LEE'S SUMMIT
MISSOURI

CODE MODIFICATION REQUEST
(PLAN REVIEW)

BUILDING/STRUCTURE NAME: JKV Courtyards - Independent Living Building

PREMISE ADDRESS: 508 NW Murray Rd

PERMIT NUMBER (if applicable):

OWNER'S NAME: John Knox Village

TO: Director of Planning & Codes Administration

In accordance with the Lee's Summit Building Code, I wish to apply for a modification to one or more provisions of the code as I feel that the spirit and intent of the Lee's Summit Building Code are observed the public health, welfare and safety are assured. The following articulates my request for your review and action. (NOTE: ATTACH ANY ADDITIONAL INFORMATION NECESSARY)

Please see the attached Unit A - Accessible Unit Plan. There is only one of these units in the building. We are proposing to modify the water closet distance requirement and the grab bar requirement. The second attachment is a white paper study that discusses proposals for additional accessibility standards based on feedback and case studies.

SUBMITTED BY:
NAME: Daron Speight ( ) OWNER (X) OWNER'S AGENT
ADDRESS: 1927 South Tryon St, Suite 207 Tel.# 704-372-7327
CITY, STATE, ZIP: Charlotte, NC 28203 SIGNATURE:

TRACY DEISTER – ASST. DIRECTOR CODES ADMINISTRATION: (X) APPROVAL ( ) DENIAL

SIGNATURE: DATE: 5-5-15

ROBERT MCKAY - DIRECTOR OF PLANNING & CODES ADMIN: (X) APPROVED ( ) DENIED

SIGNATURE: DATE: 5-5-15

COMMENTS: See attached.

A COPY MUST BE ATTACHED TO THE APPROVED PLANS ON THE JOB SITE

Planning & Codes Administration | 220 SE Green Street, Lee's Summit, MO 64063
P: 816.969.1200 | F: 816.969.1201 | cityofls.net

Joe Frogge

From: Mike Weisenborn
Sent: Wednesday, February 18, 2015 9:48 AM
To: Tracy Deister; Joe Frogge
Subject: FW: JKV_Courtyards_Code Modification Request
Attachments: Code Modification Request PLAN REVIEW.pdf; Unit A Accessible.JPG; AIA-ADA Bathroom White Paper.pdf

I will get the additional information to you as soon as I receive it. Thanks.

Yours Truly,

Mike Weisenborn | Project Manager, Development Center
220 SE Green Street | Lee's Summit, MO 64063
816.969.1240 | cityofLS.net | Mike.Weisenborn@cityofls.net
LEE'S SUMMIT MISSOURI

From: Speight, Daron [mailto:dspeight@SFCS.com]
Sent: Wednesday, February 18, 2015 9:37 AM
To: Mike Weisenborn
Cc: bhammerly (Billy Hammerly); 'Mark Shegon'; 'bsmith@greystonecommunities.com'
Subject: JKV_Courtyards_Code Modification Request

Mike,

I wanted to go ahead and send in the codes modification request for the grab bar issue at the Courtyards. I was waiting because I thought we would receive a letter from an accessibility consultant, but she has not sent us anything at this time. I have attached 2 items. The first is the plan of the unit in question and the second is a white paper that discusses proposals that are being discussed for future modifications to the accessibility standards. We feel like the fold down grab bars and the extra space around a water closet allow for more range of transfers than the conventional requirements.

Let me know what you think. As soon as I hear something back on these issues, I will go ahead and re-submit the other couple items that we have that are outstanding.

Thanks,

Daron Speight, AIA
Project Architect

SFCS Inc.
1927 South Tryon Street, Suite 207
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Website: www.sfcs.com

THE AMERICAN INSTITUTE
OF ARCHITECTS
Design for Aging Knowledge Community
WHITE PAPER

Proposal for additions to accessibility Standards for Nursing Home & Assisted Living Residents in Toileting and Bathing

A Rothschild Regulatory Task Force
Sponsored by the Hulda B. & Maurice L. Rothschild Foundation

The Hulda B. & Maurice L. Rothschild FOUNDATION

Task Force Committee

Craig Berger, SEGD
Margaret Calkins, IDEAS Institute
Vincent G. Carter, Department of Homeland Security
Quinn deMenna, Alberto, deMenna, McGarrigle & Associates, Architects
Ingrid Fraley, Design Services Inc.
Dennis Hancher, Department of Veterans Affairs Accessibility Program
Robert Dale Lynch, Lynch and Associates, Architects
Robert N. Mayer, Hulda B. & Maurice L. Rothschild Foundation
Eric S. McRoberts, Reese, Lower, Patrick & Scott, Ltd., Architects
Tracy Morgan, MSc PT
Jon A. Sanford, GA Tech

INTRODUCTION

This project has been initiated by the Hulda B. & Maurice L. Rothschild Foundation. The Rothschild Foundation is the only national philanthropy exclusively focused on improving the quality of life for elders in nursing homes throughout the United States. One of its key strategies is to work together with significant stakeholders in order to modify existing regulations and codes, such that they better support new models of aging in long term care. Currently, the Foundation is supporting national task forces working on regulatory changes to the Life Safety Code, Guidelines for the Design and Construction of Healthcare Facilities, the International Building Code, and lighting guidelines. Progressive changes supported by Foundation task forces have already been approved and implemented for the current Life Safety Code and Dining Practice Standards,. At the specific request of the regulatory community, the Foundation has built a free website, NHRegsPlus, which provides a cross-indexed compendium of all state nursing home regulations.

Another Foundation supported Task Force is working on a supplement to the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADAAG). Commencing in early 2009, the Foundation identified a need based upon feedback from both providers and architects to review the ADAAG and its implications for long term care. This focus was quickly expanded to include American National Standard ICC/ANSI. Because of its prior interest in this field and substantive expertise, it clearly made sense for the Foundation to partner with the AIA Design for Aging Knowledge Community. They have generously agreed to coordinate and to staff this project, with support from the Foundation. In addition, the Foundation has supported important research at the Georgia Institute of Technology to provide empirical support for the Task Force's recommendations.

THE ADA TASK FORCE

This Task Force is comprised of a small group of individuals who are committed to providing quality environments for all individuals, but especially older adults. Representatives include designers, researchers, providers and others who work collaboratively with each other and with other organizations with the goal of ensuring that the codes which govern the design of our environments provide for both the safety and the quality of life of all users. The activities of this Task Force are generously supported by the Hulda B and Maurice L. Rothschild Foundation, the only foundation dedicated to improving the quality of nursing home environments. This Task Force is but one of a number of activities supported by the Foundation designed to support the creation of environments that encourage continued development, active engagement, and meaningful relationships for nursing home and assisted living residents within a safe and supportive setting.

ORGANIZATIONS SUPPORTING THIS EFFORT

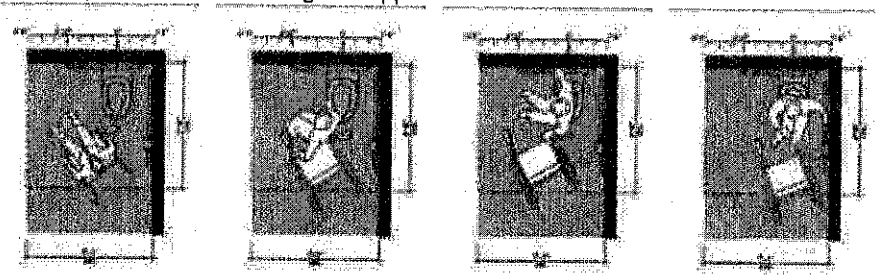
- ✓ **American Institute of Architects**
- ✓ **American Occupational Therapy Association**
- ✓ **American Society on Aging**
- ✓ **ASID (American Society of Interior Designers)**
- ✓ **BIAA (Brain Injury Association of America)**
- ✓ **Center for Health Design**
- ✓ **Erickson School at UMBC Leading Age**
- ✓ **IDEAS Institute**
- ✓ **NCAL (National Center for Assisted Living)**
- ✓ **Pioneer Network**
- ✓ **Rothschild Foundation**
- ✓ **SAGE (Society for the Advancement of Gerontological Environments)**
- ✓ **The Green House Project**
- ✓ **AHCA (American Health Care Association)**
- ✓ **Action Pact**

PURPOSE

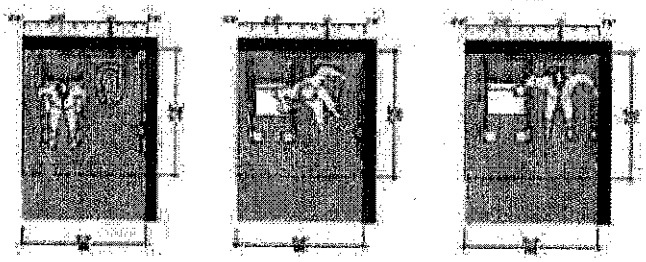
Since the Americans with Disabilities Act Accessibility Guidelines (ADA) were initially issued in 1991, millions of Americans have benefited from changes to the built environment that provides greater opportunity for full participation in society and an enhanced quality of life. Like most other accessibility codes, standards, and guidelines, they are intended to promote independence, generally based upon the stature, strength, and abilities of younger adults with a single disability, most of whom transfer directly from wheelchair to toilet. In fact, much of the initial research utilized in the development of the guidelines was based upon the physical challenges of returning veterans from the Viet Nam war. These standards were developed around the capabilities of adults who;

- have upper body strength
- can make sliding transfers
- have full cognition
- transfer independently

ADA Independent Transfer Diagonal Approach



ADA Independent Transfer Side Approach



In the time since the development of these early standards, the demographics of the population of people with disabilities have changed dramatically. People are growing older and a larger number of individuals are living longer with disabilities (Bureau of the Census, 1992; Chirikos, 1986; Colvez & Blanchet, 1981, Jones & Sanford, 1996; Kunkel & Applebaum, 1992; LaPlante, Hendershot, & Moss; 1992; Zola, 1993). Also, a greater number of these older adults now are more frail and require assistance from caregivers. As a result, individuals' functional abilities may not be as well served by existing design guidelines as was originally intended.

Maximizing functional independence with safety is a key goal of both the ADA and ANSI. Yet, many older adults, and frail elders residing in Nursing Home and Assisted Living communities have different physical abilities than the general population of adults with disabilities for whom the accessibility standards are primarily intended. This suggests that alternative guidelines and standards based on the needs and capabilities of elders should be established for buildings used primarily by older people.

The purpose of this white paper is to provide an evidence base and recommendations for a senior accessibility standard as a supplement to the Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADA) and American National Standard ICC/ANSI A117.1-2003 (ANSI) that will support the unique needs of older adults and their care providers. The intent of the proposed recommendations are to extend similar consideration to older adults as a subpopulation of people with disabilities with different abilities than the general population of people with disabilities in the same way that the Guidelines / Standards have already acknowledged those differences for children with disabilities. As such, the recommendations do not seek to change the existing Guidelines and Standards, but rather to expand the range of explicitly allowed exceptions to better accommodate the needs of older adults and their caregivers in facilities specifically used by them. The decision to use an exception would be optional but would likely be

determined where best practices or building codes call for design based on elder conditions in the Nursing Home or Assisted Living facility.

Goals of the recommendations in this white paper are to:

1. Optimize functional abilities of this population
2. Reduce Resident falls
3. Improve caregiver safety (or decreasing staff injuries)

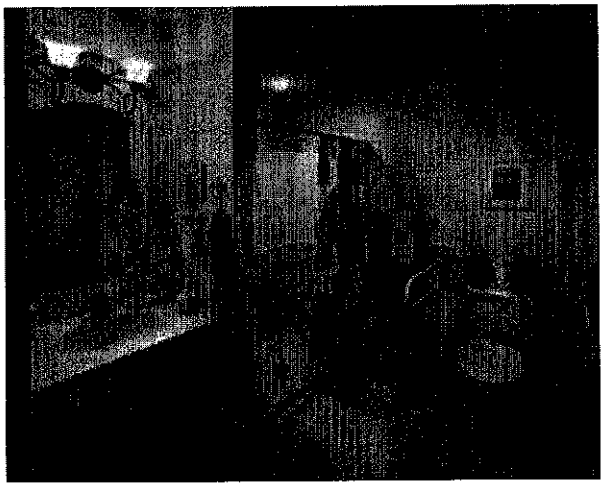
Specifically, this White Paper:

1. Describes differences in functional abilities of frail older adults in Assisted Living and Nursing Homes with ambulatory needs that necessitate an addendum to the ADA and ANSI A117.1
2. Summarizes the evidence base for changes to ADA and ANSI A117.1 to define what we know and what we don't know
3. Identifies specific requirements in both the ADA and ANSI A117.1 related to toileting and bathing that are and are not supportive of older adults, specifically in Nursing Homes and Assisted Living communities
4. Recommends additions and modifications to the guidelines/standards based on what we know from existing data that are intended to broaden the range of accessible designs for Nursing Home and Assisted Living communities
5. Recommends further research where sufficient evidence does not exist.

The recommendations provided are based on how frail elderly individuals transfer to the toilet with and without assistance, and how space for staff and equipment must be accommodated. The bathing/showering area, proposed changes would enable supportive design options in a cost-effective way, so that more buildings could be constructed with a shower in the resident' room bathroom, which supports person-centered care that is being mandated by the Centers for Medicare and Medicaid Services [CMS]. Further, the proposed changes are consistent with the intent of the draft AIA Guidelines (2001) that were approved in a final committee vote, which in a 2002 report stated:

> *"It is well recognized, that the users of hospitals and health care facilities often have very different accessibility needs from the typical adult individual with disabilities addressed by the model standards and guidelines... Hospital patients, and especially nursing facility residents, due to their stature, reach, and strength characteristics, typically require the assistance of caregivers during transfer maneuvers. Many prescriptive requirements of model accessibility standards place both older persons and caregivers at greater risk of injury than do facilities that would be considered noncompliant. Flexibility may be permitted for the use of assistive configurations that provide considerations for transfer assistance."*

Although current Guidelines/Standards do not necessarily prevent the use of designs, products, or technologies as alternatives to those prescribed in the standard, approvals for equivalency of alternative designs are differentially applied across the US. The final determination of equivalency is left up to the authority enforcing the guidelines/standards. Giving interpretation to a variety of authorities who are often unable to adequately evaluate the equivalency of a proposed design because they have little or no expertise on accessibility issues or of the needs of the sub-population being addressed, has resulted in inconsistency in acceptance. This process of requesting acceptance of equivalence is costly and inefficient for providers, and results in unequal application of the Standards/Guidelines. As a result, the adoption of new standards for nursing home and assistive living communities, similar to those that allow alternate designs for children's facilities, will provide greater options and add "flexibility" to the existing accessibility standards. Importantly, this will enable jurisdictional authorities to make more informed decisions about accessible design for frail elders in assisted living and nursing home communities.



Chapter 1 - Resident Functioning in Nursing Homes and Assisted Living

Although the Americans with Disabilities Act Accessibility Guidelines (ADAAG) were initially issued in 1991, many of the guidelines were based on design standards for young adults with disabilities that were developed almost two decades earlier. In the time since the development of these early standards, the demographics of the population of people with disabilities have changed dramatically. People are growing older and a larger number of individuals are living longer with disabilities (Bureau of the Census, 1992; Chirikos, 1986; Colvez & Blanchet, 1981, Jones & Sanford, 1996; Kunkel & Applebaum, 1992; LaPlante, Hendershot, & Moss; 1992; Zola, 1993). As a result, existing design guidelines may not compensate adequately for the range of co-morbidities and secondary conditions that are common among elders (Czaja, 1984; Faletti, 1984; Sanford, Echt, & Malassigné, 1999; and Steinfeld & Shea, 1993), particularly those living in nursing homes and assisted living communities. In fact, research has demonstrated that adhering to accessibility Guidelines and Standards may do more to promote excess disability among older people than to ameliorate it (Sanford, Echt & Malassigné, 1999; Sanford & Megrew, 1995).

Defining the Nursing Home and Assisted Living Sub Population

This white paper focuses primarily on nursing home and assisted living settings that, to a significant degree, serve a population that is among the oldest and frailest of our total population. Of the nearly 1.5 million nursing home residents, 88.3% were aged 65 years and older and 45.2% were aged 85 years and older (National Nursing Home Survey). The average age in assisted living communities is 86.9 years (AHCANCAL website). Further, because age is the single most important predictor of disability, it is not surprising that the vast majority of residents in these settings experience significant functional limitations. Only 1.6% of all nursing home residents received no assistance in any activity of daily living (ADL) (i.e., bathing, dressing, toileting, transferring, or eating), whereas 51.1% received assistance in all five ADLs. More than one-half of all residents were either totally dependent or required extensive assistance in bathing, dressing, toileting, and transferring.

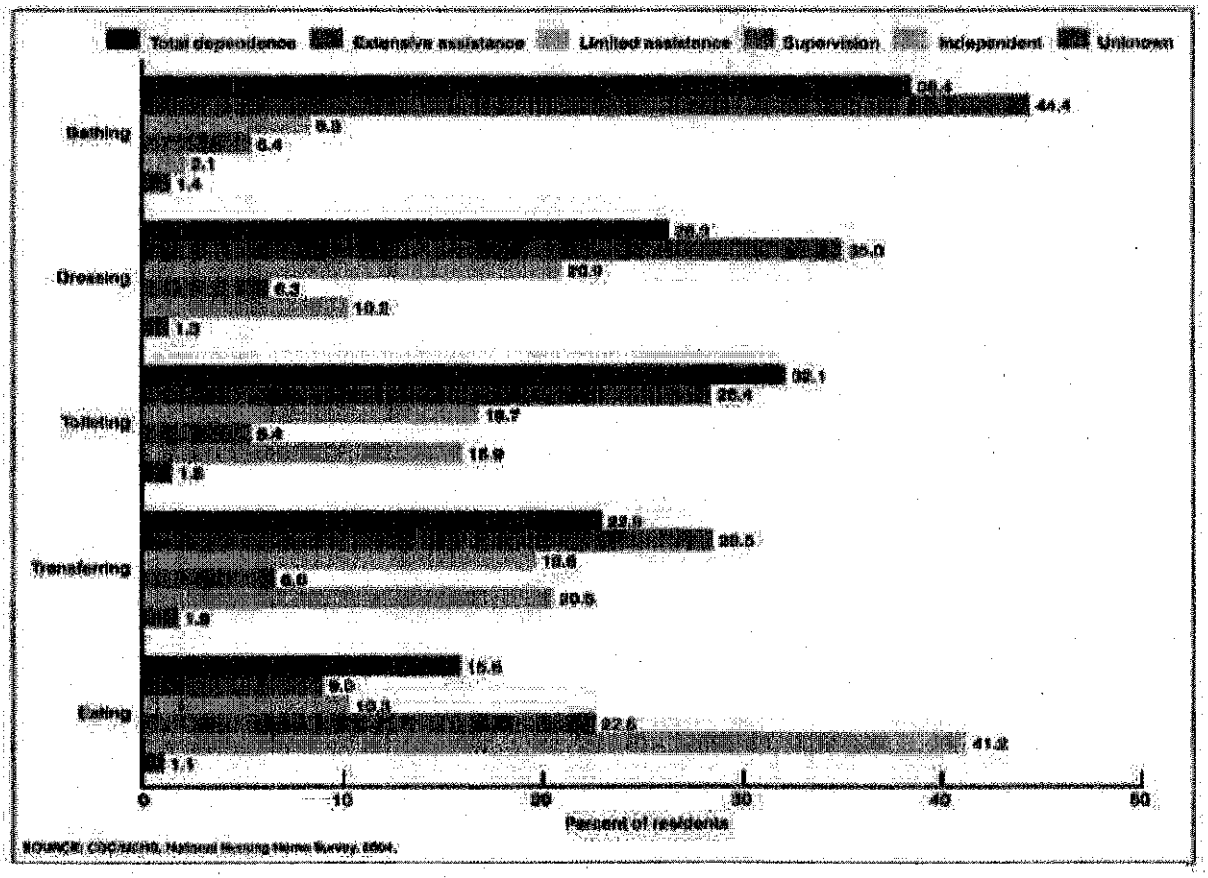


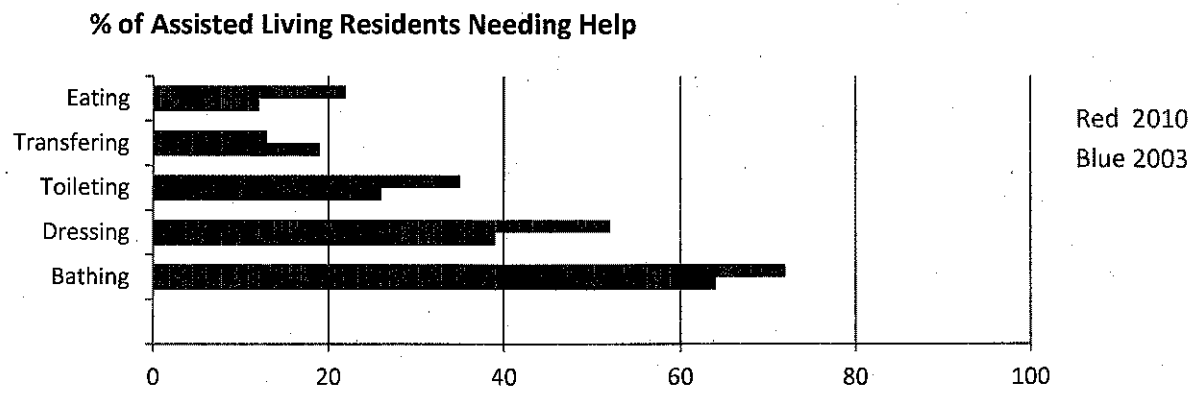
FIGURE 1 PERCENT DISTRIBUTION OF NURSING HOME RESIDENTS, ACCORDING TO TYPE OF ASSISTANCE REQUIRED WITH ACTIVITIES OF DAILY LIVING: UNITED STATES, 2004

According to The National Nursing Home Survey: 2004 Overview, Vital and Health Statistics (Jones, L. Dwyer, A. Bercovitz, G. Strahan) about 44.2% of residents were continent of bowel, and 32.5% were bowel-incontinent. About 33.4% of residents were continent of bladder, and a similar proportion (34.4%) were bladder-incontinent.

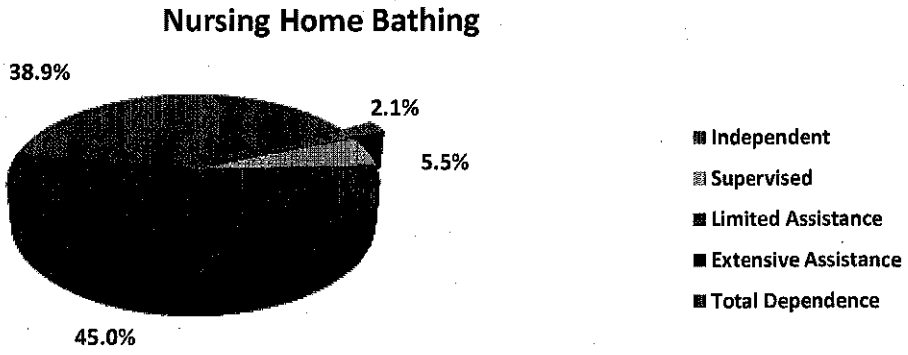
According to Medicare data (www.gov, 2011) which reports on the MDS Active Resident Information during the third quarter, 2010 only 22% of nursing home residents could transfer independently and less than 20% were able to use the toilet independently.

	Independent	Supervision	Limited Assistance	Extensive Assistance	Total Dependence
Transfer	15%	7%	16%	40%	21%
Toilet use	11%	6%	14%	43%	27%
	none	set-up	1-person assist	2-person assist	
ADL support for toileting	10%	5%	59%	26%	

The statistics suggest only slightly better functioning among residents of assisted living communities, although the trend toward increasing dependency is similar. According to Hawes, Phillips, Rose, Holan & Sherman (2003), 26% needed assistance with toileting, and 19% required assistance with transferring. Data from the 2012 National Center for Health Statistics ***Residential Care Survey*** indicate that seven years later 35% need assistance with toileting (NCHS 2010). The chart below illustrates the changes in the various ADLs and the percentage of residents needing help with them.



Bathing using a tub or shower independently is one of the most personal and complex of the activities of daily living requiring significant cognitive and physical abilities, including dexterity, flexibility, balance, strength, and coordination. (Naik AD, et al.) The National Center for Assisted Living (NCAL), in their Assisted Living Resident Profile, reports that 72% of residents in assisted living facilities require at least some help with bathing tasks, while 30% are dependent upon caregivers for bathing (National Center for Assisted Living, 2001a). The National Nursing Home Survey 2004 (See below) found that only 2.1% of nursing home residents are bathing independently.



Conversely 97.8 % of nursing home residents receive some level of assistance from a caregiver, which means that there are at least two people (resident and caregiver) in the resident bathroom. When we look at the percentage of residents that are not independent or need only supervision in bathing we find that 92.5% of the bathing in nursing homes are provided with limited to full assistance. Thus, to provide assistance and unobstructed reach to all sides of the resident bathing shower needs to be larger size than the 36 inches by 36 inches transfer shower specified in the accessibility guidelines.

Bathing, especially in unfamiliar-looking centralized bathing or showering rooms has been reported as one of the most difficult activities of daily living and often results in unwanted behaviors. Older adults resist assisted bathing for a number of reasons: it's often uncomfortable to be in a cold room while being sprayed with hot water, it's embarrassing, or it represents a loss of autonomy [Barrick, Rader, Hoeffer, Sloane 2008; Hoeffer et al.]. There is anxiety and apprehension for older people because of such factors as fear of falling, being transported to a noisy area, being in an unfamiliar place and being naked in front of strangers [Barrick, Rader, Hoeffer, Sloane 2008; Burgener, S. C., M. Jirovec, et al. (1992).]. Culture change in the nursing care industry is suggesting that a resident centered approach would provide the opportunity to bath in the residents own private bathroom rather than a central bathing room [Brawley, 2002; Calkins, 2007;, which will impact the size and space requirements in resident room bathrooms.

EFFECTS OF AGING ON ABILITIES AND FUNCTION OF NURSING HOME AND ASSISTED LIVING RESIDENTS

The statistics presented above reflect the percentages of residents at one given point in time who need different levels of assistance. The table below takes a longer-term look at need for assistance with toileting in nursing home residents. It shows the assistance needs of nursing homes residents of the past 10 years (4th quarter each year). There is a clear trend toward greater assistance. Note the increase in Extensive Assistance (25.7 to 43.4), but decrease in Total Dependence (34.8 to 26.2), meaning staff are helping a higher percentage of residents to use the bathroom.

	G1iA					G1iB	
	Independent	Supervision	Limited Assistance	Extensive Assistance	Total Dependence	1-person assist	2-person assist
2002	16.8	6.0	16.0	25.7	34.8	63.1	14.8
2003	16.4	5.8	15.8	27.3	34.1	63.3	15.6
2004	15.8	5.8	15.5	29.5	33.0	62.9	16.7
2005	15.3	5.8	15.4	31.5	31.7	62.8	17.6
2006	14.3	5.6	14.9	34.2	30.7	62.0	19.4
2007	13.6	5.6	14.6	36.4	29.6	61.4	21.0
2008	12.9	5.5	14.1	38.7	28.6	60.6	22.7
2009	11.9	5.5	13.7	41.3	27.4	59.5	24.8
2010	11.2	5.5	13.5	43.4	26.2	59.0	26.0

This trend toward greater assistance and the unique needs of this population can be better understood by briefly reviewing the aging process and its effect on function. As we age, there is a generalized decline in strength, joint range of motion, slowing of the motor system and cognition and changes in vision. These changes also greatly contribute to reduced balance and stability. This functional decline is accentuated by the multiple co-morbidities associated with this population. Neurological events such as stroke, orthopedic injuries such as hip fractures, preexisting back and shoulder trauma, arthritis, dementia processes, multisystem failure impacting physical capacity and balance or combinations therein all impact the functional mobility required to carry out activities of daily living and contribute to the accelerated functional decline seen in this population. Sanford et al. (1999) found that in a large survey sample of people with

disabilities, more than 80% of respondents identified the age related conditions of arthritis, poor balance, and hemiplegia.

TOILET TRANSFERS AMONG NURSING HOME AND ASSISTED LIVING RESIDENTS

In the context of toileting, the pronounced effect of aging in combination with multiple co-morbidities seen in the residential population can affect a person's ability to independently and safely complete the following toileting components:

1. Sit and stand from a wheelchair or toilet: reduced ability to generate the strength, coordination and maintain balance
2. Provide stability while pivoting or stepping around to and from the toilet: impaired coordination and balance during the turning action of a transfer
3. Provide support while standing: reduced balance during personal care and (un)dressing self or with caregiver assistance.

The fundamental difference between frail elders in nursing homes and assisted living communities who use wheelchairs and the typical wheelchair-dependent person living in the community is the method they use in making a transfer from a wheelchair to the toilet. Frail elders tend to have less upper body strength, range of motion and overall functioning, which restricts their ability to perform sliding transfers directly from wheelchair to toilet using side and back wall mounted grab bars. However, they do have relatively higher **levels of lower body function**, which enables them to bear weight and perform sit-to-stand transfers. Many individuals who use a wheelchair for basic mobility can perform a sit-to-stand transfer, as evidenced by the recent statistics from the National Center for Health Statistics 2012 Residential Care Survey (NCHS 2010). Twenty-two percent of assisted living residents use a wheelchair, but only 13% require assistance with transferring. In the nursing home population, the frailty is much greater, with 86% requiring assistance with transferring.

It is understandable that these functional changes have led to an increase in the number of people requiring a two-person assist (from 14.8% in 2002 to 26% in 2010). In the table above, (3rd Quarter MDS Active Resident Information Report, www.Medicare.gov) overall, roughly 75% of residents require a one or two-person assist. Thus an increasing proportion of nursing home residents need more and more assistance. This fact alone would argue for the need for more bathrooms in senior residential environments to be designed to support one and two-person assists. However, it is important to remember that each individual's abilities constantly change, typically toward greater dependency. So a person who is independent in toileting at one point in time may need a one-person assist at a later point in time (be it a week, or a month, or a year), and eventually need a two-person-assist. Thus, unless all bathrooms are designed to support assistance from staff, an individual resident might be forced to relocate simply because of a change in ability to transfer to the toilet.

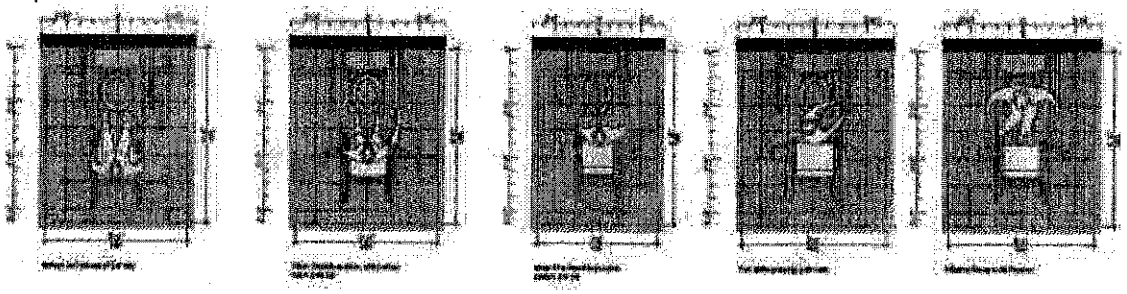
The Interpretive Guidelines of the State Operations Manual Appendix PP - Guidance to Surveyors for Long Term Care Facilities clearly state "The facility should be sensitive to the trauma a move or change of roommate causes some residents, and should attempt to be as accommodating as possible." (Interpretive Guidelines §483.15(e)(2)). While not all moves can be avoided, a poorly designed bathroom with limited purpose should not be the cause for such a disruption in one's life. Furthermore, a move to another bathroom may not be feasible when a more appropriate one is not available.

While similar detailed statistics are not available for assisted living residents, it is clear that the same trajectory of needing more assistance over time is the same. In addition to providing space for caregiver assistance to meet these anticipated needs over time, having effective physical supports in place also provides the needed assistance to maintain independent toileting function longer for assisted living residents and in fact prevents excess disability and resultant caregiver assistance in this population by optimizing the functional abilities they do have (Alexander et al., 1991; Maben, 2003; Sanford et al., 1995; Seton & Bridge, 2006). Need for a better designed bathroom to accommodate assistance should not be the factors that forces a relocation to a different apartment, or a nursing home.

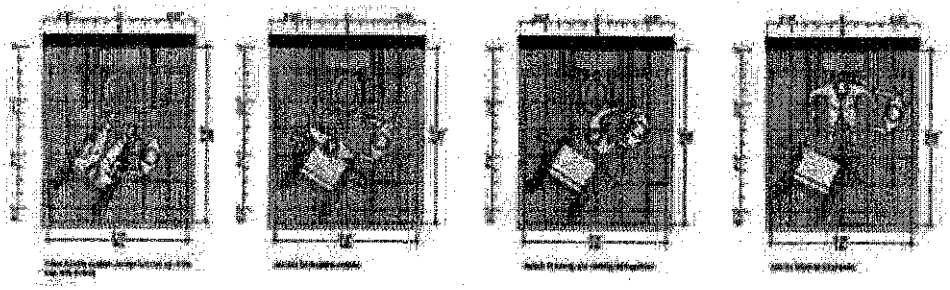
How Older Adults Transfer to a toilet

Space is needed on both sides of the toilet to accommodate the range of transfer techniques including the front approach normally used in independent transfers and the need for space on both sides of the toilet for one and two person assisted transfers as well as when using a lifting device.

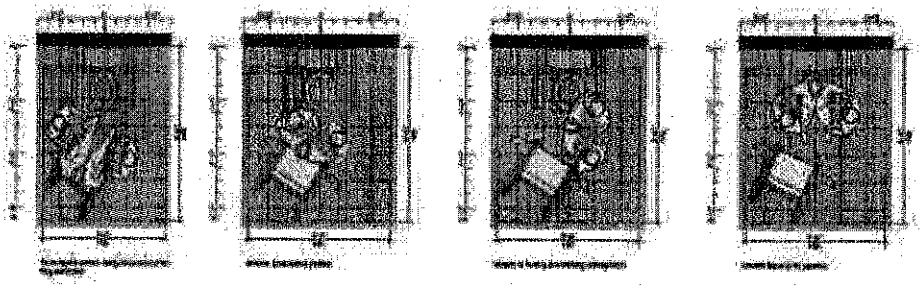
Independent Transfer



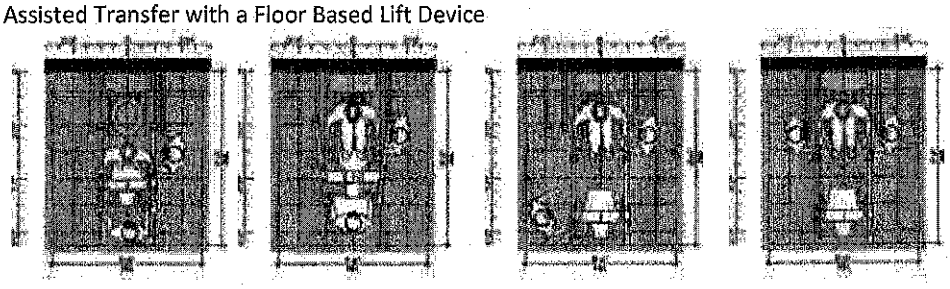
One Person Assisted Transfer



Two Person Assisted Transfer

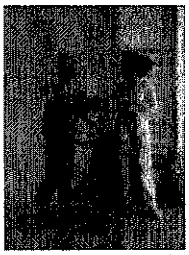


Assisted Transfer with a Floor Based Lift Device

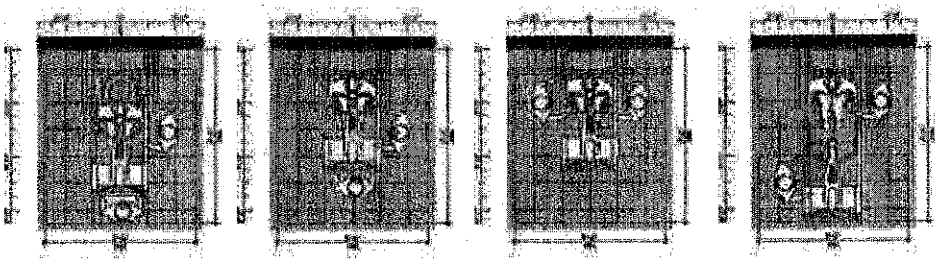


- *Sit to Stand (STS) lifts are for residents who can provide some assistance in transferring and ambulating. They are used for transfers from seated positions to seated positions (e.g., bed to wheel/chair or commode) and for assistance in dressing, peri-care, and toileting.*

  Average Sit to Stand Lift = 27" wide x 43" long (~8 sf)
  (Expanded base width = ~ 50")



Assisted Transfer with a Floor Based Sling Device



- *Floor-based Sling Lifts (FBSL) provide total support and assistance for dependent and extensive assistance residents.*

  Average Floor-based Sling Lift = 27" wide x 54" long (~10 sf)
  (Expanded base width = ~ 60")

How Older Adults Bathe

There is no industry standard protocol for showering or bathing residents. The procedure for showering and bathing varies with each nursing home and varies with each resident based on his or her physical acuity. Residents require different means and degrees of assistance based on three resident physical acuity categories:

- Non weight bearing
- Weight bearing dependent
- Independent

With end stage non-weight-bearing residents bathing may entail bed baths that use rinse less cleansing products. There are different options for weight-bearing-capable residents than there are for residents who are limited to a supine position. Showering a resident who is limited to a supine position may utilize a shower trolley with a shower room that is large enough to navigate for both resident and assistant. Another preference may be to use a bath tub that is long enough to bathe an inclined person.

However tub bathing residents has its own considerations that affect resident comfort and safety such as;

- The trauma of lifting a naked, confused resident into a tub
- The filling time of tubs while the resident is seated in the tub
- Incontinence & Disinfecting of tubs between residents
- Added time for bathing versus showering
- Extreme weight & size of resident

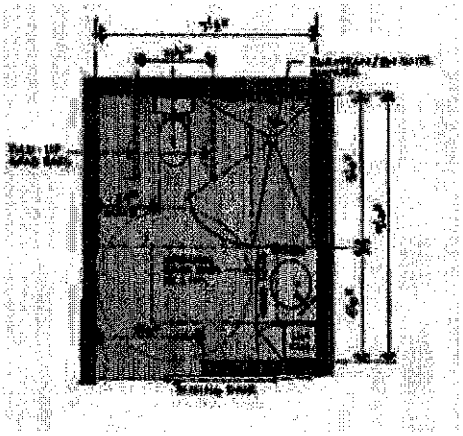
The Culture Change movement is promoting the philosophy of resident focused care where resident's dignity and choice are at the forefront. In the past, the vast majority of homes used central bathing rooms (requiring transport to the central bathing room). For resident dignity the preference would be to transport the resident with clothes on to the shower room, but this was often not the case. Residents might be undressed in their room, placed on a shower chair, draped with a sheet, and wheeled down the hallway to the central bathroom room, feeling "exposed" all the way. It is also the case that residents often void during bathing, which leads to greater incidence of cross-infection and increased time to clean and disinfect bathing rooms between residents. Increasingly, we are seeing resident bathrooms with showers so that there is not the need to transport the resident through the home. Besides being a more private and dignified process, this has the added benefit of limiting exposure to other residents waste. Finally, when an individual has soiled him/herself; the availability of the shower is an aid to full cleansing, skin care and comfort.

The VA Nursing Home Guideline 2006 states that individual bathrooms including a functionally accessible shower for each person are preferred based on best practices in continence care and hygiene as well as to minimize issues in roommate matching. The VA Guidelines further recommend that the resident should be able to receive an assisted shower in his/her individual bathroom. Due to issues of balancing and pivoting, the individual should be able to receive this shower from a shower chair rather than a bench. Use of shower chairs is the preferred method of showering for majority of nursing home residents to allow repositioning and to increase the safety of both the resident and the assistant. Movable shower chairs include armrests on either side rather than a on a fixed bench which limits staff access for assistance.

Using a shower chair and rolling into the shower is considered a safer method than transferring to a fixed shower seat within the wet area of the shower.

BEST PRACTICES FOR SHOWERING

- The steps for showering begin with transferring the resident to a shower chair. Depending on the size of the bath/shower room, the transfer may happen in the resident's bedroom.
- A shower chair will allow the resident to be stable while the care provider uses a hand-held shower on the entire body of the resident.
- Controls should be located to minimize reaching across the resident or shower
- Depending on the residents ability to move and support themselves in a standing position the resident may stand for a short time to enable the care giver to assist with perineal care. Perineal care is the washing of the genital and rectal areas of the body. Residents capable of weight bearing and who can stand for perineal care will need a handrail to grip while standing. Five feet of handrail along the side wall of the shower is more than adequate for this purpose.
- The floor design and depth are sized and shaped for safer "foot work" area of staff or residents. That is, staff assistant stands in a safe handling position on a dry floor; the resident is showered in the cavity of the area while seated in a "position able" shower chair with arm rests rather than the ADAAG shower, predicated on the use of an armless bench. After showering, the resident can be initially dried, particularly on the limbs and back, and prepared for a safer transfer on dry floor.
- The entry and drain of the shower are designed to direct water flow to the back of the shower, away from the entry
- The shower configuration is as large as needed, but not larger than necessary; space and cost limitations are critical because of the repetitive nature of resident bathrooms. Here is where it is critical that efficiency of overlapping turning radiuses, fixture clearances.



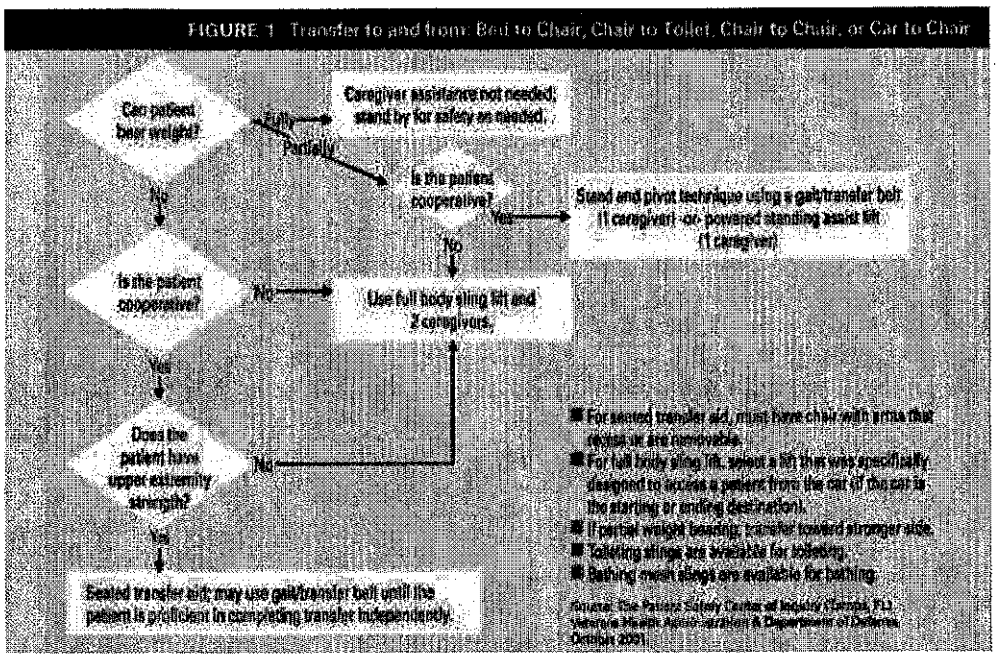
STAFF SAFETY: ASSISTANCE IN TRANSFERRING AND INDUSTRY'S ZERO LIFT TRENDS

Providing care to nursing home residents is physically demanding work. Nursing home residents often require assistance to walk, bathe, or perform other normal daily activities. In many cases residents are totally dependent upon caregivers for mobility. Manual lifting and other tasks involving the repositioning of residents are associated with an increased risk of pain and injury to caregivers, particularly to the back. These tasks can entail high physical demands due to the large amount of weight involved, awkward postures that may result from leaning over an object or working in a confined area such as a bathroom, shifting of weight that may occur if a resident loses balance or strength while moving, and many other factors. Some of the risk factors that workers in nursing homes face include:

- Force - the amount of physical effort required to perform a task (such as heavy lifting) or to maintain control of equipment or tools;
- Repetition - performing the same motion or series of motions continually or frequently; and
- Awkward postures - assuming positions that place stress on the body, such as reaching above shoulder height, kneeling, squatting, leaning over a bed, or twisting the torso while lifting.

Nursing Homes are ranked fifth among all industries for low back injuries for staff. These injuries rose 55% in the last decade. Some of the reasons for the increase in injuries which the nursing home sector is seeing are because there are more acute residents who require more assistance. Frequent manual lifting of residents is the primary risk of injury. Secondarily catching a falling load during resident transfers is reported to be the second greatest cause of injuries in Nursing Homes in study completed on the ergonomic risk factors of caregivers in the nursing home settings (Village, 2005).

Occupational Safety and Health Administration (OSHA), sets and enforces protective workplace safety and health standards. OSHA recommends that manual lifting of residents be minimized in all cases and eliminated when feasible. This recommendation resulted from rampant cases of lifting injuries reported by employees of nursing homes who may be asked to lift residents who weigh more than the personnel attempting to do the lifting. OSHA further recommends that employers develop a process for systematically addressing ergonomics issues in their facilities, and incorporate this process into an overall program to recognize and prevent occupational safety and health hazards. OSHA recommends that nursing home managers implement solutions to tackle such problems. These solutions are geared towards the elimination of hazards in the workplace and improving the overall condition of the workplace.



OSHA provides this guideline with solutions for lifting based on resident characteristics such as weight bearing, cooperation and strength but does not give environmental guidelines as to the space required to safely implement the recommended lifting solution and particularly when a lifting device is needed.

Resident Handling Per Classification

- Non-weight bearing: Use Mechanical Device
- Weight bearing dependant: Use Two-Person Walking Belt with Pulling Technique
- Independent: Resident Moves on Their Own

Despite OSHA regulations to minimize manual lifting, one study (Evanoff et al. 2003) found that mechanical hoists were used for only 2% of patient transfers. Reasons found for not using hoists were:

- Not enough room to get resident, 1 or 2 caregivers and lifting device in the bath room and into the correct position.
- Hoist not available
- Takes too much time
- Lack of staffing
- The physical effort required to use hoist

Falls Risk in the Bathroom Environment of Assistive Living and Nursing Homes

The Center for Disease Control finds that, each year, an average nursing home with 100 beds reports 100 to 200 falls (Rubenstein et al, 1997). About 1,800 older adults living in nursing homes die each year from fall-related injuries. Those who experience non-fatal falls can suffer injuries, have difficulty getting around and have a reduced quality of life (Rubenstein, Josephson & Robbins 2004). There is evidence that a majority of falls occur in resident bedrooms and bathrooms (Betrabet Gulwadi & Calkins, 2007; Nyberg, 1995) While the majority of falls are unwitnessed (over 60%), Nyberg found that of falls that occurred while changing position, 5% occurred when the patient was being assisted by staff. Studies in hospitals have found that 50% of falls are elimination related (i.e. related to getting to and using the bathroom) (Hitcho et al., 2004).

A review of the non-research-based literature finds increasing support for bathroom designs that exceed the ADA guidelines. Alden (2004) addresses eight aspects of bathroom design, including doors, toilet, grab bars, lavatories, showers, storage, environmental comfort and color, and provides recommendations that "go beyond the requirements suggested by the Americans with Disabilities Act." For example, locating the center line of the toilet 36" from the wall, providing drop down grab bars, and "whole room" showers are all viewed as positive design features by designers and long term care staff . Similar recommendations are made by Brawley (2006), Maben (2003) and Calkins (2002). Noreika, Kujooth and Torgrude (2002) report on a small-scale study in a long term care facility that compared a bathroom design that included fold-up grab bars and a semi-enclosed shower against a bathroom with ADA-style grab bars and no shower. Only two of 15 staff who participated indicated that the new bathrooms were not "OK for toileting residents" or not "well equipped for managing incontinence". Unfortunately, they did not ask about specific features of the new bathrooms, such as grab bar design and location.

PRACTICAL APPLICATION OF A UNIVERSAL DESIGN BATHROOMS VERSES SPECIALIZED ACCESSIBLE DESIGN BATHROOMS

ANSI A117.1 has served as the technical basis for most of the accessibility standards subsequently adopted by Federal and State governments. However ANSI does not determine where accessibility standards need to be applied. State and Federal governments determine the "scoping" or where and how many areas need to meet accessibility requirements.

Scoping requirements are specifications as to how many, and under what circumstances, accessibility features must be incorporated into the design of facilities. Scoping requirements are established by the Uniform building code adopted by each state where the facility is to be constructed. Each state determines through its state Uniform Construction Code the specifics of quantity of dwelling units or resident bedrooms that need to be Accessible. For example most states require that at least 50% of nursing home resident toilet rooms meet accessibility requirements. The state

Uniform Construction code then references ANSI which contains only the technical requirements for accessibility of those rooms.

The expectation of scoping assumes that management of different types of toilet rooms either accessible or standard will be managed by staff upon admissions of each resident to a home. In practice it is not practical to match up the resident's ambulatory needs at the time of admissions with the available rooms in the home. Furthermore the residents ambulatory needs will change as they age, moving to more disabilities and an increase need for assistance.

Ideally, assisted living and nursing homes should be designed to same level of accommodation so that **all** or 100% of bathroom meet the range of resident needs including eventual need for assistance. Typically the building code requires 50% of the resident rooms in nursing homes to be accessible. The standard practice in designing a nursing home is to make 100% of the rooms accessible so that all rooms have the same level of accommodation. The Department of Veterans Affairs has advised that "100% accessibility makes nursing simpler, puts less strain on staff, gives patients more independence, and requires less patient supervision by a limited staff." (Dept of VA Barrier Free Design Guide, 2011)

The accessible requirements drive the standard for the typical resident bathroom making it critical that the accessible requirements contain the flexibility to accommodate all levels of an older population's ability and need for assistance.

Chapter 2 – Evidence Base for Technical Requirements for Toilet and Bathing Facilities in Nursing Home and Assisted Living

Review of Current Industry Practice Trends

The standard of practice in the design of nursing and assisted living homes is to either apply the accessibility requirements to 100% of the resident bedroom and bathrooms or to request equivalence from the jurisdiction to make 100% of the resident bedrooms and bathrooms an arrangement similar to ANSI 604.5.3 for swing up grab bars with additional space on both sides of the toilet, generally 24 to 30 inches from the wall to the centerline of the toilet. The intent of the centerline dimension for the swing up grab bars is to locate the bar in the same orientation to the toilet as if there was a wall mounted grab bar.

The alternative ANSI (604.5.3) for swing up grab bars on each side of the toilet is an exception permitted in "*Type B units located in institutional facilities and assisted living*". This alternative can be used where the accessible units are not required. This suggests that ANSI already recognizes the benefits of two swing up grab bars. However this exception is only permitted in the units that are not "accessible," i.e., units where a rear and side wall-mounted grab bar are not required. In practice, because swing up grab bars are actually more useful than the required configuration, applying this exception in nursing homes and assisted living makes the "non-accessible" bathrooms or the Type B units more functional to older residents than the "accessible" ones. ADA currently does not provide a similar exception to use swing up grab bars in B units located in institutional facilities and assisted living.

Sanford, et al. queried a number of architects who had designed bathroom configurations in long term care facilities that were intended to support assisted transfers and that differed from those required by the ADA guidelines for supporting independent function. Despite minor differences, there was remarkable consistency in the location of the toilet and type of grab-bars. The toilet was moved further away from the sidewall (> 18+" from the sidewall to centerline of toilet as specified in ADAAG) to provide more clearance between the sidewall and the toilet. The positioning and type of grab bars were also changed to provide more room and flexibility. