STRUCTURAL MODIFICATIONS



STRUCTURAL MODIFICATIONS AND DME FOR HOME ACCESSIBILITY

Environment structural modification ideas and suggestions vary with each individual and their environment(s). Modifications are based on the individual's functional strength, skills, mobility, age, home or work structure support system, lifestyle and funding resources. A home evaluation is recommended to provide the most appropriate information for the individual and their family to ensure safety and functional wheelchair accessibility. If an on-site structural evaluation is not possible by rehabilitation professionals, alternative means of assessing the structural environment include real-time video conferencing consultations, review of floor plans with dimensions, and video or pictures of specific structural considerations. These can include, but are not limited to doorways, entrances and exits, hallways, bathroom, bedroom and work spaces.

There is no legislation stating home modifications are medically needed or necessary. Thus, the financial burden typically falls to the individual and their family. Local foundations and organizations or fundraisers may add support for modifications needed. Federal, state and local governments may offer programs and grants to assist the private home owner and those living in a multi-dwelling building with the financial burden. Workers' Compensation insurance, Veterans Administration, Medicaid Waivers, victim's compensation funds, catastrophic accident insurance or a medical trust fund may pay for some or all home modifications. The State Division of Vocational Rehabilitation may fund a portion of needed home modification for the client with SCI who will be returning to work or school.

When considering home modifications, a rehabilitation therapist and/or assistive technology professional will generally recommend one of four design principles: Transgeneration, accessibility, adaptability or universal. The Americans with Disability Act (ADA) includes guidelines that state the with minimal specifications for wheelchair access in and around public and commercial buildings. These specifications identify specific measurements that are meant to be widely applicable for any disabled individual and therefore are not customized to the individual. For the individual

with an SCI, a broader understanding of their specific physical mobility, adaptive equipment, medical and functional status needs to be considered when structural modifications are made. Below you will see recommendations which include ideal measurements for all wheelchair users, however it is important to remember the specific clients' needs and an individual with a small or narrow wheelchair may not need the same measurements for clearance or turning as an individual who uses a bariatric power wheelchair.

Considerations for individual environmental assessments:

- A temporary set up can be recommended to provide a safe and functional space, while the loner term renovation plans are developed. This provides time to make a final decision about structural changes or change in residence.
- The functional mobility status of the person with the SCI will determine their ability to access their home environment, whether through power mobility, manual wheelchair or as an ambulator.
- A back-up generator should be provided for the person who is dependent on mechanical ventilation in addition to ensuring power to other necessary durable medical equipment.
- Is the individual dependent on caregivers to complete basic self-care skills?
- What space is needed for durable medical equipment storage, wheelchair accessibility and able body person movement while assisting?
- Will the individual return to work or school?

Finally, while this chapter addresses modifications for a primary residence, the concept of visitability may be useful for family and friends of people with disabilities. Visitability refers to making core spaces accessible to all individuals, but not necessarily having all of the modifications required by a person with a disability (AARP doc). For example, a visitable home's basic requirements include:

- A zero-step entrance
- Wide interior doors
- An accessible half bathroom on the main floor

These modifications enhance access for people with disabilities for social purposes, but do not include some of the more expensive modifications such as a roll in shower and certain kitchen modifications.

PHYSICAL ACCESS

The slope of the property, driveway and other natural or man made barriers need to be considered for possible modification to provide the person with safe and functional access to the home. For the person using a wheelchair for mobility the following are considerations to provide full access:

Appropriate parking space to accommodate the vehicle and their wheelchair for transfers, or a modified van with lift; this includes additional side space compared to standard parking space, usually marked with an accessibility sign.

Exterior doorways should be devoid of screen and storm doors. A 5'X5' clear level platform on a porch or entryway with a minimum 18" space on the latch side of the door is recommended.

