

## **Architectural Barriers in Residential Construction**

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Time brings all things to pass. In this, the ancient Greek playwright, Aeschylus, is correct. So it is true that, as we age, we have the opportunity to experience life's gifts and tragedies from different vantage points. As a child, I was born into a world that was, at best, blind to people that had disabilities. For the most part, the "healthy masses" lived life that was largely apart from others with special needs. At this point in our American history, disabled persons the architectural landscape was that of barriers that kept many from even attempting to inhabit public spaces unless absolutely necessary. I rarely came into contact with people having a physical disability. At that time in our society, the disabled were simply kept from view. My perception of aging was simply the addition of a few wrinkles and a change in hair color. Even as an older child, the concept of diminished ability was thought to be a choice rather than a function of life. I had absolutely no concept of what a physical disability truly was. In the mid-1970's my grandfather had a near-fatal automobile accident that initially left him unable to walk. He never ventured into public until he was able to walk again. My other older relatives had passed away quickly without experiencing any profound disability. By the time my young adulthood arrived, we reached critical mass, a turning point, when people in the United States had nearly doubled their life expectancy since 1900<sup>i</sup>. Extended life expectancy had brought about its own set of challenges that included an ever-increasing population with disabilities living in a world that was incompatible with their existence.

We would likely find it surprising that, many hospitals, most nursing homes and like facilities that dealt with disabled individuals on a regular basis, did not already have a reduced barrier plan in place or at least accommodations that approached what we see today in even the most basic of public spaces. The turning point for accessibility and saving grace for those who were disabled arrived in 1990. The ADA or the Americans with Disabilities Act, enacted by President Herbert Walker Bush, substantially reduced the barriers to individuals with special needs and seeking to live their lives in the public realm. These were people who were previously unable to venture much beyond (and even sometimes within) their own living environment. This sweeping legislation included provisions for job discrimination, public entities (including transportation), commercial facilities, telecommunications and other sweeping and applicable provisions.<sup>ii</sup> As a result, we live in a world that integrates sloped street curbs, ramps, kneeling busses, automated doors, virtual attendants, braille, signs, proper openings for wheelchairs, grab bars, reachable/operable switches & faucets, knee-spaces, and the like, all of which has blended into our society to become rule rather than exception.

In the 23 years since the passage of ADA I have grown accustomed, as many Americans have, to the evolving architectural landscape. Additions and changes to city, municipal, public and transportation infrastructure such as sloping curbs, talking crosswalks, automatic doors and the like along with the visibility of people benefiting from these changes is now a part of daily life. The architectural landscape in the United States is a completely different world that, through continued innovation and the clarifications of the ADA through the ADA Amendments Act of 2008, continues to open up to more people. This is only part of the story.

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### **Paradigm Shift:**

In December of 2012 my father had a traumatic stroke. We soon found out that the extent of the damage would make even basic functions of daily life a continuous challenge. My family was not impervious to disability and, more poignantly we were now 'those people' whom others looked upon and thanked heaven that they were not. It was not until I had to assist with the 'transfer' that I understood fully the immense importance of ADA and how it would soon come to benefit my Dad and the lives of his family of caregivers. I would soon understand that 'transfer' was a keyword that meant transition from different locations of rest. Just the ability to stand and move our bodies is something that we can all appreciate more by understanding the process of taking a shower for a person who is unable to walk. For a person with unable to walk the process involves some tricky moves, essentially, transferring from bed to wheelchair, wheelchair to shower-chair, shower-chair to wheelchair, wheelchair to bed. This process was just to take a shower and can take as long as 2 hours do do it safely with the assistance of many ADA compliant devices along the way. To name just a few, grab bars, large doorways, low thresholds, high traction surfaces, lowered controls, and roll-in showers become essential elements.

Recalling the quote at the beginning of this text and then peering back at my family history, it was clear to me that Aeschylus was correct, all things do come to pass, and in some way, it is likely that those reading this text already have or will, be in direct contact with a person having a disability of similar proportion. For my part, this change set the next stage of life for my father and those who care for him. I was charged with figuring out how to help another live differently. Strangely, for my dad, the stage was clearly set for functioning in public life. Managing curbs, hospitals and public restrooms was well defined and even tested in a few excursions away from the hospital environment. The ramps were in place, the parking was there, and the restrooms were properly sized and outfitted. The challenge, even with a background in architectural design and ADA compliance, was figuring out how to help my dad live at home and in the most independent way possible.

