Universal Design in Single-Family Housing:
A Health Impact Assessment (HIA) in Davidson, NC

November 2013

What is Universal Design?

The concept of universal design emerged in the mid-1980s and is defined by the Center for Universal Design as "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." [1] In terms of residential design this means including a step-free entrance route that blends into the overall design, wide doorways, a bedroom and bathroom on the lower level, and placing light switches and outlets at appropriate heights for children or sitting adults.[2] Additional universal design features are typically found in kitchens and bathrooms including: adjustable or multiple countertop heights, extending and removable cabinets or drawers, lever faucets, attractively designed grab bars, and a curbless shower with a handheld shower head.[3]

In 1997, a working group of architects, product designers, engineers, and environmental design researchers, collaborated to develop seven principles of universal design. These principles described further in the following pages include: equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use. [1]

Principles of Universal Design[1]

1. Equitable Use - The design is useful and marketable to people with diverse abilities.
   - Provide the same means of use for all users: identical whenever possible; equivalent when not.
   - Avoid segregating or stigmatizing any users.
   - Provisions for privacy, security, and safety should be equally available to all users.
   - Make the design appealing to all users.

2. Flexibility in Use - The design accommodates a wide range of individual preferences and abilities.
   - Provide choice in methods of use.
   - Accommodate right- or left-handed access and use.
   - Facilitate the user's accuracy and precision.
   - Provide adaptability to the user's pace.

3. Simple and Intuitive Use - Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.
   - Eliminate unnecessary complexity.
   - Be consistent with user expectations and intuition.
   - Accommodate a wide range of literacy and language skills.
   - Arrange information consistent with its importance.
   - Provide effective prompting and feedback during and after task completion.

4. Perceptible Information - The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.
   - Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.
   - Provide adequate contrast between essential information and its surroundings.
   - Maximize "legibility" of essential information.
   - Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).
   - Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

5. Tolerance for Error - The design minimizes hazards and the adverse consequences of accidental or unintended actions.
   - Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.
   - Provide warnings of hazards and errors.
   - Provide fail safe features.
   - Discourage unconscious action in tasks that require vigilance.

6. Low Physical Effort - The design can be used efficiently and comfortably and with a minimum of fatigue.
   - Allow user to maintain a neutral body position.
   - Use reasonable operating forces.
   - Minimize repetitive actions.
   - Minimize sustained physical effort.

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.
   - Provide a clear line of sight to important elements for any seated or standing user.
   - Make reach to all components comfortable for any seated or standing user.
   - Accommodate variations in hand and grip size.
   - Provide adequate space for the use of assistive devices or personal assistance.

In 1988, the Fair Housing Amendments Act required accessible units within all new multi-family apartments and condominiums with four or more units.[4] The number of accessible units was furthered increased with the passage of the Americans with Disabilities Act in 1990 which required all government housing to be accessible. However, detached single-family houses and townhomes, where the majority of the population lives, are not covered by federal law in regards to accessibility codes. The vast majority of private houses and townhomes continue to be built with accessibility barriers including steps at every entrance, narrow doorways and hallways, and lacking an accessible restroom on the main floor.

What is Visitability?

Visitability has been defined as "a movement to change home construction practices so that virtually all new homes—not merely those custom-built for occupants who currently have disabilities—offer a few specific features making the home easier for mobility-impaired people to live in and visit." [5] Partly in response to the growing senior population, local visitability legislation has been passed across the United States including Atlanta, GA (1992), Tucson, AZ (2002), and Bolingbrook, IL (2004).[4] As of 2011, visitability ordinances or voluntary programs have been instituted in cities in Georgia, Florida, Texas, Virginia, Vermont, Minnesota, New Mexico, Kentucky, Illinois, Oregon, Kansas, New Jersey, Michigan, Pennsylvania, and Ohio. Federal legislation requiring visitability features within new single-family homes and townhomes built with federal assistance has been introduced twice by US Representative Jan Schakowsky (D-IL).