Where there are steps to enter a home, the addition of a ramp or exterior lift allows for independent access. Two forms of entry / egress are suggested for safety reasons in cases such as fire, so in addition to modifying the primary entry, a secondary exit, such as a ramped deck off of a back bedroom or family room should be considered.

Ramps should meet the following ADA specifications if possible:

- For every inch of rise, a foot of ramping is required resulting in a 30' max run
- Width 36" to 48" with a non-skid surface so not slippery when wet.

- Bilateral guardrails for safety measuring 30" to 32" high with a railing grip of 1.5" wide and spaced 4" apart should be provided. A curb border measuring 4" high along the edge of the ramp and platform to prevent a wheelchair from falling off the sides is necessary.
- If the ramp changes direction, reaches 30 feet, and/or rises higher than 3 feet off the property, an interim flat landing is recommended to provide a resting spot and allow for turns.
- To provide for wheelchair maneuverability and space for the caregiver, the platform should measure 5'X5' for manual and power wheelchairs and 6'X6' for tilt-in-space and wheelchairs with ventilators.
- Overhead coverings are suggested, if possible, to protect against environmental factors. Walkway should be level, non-slip and minimum of 48" wide.

Suitcase ramps are portable to be used on multiple homes or for travel and are not permanent: and typically no more than 16 feet in length at maximum.

Portable and modular ramps should meet the same specifications and ADA guidelines.

Threshold ramps are appropriate for navigating high entryway thresholds where there may only be one small step or a high threshold to navigate.

RAMP ALTERNATIVES

Ramps require adequate space to allow for a gentle enough rise for use. Vertical platform lifts are an alternative to ramps when there is not enough space for a ramp with a safe slope, or if the slope would be excessively long and thus burdensome to individuals who use manual wheelchairs or ambulatory devices.

The following are recommendations when considering a vertical platform lift:

- Consult with a qualified lift vendor to evaluate the building structure and appropriateness of lift use.
- Standard safety and emergency features, accessible switches, fold down ramp and lift's weight capacity should be evaluated for appropriateness to the individual who will use the lift (i.e. hand function, size of wheelchair, weight of person plus wheelchairs, etc.).

PHYSICAL ACCESS AND RAMP ALTERNATIVES



Covered Access for Loading and Unloading a Car





Custom Built Ramp to Existing Home



Threshold Ramp https://expressramps.com/ez-access



Modular Ramps (Permanent or Temporary) PATHWAY® 3G Modular Access System www.discountramps.com/ez-access-modularpathway-wheelchair-ramps/p/PATHWAY



- An exterior mechanical lift may be needed due to limited space or terrain of property, limiting the ramping possibilities.
- An interior vertical lift may be considered for an individual who needs floor to floor access.

INTERNAL STAIR NEGOTIATION

While single level or ranch style homes may afford the most accessibility, multi-story homes can also be made fully accessible.

Stair Lifts

An incline platform lift that accommodates the wheelchair is a modification option for stairs. It requires expert assessment due to structural requirements.

www.accessiblemed.com/wp-content/uploads/ 2020/03/inclined-wheelchair-platform-lift-b.jpg

Stair Glides

A stair glide (seat that someone transfers onto and off of at the other end and moves up/down stairs on a rail) would be recommended only for those with strong upper body strength, trunk stability and independence with transfers. Multiple wheelchairs are needed for use at the top and bottom of the stair glide.

ELEVATORS

Elevators can also be installed in homes and are an alternative to a stair lift to move between floors though are usually a more costly option and require adequate space.

Elevators vary in cost depending on the cab size (number of people or size of the wheelchair needed to be transported), type (hydraulic, pneumatic, traction, chain-driven, cable-driven, electric rails), and number of floors needed to access. The more floors that need to be accessed generally the more expensive the elevator. More expensive elevators are also needed in order to lift the weight of a power wheelchair.