With a new respect for those who have and continue to live with a disability, my life has proven to be the great teacher. After 6-month of intensive rehabilitation, surgeries, and

finally ending up in a SNF, or 'Skilled Nursing Facility' (a kinder acronym for what has been known as a nursing home), dad was ready to go home, but his home was not ready for him. What was clearly evident is that there is a profound lack of planning for living at home with a disability. From a design standpoint, in residential architecture, emphasis is primarily on curb appeal, popular trends and cost efficiency over integration of accessibility. Yet, with the baby boom generation now becoming senior citizens, accessibility at home should be the focus of the growing needs of our society. Understanding how to live at home in a way that is most independent not only takes stress off of our staggering health care costs, but it also fosters health benefits if the setting is properly addressed. Unfortunately, making this transition back to home living is cost prohibitive and too time consuming for many.

In the case of my father, he was away from his home for over six months after his stroke. That meant that he was using the public resources of Medicare/Medicaid to live daily life including a private room, prepared meals, laundry services, and the resources of a trained staff. Roughly half of this time could have been in a home setting had his home been in a condition to support his new needs. Moving away from a care facility, when possible, has two major advantages over remaining in an SNF. The first is cost. According to AARP, annual care in an SNF is roughly \$50,000 and in some instances it can be much higher. If you want a separate room, have a special diet plan, or require more intensive care services, the annual costs can quickly skyrocket to six figures. The second benefit to living at home is arguably even more profound. It is, essentially, physical and mental restorative and follows from reestablishment of privacy and dignity to renewed feelings of independence and self-reliance, all within a familiar setting. The results can yield accelerated mental and physical healing. Often, with the assistance of family and/or a caregiver, the home can become a sanctuary when compared to the veritable mayhem of people, smells and noises of living in a hospital, rehab or SNF.

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#### Overcoming Residential Barriers:

While financial barriers can be rather large to modify personal residences, simple planning for our new private spaces or incorporation into remodels can make many homes much more adaptable environments. ADA has many detailed guidelines that are helpful cues but simple planning can yield a home that is vastly more accessible without turning it into a hospital or completely ADA compliant public space. Knowing exact future needs is not necessary to basic planning. The trick, however, is to understand the extent of possibilities and plan broadly. Whether it is your life, the life of a family member or close friend, true planning for an adaptable residence is an asset that can add value while enhancing appeal.

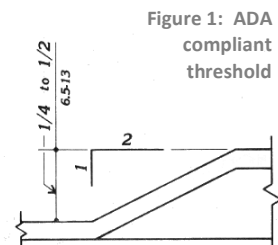
My father was fortunate to live in a single floor residence at the time of his stroke, but, this alone was not the only consideration, if anything, it was far from being a place in which he could live or receive care. Alterations that are key to his care and rehabilitation would require changes to widen doorways, removal of thresholds and

substandard flooring surfaces, and installation of ramps over entry thresholds. We would also need to change style of faucets, door handles and switches. The addition of a roll-in shower was truly the most costly but worthwhile addition to his home. This element alone would, in many cases, be considered a luxury, yet could have (with proper planning) been integrated into the home during construction at little-to-no additional cost over the traditional curbed shower. We also had to contend with a hallway that, while wide enough for a wheelchair, it had a 90-degree turn that precluded wheelchair travel.

Hindsight being 20/20, my paradigm shift also carried over to considerations in basic architectural design for new and remodeled residences. This is especially true for individuals making their 'dream-home' in which they plan to either retire in or live out their lives. The rub is that while planning a residence, it is impossible to know how or if it will be necessary to implement a specific plan for accessibility but there are key elements that should be considered well beyond having a room on the first floor for the inevitable 'in-law' visit or move-in. The silver lining is that planning for a wide variety of needs is quite simple and none of it needs to be ugly, expensive or utilitarian!

