessary modifications as a new construction project would be slightly higher due to the incorporation of accessible appliances, bathroom fixtures, and other universal design features. Following the modifications list, the cost of a new house with the modifications would be \$102,842 (Figure 3).

As this cost analysis shows, new construction with modifications would raise the total cost by only \$3,700. The additional universal design features would allow the homeowner to comfortably age in place. The cost for remodeling would be significantly higher than most elderly homeowners would be able to afford, approximately one half the cost of building new. As found in previous research, most elderly persons prefer to stay in their homes and neighborhoods with which they are familiar (AARP, 2002), but with this tremendous cost to create a house that would meet their needs they would most likely have to relocate in order to have a comfortable, accessible residence.

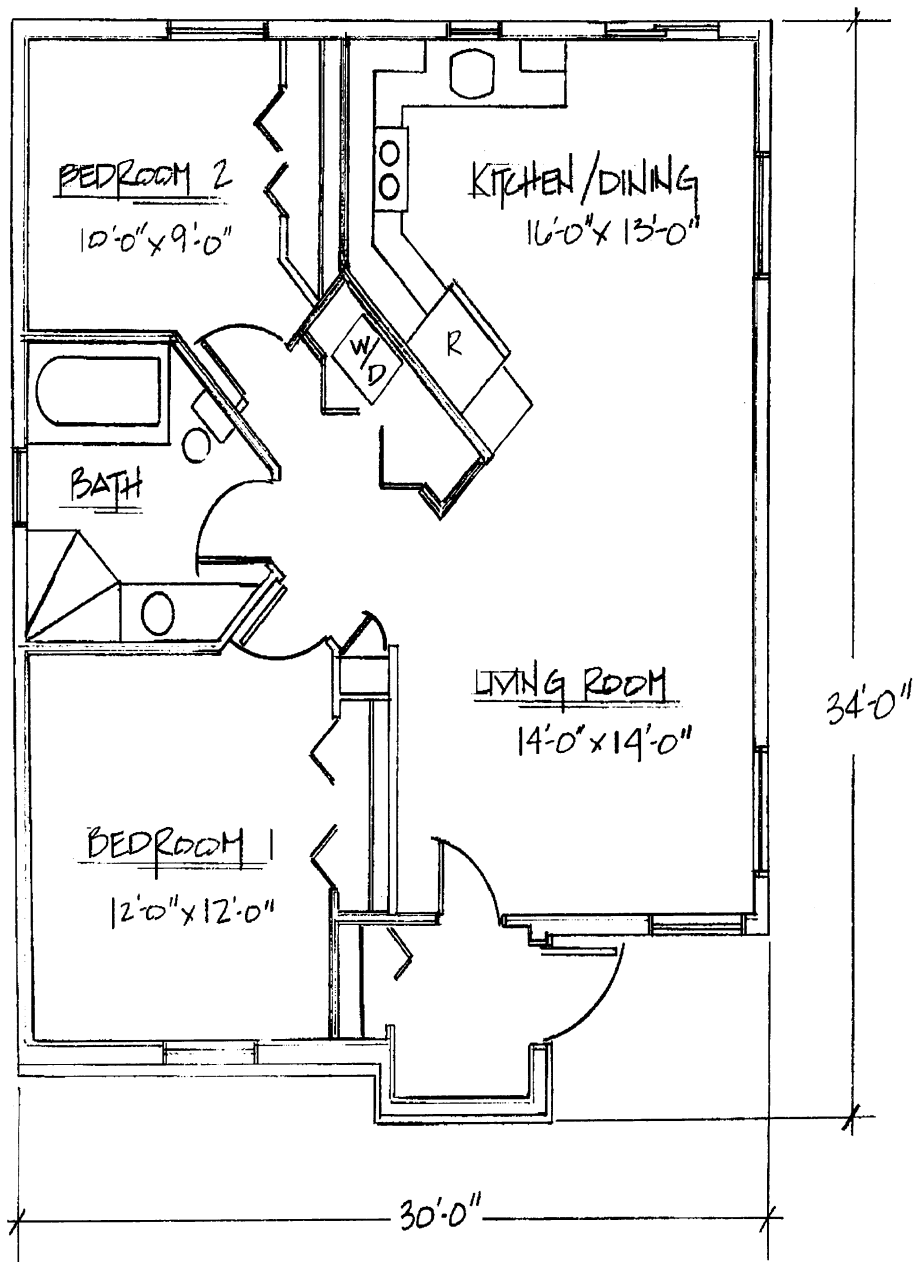


Figure 3. Newly Constructed, Fully Accessible Floor Plan

Conclusions

Both the ADA and universal design guidelines need to be incorporated into new residential construction to create more user-friendly environments for people of all ages. Using universal design principles and technological advances in building construction will create safer home environments, more user-friendly spaces, and spaces that are well adapted to everyday living for people of all abilities.

This study revealed that a new house with modifications would not cost significantly more than a house without the modifications. However, remodeling to meet the needs of elderly/disabled persons would be over half the cost of building new. In most instances elderly/disabled persons would not be able to afford the remodeling costs of staying in their homes. They would either have to adjust the way they live in their homes or find other housing environments that would meet their needs. Aging in place would be a very costly alternative for many elderly homeowners.

Designers working in the housing industry need to deliver creative and innovative designs to meet those everyday needs. In the homes of the future, spaces must be created that will be flexible and change with homeowners as they age. The choices in housing for the aging population need to be expanded. "Let's build homes now that will factor in the needs of families who may have a disabled or chronically ill family member and will allow us to make minimal adjustments without spending lots of money" (Murillo as cited in Brown, 2000, p.18). This area of housing currently is vastly under developed. The housing and design community, interested in making lives better for people of all abilities, should educate contractors and the public in this vital area. The homes we live in should work for us as we age in place.

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