Features that should always be cited in visitability legislation include:

- At least one zero-step entrance approached by an accessible route on a firm surface no steeper than 1:12, proceeding from a driveway or public sidewalk;
- Wide passage doors (at least 34" in clearance); and,
- At least a half bath/powder room on the main floor.[5]

Other features often included within visitability legislation include the reinforcement of bathroom walls for later installation of grab bars and the accessible placement of electrical controls. Highly recommended voluntary efforts include having a full bathroom with maneuvering space and a bedroom on the main floor.



Why should Davidson Care about Universal Design and Visitability in Housing?

Corresponds with the Town's Vision

According to Davidson's Comprehensive Plan "the town should require housing and commercial development appropriate for occupants of all ages and abilities."[6] Furthermore, the town should "require universal design specifications as a percentage of total housing units in future developments."

Current and Future Housing Stock

According to the 2010 US Census, the Town of Davidson has a population of 10,944 people and 3,671 households.[7] Of these 3,671 households, 66% are classified as family households (householder and one or more people related by birth, marriage, or adoption) and 34% of households being nonfamily households with the majority of nonfamily households being occupied by a householder living alone (78%).[7] The majority of housing units within the town are single family homes (64%) or townhomes (15%).[8] It is estimated that the Town of Davidson will absorb between 2,000 and 5,000 new households between 2010 and 2030. [6]

Aging Population and Aging-in-Place

In 2010, there were 1,368 residents 65 years old or older (13% of Davidson's population).[7] By 2030, this population group is expected to increase quickly as the baby boomer generation ages to 2,377 people (based on a projected increase of 2.8% each year).[9] As people age, they are more likely to have a chronic disease (80% of older adults have one chronic condition and 50% have two or more) and may need additional assistance to complete daily tasks.[10]

> ***"Being able to remain in your own home is so important if a cohesive system is in place to make that possible."***
>
> Survey Participant

In a 2008 survey of older adults, conducted by the Davidson Aging in Place Task Force, 82% of respondents indicated that they either lived in their own single-family home, townhome, or condominium. [11] Ninety-four percent of survey participants responded that they plan to remain in Davidson as they get older, with 70% indicating that they plan to live in their current home as long as possible, 10% indicating that they plan to move to another dwelling within Davidson, and 15% indicating that they plan to move into an assisted care facility within Davidson (The Pines). By incorporating basic universal design

features into the initial construction of a home, the house can be easily retrofitted to allow its owners to age-in-place.

Unintentional injury is the 9th leading cause of death for adults 65 and older in the United States.[12] Falls are the leading cause of unintentional injury deaths (52%) in this age group, with 21,649 deaths resulting from falls in 2010. Non-fatal falls (over 2.4 million in 2012) can result in serious injuries−traumatic brain injuries, fractures, lacerations−that require additional medical care/ hospitalization, in-home services or potential relocation to an assisted care facility.

Fortunately, the majority of falls are preventable by reducing tripping hazards, adding grab bars inside and outside the tub or shower and next to the toilet, adding railings on both sides of stairways, and improving the lighting throughout the home.[13] Universal design takes these precautions into consideration prior to a fall taking place (reinforcing walls to allow for easy installation of grab bars or the inclusion of towel racks that double as grab bars from the initial design) and helps those who may be recovering from injuries return to their home sooner (curbless showers that allow those using assistive devices to walk or roll into the shower).



Low and Fixed Income Populations

The cost of implementing visitability or universal design features in the initial construction of the home is significantly less expensive than retrofitting a home as need dictates. For example, due to the builder's ability to plan, site, and grade for cost-effectiveness, the estimated cost of installing a zero-step entrance on a concrete slab is $0 or $250 for over a basement.[14] The cost of installing wider doors in new construction is $2 per doorway. In comparison, the cost of retrofitting a home to meet the needs of an inhabitant who develops a disability or needs additional features (such as grab bars) to safely age-in-place is far more expensive. Adding a zero-step entrance ($3,300), widening existing doorways ($700), or reinforcing walls ($800) are common retrofits that quickly add up. For those with low or fixed incomes, this means that residents may essentially be trapped in his or her home, needing assistance to enter or exit the building or use the bathroom.