Elevators can be categorized by how they move the cab (chain, cable, hydraulic, pneumatic, traction) or by whether or not they require a shaft. Traditional elevators require built in shafts and mostly utilize a chain and drum or cable with a counter-weight system to lift the elevator. Some cable driven elevators require additional space for a mechanical room in addition to the elevator shaft and some require a pit below the elevator shaft. Due to the construction requirements, traditional shaft elevators with or without a mechanical room may be more costly to install and especially more difficult to retrofit in an existing home. Traditional elevators have the advantages of being able to lift heavier loads, access homes more than 3 stories high, and be installed in out of the way areas of the home or put into the initial design of the home.

Some smaller home elevators utilize traditional lifting systems but have eliminated the need for construction of a shaft, pit or mechanical room which allows for space saving, easier installation into an existing home, as well as faster installation.

Examples of shaftless elevators can be seen here:

https://www.easyclimber.com/home-elevator

https://www.stiltzlifts.com

Pneumatic elevators use a vacuum air technology to lift the cab. Pneumatic elevators do not require a preconstructed shaft, pit, or machine room therefore are generally easier to fit into an existing home and require less space. They are limited in the number of floors they can access and with a lower weight capacity.

https://www.vacuumelevators.com/pve52-homeelevator

AUTOMATIC DOOR OPENERS AND ACCESS

Automatic door openers can enable complete independence when entering and exiting a residence. These systems can be operated by remote control, which can be mounted on the wheelchair. Some systems allow connections into existing specialty switches or wheelchair control units. Finally, some newer universal models can be connected to phone apps. Customization is possible through a wide range of activation devices including:

Proximity Sensors - allow access without requiring hand use by activating the door when a smart tag is within a specified area of detection.

Wireless Keypad - mounted outside of the door eliminates dependence on keys by allowing entry with a code.

Electromechanical systems allow access similar to getting "buzzed in" to an apartment building.

INTERNAL STAIR NEGOTIATION





Stair Glide

AUTOMATIC DOOR OPENERS AND ACCESS



Open Sesame Door Systems







Traditional Built-in Shaft Elevator in a Home.





Pneumatic Elevators



https://www.vacuumelevators.com/ pve52-home-elevator

Biometric Fingerprint/Smart Lock Systems

For a review please see: https://www.pocket-lint.com/ smart-home/buyers-guides/154026-best-biometriclocks

Touchless systems are also becoming available.

Video Doorbell Systems

Many of these features enhance security and facilitate entry by visiting family members or care providers.

www.opensesamedoor.com/automatic-door-openerfor-home

https://lockly.com/collections/door-lock?gclid=CjwK CAiAg8OBBhA8EiwAlKw3ksH6uJyLjvJrV5JKHySguVr QXQkUOsluk5jo_8n13G9cUdiCWgsn7RoCwgEQA vD_BwE

INTERIOR DOORWAYS AND HALLWAYS

The following is recommended for maximal accessibility in doorways and hallways:

- Doorways leading off of a 36" wide hallway should also be 36" wide to allow for wheelchair turning radius through the door.
- Hallways may need to be up to 5' wide for a manual wheelchair or 6' wide for a power wheelchair to accommodate a 360 degree turn within the hallways
- Doorways need to be wide enough and clear of obstacles to allow the individual access and



Barn Style Door

maneuverability, including a width that allows for manual propulsion of wheel rims, or power box use as passing through the doorway.

- Doorways should measure a minimum of 32" to 36" wide with the door swinging in for manual and power wheelchair users. Typically a straight entry into the doorway should measure 32" wide and if you are turning into the doorway it should measure 36" wide.
- Doors should open to at least a 90 degree angle leaving the doorway opening measuring approximately 1.5" to 2" wider than the wheelchair.
- Door thresholds should be beveled and measure $\frac{1}{2}$ " interior and $\frac{3}{4}$ " exterior in height.
- Kick plates are recommended to prevent damage from the wheelchair and on the door.
- Lever handles are easier to manage then knobs both to open, and swing the door out of the way.