**Doors & Hallways:** Possibly the most important consideration is horizontal movement through a structure. Since we do not know when or even if there will be a need, best planning dictates using items that provide maximum impact for minimum cost. The first rule is to keep all hallways at least 36" wide and all doorway openings at least 32" clear (this includes the intrusion of the strike). The 2'-0" door opening to 'save wall space' simply will not do and should have no place in planning a new home. If wall space is a consideration then pocket doors should be considered. The optimal door opening for passage is 36" clear. If this door is to be at the end of a hallway then the hallway should be at least 44" wide to include standard casing trim around door. For wiggle room around end-of-hallway door and casing, however, 48" becomes optimal. If the hallway has a 90-degree turn then it is best to consider the wider hallway. Many wheelchairs have footrests. These add length to the chair and make turns more challenging. Incorporating a chamfered inside corner in the hallway turn equal or greater than 2'-0" can profoundly ease navigation of sharp turn. This measure bought other benefits including a much easier path for moving large items through the house during and after the construction process. Another consideration in the hallway is blocking for handrails. Before closing up walls, consider this simple framing addition to provide a continuous substrate for any future handrails and guardrails for ambulatory assistance and wall protection from large wheelchairs.

Although my father's residence was a single floor structure entry, egress was still inhibiting. Typically these doors have thresholds that are at least 1" above the floor surface. This is cumbersome for a wheelchair and walker. Ordering entry doors that have a nearly flat threshold or ADA compliant threshold with a slope having twice the run per rise and below



½” (figure 1). Compounding residential egress is the typical drop in level from entry, patio and porch. Typically this drop in elevation is as much as 3-1/2” making the need for a ramp retrofit necessary for entry. Planning to provide positive drainage away from exterior wall surfaces and minimizing this drop during forming and before concrete pour to a maximum of 1” will greatly reduce the need for large-scale ramping project in the future. Another encumbrance is generally opening the door. Even with the assistance of another person. Having to open, hold, and then close the door is cumbersome. Modern residential door-closers are available and affordable but require an electrical power source. Providing a 120-volt power loop above each doorway will allow for ease of installation of a variety of devices. Adding master bedroom and bathroom doors to this list would also be easy to do at the construction phase. In our case, this will be a costly retrofit that will include electrical, drywall, and paint even above the cost of the opening device. As for hardware, ditch the use of knobs and stay with simple lever handles, some are even listed as ADA compliant.

**Bathroom** spaces loom large in accessible design. Again, the word for the record is ‘transfer’. In the case of my father, transferring to toilet or to shower-chair requires space, a high-traction floor surface, and plenty of grab-bars. Providing a high traction floor should be compulsory in any wet location. My father’s house required removal of walls from around the master toilet room to allow a wheelchair to pull up. Proper planning should allow for a toilet room to have wheelchair access equal to that of ADA requirements. Toilet rooms are generally inaccessible. If the concept is an open bathroom, then the original concept can include an elegant approach and access to the toilet location. In all wet locations, blocking at 36” will allow for easy installation of grab bars as needed. We had to open and modify walls in our master bath retrofit but were able to find some nice grab bars that matched the hardware we selected. Another trick is to plan tile so that grout joints lay directly at 36” above the floor level. One of the more costly concerns for bathing is how to shower or provide a bath. Since my father’s disability was more severe, a walk-in bath tub was not a possibility. Coupled to the fact that my dad is a shower-taker anyway we knew that providing a relaxing and accessible environment would require a major retrofit. The 20/20 hindsight suggestion, provide a roll-in or curb-less shower in the design of your home that has a drainage area of about 5’ by 5’. While considering a full bath remodel, also provide controls for temperature as well as pressure along with a diverter to a handheld shower wand. Both controls and wand should be positioned no higher than 4’ above the floor. In our case, we also incorporated a tall floor-to-ceiling niche for supplies stored at standing and sitting heights. The idea here is enhanced independence. We decided to leave the bench seat out of the space in favor of more space to maneuver a shower-chair.

The overall result was a very clean looking space that was reminiscent of minimalism yet light and serene. The master bath was the most expensive portion of the renovation with a scope that included plumbing, tile, paint, electrical, framing, drywall and foundation removal for a roll-in shower. Yet, this bath gets the ‘oh-wow’ from those visiting the home at it has style that rivals most master bath areas. Had planning and

simple understanding of basic wheelchair access been instituted from the beginning, the conversion process would have been little more than addition of grab-bars and installation of an ADA height toilet.