People with Disabilities

A disability can be physical, mental, emotional, intellectual, or communication related.[15] Disability may result in substantial limitation in one or more major life activities and the limitations are expected to be permanent or long term in duration. The likelihood of disability increases with age and the severity of disability can also vary considerably from person to person. A disability can be visible or invisible, and some people may use assistive equipment such as a wheelchair, communication board, or assistive listening device.

Over 36 million people (12% of the U.S. population) have some level of disability.[15] According to statistics provided by the Mecklenburg County Health Department, as of August 2013, there were 79 people who receive Adult Medicaid Services due to a disability in Davidson. Using statewide disability rates and 2010 U.S. Census data, it is also possible to estimate the number of adults with disabilities in Davidson, NC by age group (see table below). According to these estimates, there are approximately 1,715 adults with disabilities within the Town of Davidson or 20% of Davidson's population over the age of 18.

Age Category	NC Percentage with Disability	Total Number of People in Davidson	Number of People with a Disability in Davidson
People 18-44 Years of Age	13.3%	3,650	485
People 45-64 Years of Age	27.3%	2,617	714
People 65+	37.7%	1,368	516
Total	25%		**1,715**

In North Carolina, children with disabilities are classified as children with special health care needs (CSHCN) defined, as "children who need prescription medications or have an elevated need for medical, mental health, or education services due to a medical, behavioral, or other health condition that has lasted or is expected to last for at least 12 months."[15] According to results of the 2011 NC Child Health Assessment and Monitoring Program (CHAMP), 18% of children ages 0-17 are considered CSHCN. Using this percentage and 2010 U.S. Census data (2,500 children in Davidson), approximately 450 children within Davidson would be considered CSHCN.

Young Children

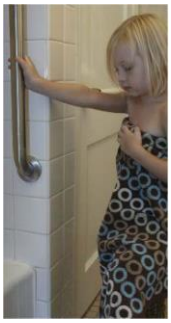
According to the 2010 U.S. Census, there are 1,344 children under the age of 10 in the Town of Davidson with 40% of them being under the age of 5. [7] Unintentional injury (which includes drowning, motor vehicle accidents, burns, suffocation, poisoning, firearm injuries, falls, and cuts) is the leading cause of death for those between the ages of 1 and 44.[12] Nationally, home hazards including risks of drowning, burns, and falls accounted for 44% of deaths between the ages of 1 and 4 and 31% for those between 5 and 9 years of age. In Mecklenburg County, falls are the leading cause of injury hospitalization (169 cases from 2007 to 2009) and Emergency Room visits (11,697 visits from 2007 to 2009) for children between the ages of 0 and 14.[16]

Incorporating universal design features into homes can help prevent injury and aid with a child's development. For example by wrapping stairs around stacked closets, the stair run would be shortened and if children were to fall, they would only fall a couple of stairs versus an entire flight of stairs. Falls from windows can also be prevented by installing cranked windows, which are commonly easier for older adults to open, and can be designed to open only so far, from the top, or at multiple places within the windowpane. Installing grab bars within bathrooms can assist both children and older adults in and out of the bathtub, thus reducing the number of falls.

The risk of burns can be greatly reduced by: removing microwaves from over the stove and placing them on the counter or within a microwave drawer (also helpful for shorter or seated adults), installing anti-scald mixing valves on shower and tub faucets, and incorporating induction cooktops within kitchens (also helpful for adults with visual impairments).

Installing sidelights at the main entrance to the house can allow children to see who is at the door, while a zero-step entrance can easily accommodate a stroller. By installing all three visitability features, children can have friends with disabilities over to play. Additional universal design features such as varying counter top heights, and accessible refrigerator drawers, can allow children to be more independent and involved with family activities, such as preparing snacks and meals.



Health Impacts of Recommended Efforts to Increase Visitability and Universal Design in Housing

Davidson Housing Ordinance passed requiring at least one zero-step entry to single-family houses and townhomes that are constructed following the ordinance adoption.

Houses within Davidson's planning jurisdiction will be built with a zero-step entry.

People with mobility limitations are able to visit for short periods of time (cannot assume a bathroom is available).

Convenient entry for those without mobility limitations- i.e. parents with strollers, movers, bicyclists, young children, etc.

Davidson and/or Mecklenburg County pass amendment to Chapter 11 of the NC Building Codes to include: a zero-step entry, accessible bathroom on main floor, 34" entryways and hallways, and reinforced bathroom walls.

Houses within Davidson and/or Mecklenburg County are built according to amended codes.

People with mobility limitations are able to visit for extended periods of time.

Houses are retrofitted within Davidson to become visitable and allow aging-in-place.

A public education campaign is launched on the importance of visitability and universal design, including ways to make your home visitable and ready for aging-in-place.

Citizens appreciate the need to have universally designed and visitable homes.

Citizens engage in the conversation around visitability and encourage political leaders and builders to build visitable homes.

Mental Health Improved
+ Decreased feeling of isolation/ segregation from society
+ Decreased embarrassment from being carried into house
+ Decreased feeling of depression resulting from being isolated or dependent on others.
+ Increased independence and empowerment.

Physical Health Improved
+ Decreased risk of injury or falling on stairs for those using a cane, crutches, or walker.

Mental Health Improved
+ Decreased stress when entering or exiting a home with large/ heavy objects.
+ Increased independence for young children.

Physical Health Improved
+ Decreased risk of injury or falling on stairs.
+ Decreased risk of strain or sprains from lifting objects.

Mental Health Improved
+ Decreased embarrassment from needing assistance to use the restroom.

Physical Health Improved
+ Decreased risk of Kidney disease since they are now able to use restroom when needed and drink appropriate amount of liquids.
+ Decreased risk of injury on hands and elbows when provided enough room to maneuver in entryways and hallways.

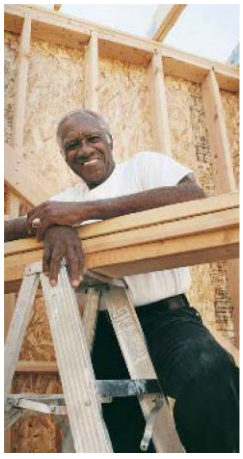
Mental Health Improved
+ Increased feelings of empowerment, compassion, and community.
+ Increased feelings of happiness and being content that friends and family can visit them within their home and they will be able to age-in-place.

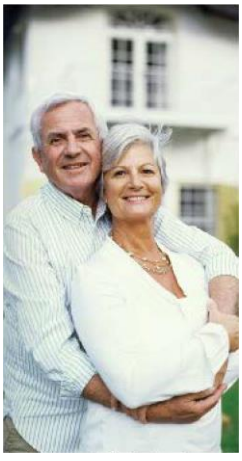
Physical Health Improved
+ Decreased number and severity of falls and burns for children, older adults and people with disabilities as universal design features are incorporated.

What can Davidson do to Incorporate Universal Design or Visitability in Housing?

There are many things that the Town of Davidson can do to: increase awareness of the need for universal design and visitability features within single-family homes; require or encourage the incorporation of these features within new construction; and partner with other municipalities and entities to increase the prevalence of universally designed homes.

- Partner with the Davidson Committee on Aging, local disability groups, builders, real estate agents, and others to launch an educational campaign on the benefits of constructing homes with visitability and universal design features.
- Incorporate a zero-step entry as a requirement for newly constructed single-family homes as part of the Davidson Planning Ordinance update and consider adopting a local amendment to Chapter 11: Accessibility of the *North Carolina Building Code* to include single-family houses and townhomes.
- Encourage Mecklenburg County to also adopt a visitability ordinance so that all newly constructed houses within its jurisdiction will have a zero-step entry, a bathroom located on the main floor, hallways and entryways of at least 34” and reinforced bathroom walls for grab bar installation.
- Track the availability of housing stock with visitability features or additional universal design components for evaluation purposes, as well as the marketing of homes to those who live or move to Davidson with existing disabilities or special needs.
- Consider establishing a voluntary program for homebuilders interested in incorporating universal design and visitability features within their projects including: a guidebook for building homes with these features, a recognition program, and an updated list of available subsidies, trained subcontractors, various products, and service providers.
- Work with nonprofits to provide financial assistance to low-income homeowners who need to retrofit their homes to accommodate an existing disability or prepare for aging-in-place.





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