Simple modifications for doorways and hallways can maximize space and provide full accessibility, the following are some possible modifications:

- Pocket doors
- Barn Style Door
- French style doors to replace sliding glass doors
- Remove door, jam and molding, and replace with a curtain



Pocket Doors

 Offset hinges to replace standard door hinges which opens the door out of doorway, adding 1-2 inches to doorway width

https://www.mobility-aids.com/assets/images/ adm6402-offset-door-hinge-brass-door-w.jpg

https://secure.img1-fg.wfcdn.com/im/99290129/ resize-h800%5Ecompr-r85/3498/34985098/3.5%25 22+H+x+4.5%2522+W+Offset+Pair+Door+Hing es.jpg

- As with exterior doorways (see above), automatic door openers can be considered for interior doors to maximize independence.
- 36" to 44" from the floor increases independence for individuals with fair upper body strength and weak grip. Lever door handles can also be modified for loops or straps to increase ease of use.

BEDROOMS

A minimum room size of 10' X14' will accommodate a bed, bureau, desk and adequate room for maneuverability of all equipment and wheelchair

Some Considerations:

- Access along both sides and end of the bed are needed in order to change linens along with enough space for appropriate and safe transfer (4 feet).
- Adequate storage space for medical and urological supplies.
- Closet access with pocket or sliding doors and rungs set approximately 3' 6" to 4' from floor.
- Lower closet bars that can be accessed from wheelchair height.
- Work or desk space provided; measurements depending on how high the individual sits in their wheelchair; Average measurements are approximately 2'6" to 2'10" high and 2'deep and 3' wide.
- A clear area within the room to turn around measuring 5' X 5'.
- Mirrors should be low enough to be useful from wheelchair level.
- Lower bed level height some beds such as platform beds can be used without a box spring to

lower the height. If the individual can not transfer to a standard bed hospital beds can provide an adjustable height.

- Provide access on both sides of the bed. One side should allow 5' X 5' feet of maneuverability for the wheelchair and possible use of a lift. The other side of the bed should, at minimum, allow for an individual to be able to stand alongside of the bed to assist with self-care and position changes in bed as needed.
- Provide adequate storage space for medical and urological supplies, etc.

Considerations for People with Tetraplegia or Ventilator Dependency:

- Ample power source and outlets for durable medical equipment (DME), electronic aids for daily living (EADL), ventilator and any other electronic devices.
- Back-up generator for emergency use.

Complementary information can be found in separate chapters, Beds and Mattresses, and Transfer Devices and Lifts.

BATHROOMS

Bathroom modifications will vary by level of injury, durable medical equipment needed, available space, and funding. For individuals with good upper body strength and trunk stability a standard bathroom may be able to be modified with minimal changes such as adequate doorways to enter. For individuals with tetraplegia, more substantial modifications may need to be made in order to allow for roll-in shower and assistant access.

Important Considerations for Bathroom Accessibility Include:

- Open floor area 5' X 5' for wheelchair or shower commode chair maneuverability.
- Minimum 4 feet floor clearance in front of fixtures.
- Mirrors, cabinets and shelving mounted no greater than 40" (bottom edge) from floor.
- Appropriate grab bars mounted around toilet and shower area, depending upon hand grip available, and accessibility if stationary (swingaway bars are also available).
- Close proximity to the bedroom.

FOR SPECIFIC BATHROOM FIXTURES

Sink

For the Person with Paraplegia:

- Although people with paraplegia may be able to maneuver a wheelchair sideways to access a standard sink with no opening underneath, roll-under sinks provide improved access and maneuverability.
- A wall mounted sink or sink set into a vanity cabinet with open area underneath, and insulated exposed pipes to prevent burns; Shallow sink bowl approximately 5" deep.
- Clearance under the sink varies with the seated height of the individual's legs. An average minimum is 27" to 32" high with the sink set at 34" from the floor.
- Width of the opening under the sink should be approximately 27" to 32" wide and a minimum of 25" deep.
- Counter and cabinet space should be available adjacent to the sink for supplies.
- The faucet should be placed within reach.

For the Person with Tetraplegia:

- Clearance measurements may vary depending on seated height in wheelchair or shower commode chair.
- Lever handles or an automatic faucet should be set within reach and at a maximum distance of 1'9" form the edge of the vanity to allow for oral and facial grooming.

Toilet

- The ideal height should be based on the commode chair to be used and the individual's transfer status. A standard style and height (14-15 inches from floor to seat) toilet is recommended for use with a standard height roll-in-shower/ commode chair or a drop arm commode. High Boy, comfort height, ADA height, chair height, or long toilets or those with flared shapes are not recommended for people using commode chairs because they may not fit over.
- If the patient has adequate strength, mobility and balance to transfer to a standard toilet without the use of an over-toilet commode then an ADA

height toilet (17-19 inches from floor to seat) may be preferred.

• If transfers do not occur independently, or overtoilet modifications are needed then space on both sides of the toilet should be considered. Adequate space would be 18" from the center of the toilet bowl (or can measure 10" from the side of the toilet) to the nearest wall or cabinet. This allows clear access to complete personal care and for a commode chair to slide back over the toilet.

Showers

Showers can be modified to be roll-in, stall type, or leave existing tubs. Products including pre-fabricated collapsible silicone water dam thresholds can be installed to prevent water leakage but allow for wheelchair access. Shower stalls should be graded to allow for appropriate water drainage towards the shower drain.

Modifications should be based on the individual's balance, strength, and safe transfer status. Accommodations can be made for different showers or tubs using different showing DME that is available.

Complementary information on showering DME such as shower chairs, tub transfer benches, and shower boats can be found in the chapter on Activities of Daily Living (ADL).

In regards to creating accessible spaces for DME use the following should be considered:

- For use of a standard wheeled shower-commode chair, a space of 5' x 5' is needed for a 2 or 3-sided roll-in-shower unit.
- To accommodate a tilt-in-space rehab shower commode chair and the caregiver the area will need to be a minimum of 6' X6' space for the constructed 2 or 3-sided roll-in-shower unit with no curb.
- The floor should be tiled or have non-slip material with a slope down toward the center drain for adequate drainage and without a curb in the entryway.
- A hand held-shower allows for personal use and should include adjustable height. Models with height adjustment or multiple shower heads provide flexibility if multiple people will be using the bathroom. Adapted grip options are available.

SPECIFIC BATHROOM FIXTURES



A pre-fabricated standard sink which is wide enough and high enough to allow for manual wheelchair rollunder access.



Hand-held shower with adaptation for limited hand function



ADA height toilet turned to allow full side access for transfers including a grab bar for additional transfer assistance. This would be for an individual who is independent with transfers and does not need an overtoilet modification.





Handheld shower with adjustable height, grab bars, single button push to turn on, and set temperature control.



An open floor plan roll in shower which will accommodate a rolling shower commode chair, til-in-space shower commode chair, and shower attendant.

- A ceiling hung track shower curtain is helpful.
- Temperature controls should be used to prevent burns from insensate skin and can include anti-scald mechanisms on individual faucets, temperature controlled/locked controls, and preset on-demand shower controls.

Prefabricated shower stalls and kits are available to fit into smaller spaces or for existing tub footprints. Depending on the size and individual need they can come with built in seats and grab bars.

https://www.freedomshowers.com/Handicapped-Accessible-Showers/APF4836BF4P

https://www.barrierfree.com/product/barrier-freeshower-five-piece-54x36-diamond-tile-look-2/

https://www.homedepot.com/p/Ella-Plus-24-38-inx-38-in-x-79-in-4-piece-Shower-Kit-in-White-with-Center-Drain-3838-BF-4P-5-C-W-SP24/205481352

Prefabricated shower pans are also available to provide appropriate water drainage towards the drain while allowing for barrier free access.

https://www.tileredi.com/shower-pans-and-bases/ redi-free-barrier-free-brands

For the person with strong upper body strength, balance and trunk stability the choice to use a standard tub is an option. Guidelines state that a floor clearance of no less than 4 feet will provide wheelchair maneuverability and a safe transfer onto a padded tub bench set into the tub. The tub should not have shower doors.

Complementary information can be found in the chapter on Activities of Daily Living (ADL).

KITCHEN

Even if the individual is not the primary homemaker, they should be able to access the kitchen for meals and partake in family gatherings. For the individual with good stability and upper body strength rearranging stored items and minimal modifications may be the only set up needed.

Kitchen Considerations May Include:

• The table should have an open leg space, with a height to accommodate knee clearance when sitting in their wheelchair.

- The kitchen may need to be rearranged to move freely by providing a 5' X 5' turning radius, and incorporating 4 feet maneuverability along appliances/furniture. Provide one work area with width of about 36" and height between 30" to 34" for knee clearance and 2' depth and accessible reach of 1'9".
- Clear access under the sink by removing cabinets and insulating exposed pipes. Use of a shallow sink with lever style faucet.
- Use of cabinet shelves with pull out drawers, rotating shelves and/or a lower counter with a pull-out board; safety considerations.
- In order to see the stove, install a tilt mirror over the stove for visibility into pots and front dials on the stove to avoid reaching over burners.
- Consider installing a lower section of counter for meal prep accessibility. A stovetop can be installed on a lower counter for improved accessibility.
- Microwaves can be installed in lower cabinets for wheelchair access.
- A kitchen cart should be used for item transport to prevent burns and spills.
- For people who are able to stand, a perching stool can provide a mobile workspace and conserve energy while cooking.
- Some modern faucets allow for touch control which can be more easily used with limited upper extremity mobility to turn on and off a faucet.

Other Structural Considerations:

- Temperature regulation is important. Be sure walls are insulated, and heat and air conditioning are adequate for the individual's needs.
- Install and maintain smoke and carbon dioxide detectors throughout the house. In addition, the individual should inform the fire department and police station someone with a disability is living in the home, and the location of their room, so they can assist them first in an emergency.
- If possible, it is recommended to have two exit emergency routes.

KITCHEN



Roll Under Sinks





Lowered Height French Door Oven



Roll Under Stovetop





Touchless automatic trash cans



Roll Under Counter with Mixer Attached. The mixer is stored in the cabinet and more easily lifted into the use position with the adjusted rack.

- Hardwood, tile or linoleum floors are easier for wheelchair propulsion and easier to clean in multi-purpose areas (such as bed-bathing). Smooth flooring is also convenient when a hoyer lift is needed. If carpet is present, low pile carpet is preferred and a plastic mat, such as an office mat, can make a lift or wheelchair easier to maneuver.
- Rearranging furniture may enhance wheelchair maneuverability.
- For the individual on a ventilator and other medically necessary equipment should have a back-up generator in case of power outage.
- For the bariatric individual, the structure of the home must be able to hold the patient's weight coupled with the necessary durable medical equipment's weight.
- Wheelchair wheels can track dirt or moisture from the outside into the home. Having a textured mat inside the entrance can reduce tracking outside dirt inside the home.

An alternative consideration could be to create a fully accessible living space consisting of a bedroom, modified bathroom, and work station area through new construction or by an addition to an existing home. This type of project should not be a quick decision, and requires extensive planning and funding resources.

MODULAR, PREFABRICATED, AND "TINY" HOMES

Modifying an existing home can be costly and time consuming especially if large or multiple structural modifications need to be made or if modifications are needed quickly. Depending on the existing home, accessible modular homes, prefabricated homes, or tiny homes including "PAD"s (Personal Accessible Dwellings) are available that are wheelchair accessible and specifically designed for people with mobility impairments. Unlike structural modifications to an existing home, some prefabricated homes can be available on-site within a matter of weeks. In addition, some of the tiny homes or PADs are available to rent while home construction or other accommodations are undertaken to allow people to reside in the community. Some examples:

https://www.wheelpad.com

https://littlehouseonthetrailer.com

https://impresamodular.com/accessible-modularhomes

https://modularhomesmi.com/handicap-accessible-floor-plans

QUICK FIXES

These easy accessibility options are great for those who need temporary or low cost options.

- Provide privacy with a room divider privacy screen. Tri-fold display boards can provide privacy.
- 2. If a doorway is too narrow with the door in-place, removing the door and replacing it with a curtain hung from a tension rod can be an alternate option.
- If the wheelchair is unable to make tight turns in hallways or fit through bathroom doors, a transport chair has a smaller turning radius and narrower profile and can be pushed by a caregiver into some otherwise inaccessible areas.
- 4. Suitcase ramps can provide access over low curbs and thresholds and can even be stored in the trunk of a car.

CONCLUSION

This basic guideline can be used when addressing structural modifications for access for persons with mobility impairments. It is recommended that prior to any modification/construction a professional consultation should be pursued with qualified professional and licensed contractors and accessibility design specialists who understand functional accessibility, not just dimensional guidelines. The individual modifications should be tailored to the needs and functional mobility of the individual.

A Note About Funding and Resources for Home Modifications

Some insurance companies may cover modifications considered medically necessary, and these would need to be outlined in a letter of justification by an occupational therapist (OT). Funds for modification are also available through civic and government organizations. Many of these organizations advertise services for older adults, but they may also assist younger adults with disabilities. Local fire departments' Benevolent Associations are often willing to assist with minor remodeling projects for access. Stores such as Lowes and Home Depot may be willing to donate supplies and materials.

Use your best judgment when hiring contractors. Get references, and check the company with the Master Builders Association and the Better Business Bureau (contact information below).

Note: The following list is not meant to be inclusive or an endorsement by ASIA

References and Resources

AARP HomeFit Guide www.aarp.org/HomeFit

Adaptive Access http://www.adaptiveaccess.com

Americans with Disabilities Act https://www.ada.gov

Better Business Bureau https://www.bbb.org

The Center for Universal Design – North Carolina State University https://projects.ncsu.edu/ncsu/design/cud/index.htm

Christopher and Dana Reeve Foundation https://www.christopherreeve.org/living-withparalysis/home-travel/home-modification

Directory of Centers for Independent Living http://www.virtualcil.net/cils

Easterseals https://www.easterseals.com/explore-resources/ making-life-accessible

Master Builders Association https://www.mbaks.com

Muscular Dystrophy Association https://www.mda.org/quest/article/right-ramp-canmake-your-life-easier

Open Sesame Door Systems https://www.opensesamedoor.com

Paralyzed Veterans of America https://pva.org

Rehabilitation Engineering and Assistive Technology Society of North America (RESNA)

National Assistive Technology Technical Assistance Partnership (NATTAP) http://www.resnaprojects.org/nattap/goals/ community/HMRG.html#laws

Sisto, Sue Ann, Erica Druin, and Martha Macht Sliwinski. 2009. Spinal Cord Injuries: Management and Rehabilitation. St. Louis, Mo.; London: Mosby.

United Auto Workers National Community Outreach Program https://www.uawford.org/ nationalcommunityoutreachprogram

United Spinal Association – Spinal Cord Resource Center https://askus-resource-center.unitedspinal. org/?pg=kb.printer.friendly&id=3

United States Access Board https://www.access-board.gov

United States Department of Housing and Urban Development https://www.hud.gov/program_offices/fair_housing_ equal_opp/physical_accessibility

Universal Design Living Laboratory https://www.udll.com

University of Southern California Leonard Davis School of Gerontology Fall Prevention Center of Excellence https://homemods.org

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