**Electrically speaking**, making things happen without having to jump into a wheelchair greatly facilitates comfort. The invention of the remote control fan and lighting was a true gift to individuals who are mostly bed- and wheelchair bound. Virtually every electrical device, including receptacles, can now be controlled via remote, or even better smart phone. This means that HVAC, ceiling fans, lighting, blinds, and nearly any other item can be at the fingertips of the disabled. This empowerment essentially gives everyone a break from highly nuanced care associated with controlling every aspect of the patient's comfort. With this, there is a degree of retrofit in new homes but if planned at inception, power can be provided to these locations and proper switching can be installed to allow for this upgrade at a later date. Our only upgrade to my dad's house to this point was installation of remote fans and lighting but I can see a point at which the thermostat, shades and door controls will be incorporated to relieve the caregiver from continued adjustments. Providing power to key window locations will allow light control of the space via remote controlled power shades. We have yet to implement this in our design but I can plainly see that this would have been a keen consideration in new construction at locations such as the Master bedroom, dining and living spaces.

**Flooring** surfaces come into play for both the disabled and the caregiver. Thick carpet and multiple surfaces make movement difficult. While carpet, in itself may have some positive attributes such as minor cushion for a fall and traction, thick carpet can hinder movement of equipment and wheelchairs. This was the case at my father's house. Before move-in we altered the flooring surface from thick carpet to wood flooring with smooth transitions between different surfaces. Again, at wet locations, namely the master bath, tile with no sheen was selected for high traction attributes.

**Room size** would be another consideration. People would be amazed at how quickly space can be used in what previously seemed to be a large room. A typical hospital bed requires an additional 1-2 feet in length for all headboard, foot board and for adjustment. While you may be transitioning from a king or queen sized bed, having additional hospital equipment, chairs for visitors, and another sleeping area in the same room for the caregiver is typical. These spaces get crowded quickly. Again, the word 'transfer' comes into play. The bed also needs at least four feet of clear space on both sides, not only to have a wheelchair in place, but also to maneuver the chair with a full turn. My general rule-of-thumb; the master bedroom and any other first floor room that could double as a sleeping space should be no less than 20' by 18'.

As a side note, wheelchairs come in an extremely wide variety of sizes and shapes. Depending on the person, many are custom-made. The size can be quite large when equipped with a reclining device, leg-rests, headrest, protective armrests, and the

associated holders for oxygen and other devices. When possible, plan for larger than the minimum required opening and consider that the chair not only takes up the space that it will need space to maneuver around common furniture. The answer does not need to be additional square footage. Rather than carving a home into tiny single-use compartments, having fewer larger spaces will end up making a future accessible home more adaptable and actually feel larger.

While this is only a short list of recommended considerations, consulting an architect familiar with ADA and accessibility issues can broaden value to what is typically the most costly investment we will encounter. It can also make our most valuable asset, our lives, much more comfortable and livable, even after a life-altering event.

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As we move closer to a comfortable and controlled environment for my father, we will likely encounter minor alterations. All things considered, counter height modifications, modifications to furniture, elimination of bulky objects, and generally freeing up the space; fine adjustments have actually made the home less cluttered resulting in a more spacious appearance. It is likely that other sundry items will creep up as dad continues to live in his newly altered home. Each day is a learning experience and there are nuances for every individual. The takeaway is that each day of life should be as unencumbered as possible and just as we plan for retirement, comprehensive planning for life events that may come to pass makes perfect dollars and sense.

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<sup>i</sup> For data through 2002, the Congressional Research Service (CRS) compilation from National Center for Health Statistics (NCHS), United States Life Tables, 2002, National Vital Statistics Reports, vol. 53, no. 6, Nov. 10, 2004. For 2003, NCHS, Deaths: Final Data for 2003, National Vital Statistics Reports, vol. 54, no. 13, Apr. 19, 2006.

<sup>ii</sup> Wikipedia. [http://en.wikipedia.org/wiki/Americans\\_with\\_Disabilities\\_Act\\_of\\_1990](http://en.wikipedia.org/wiki/Americans_with_Disabilities_Act_of_1990). Retrieved May 18, 2013.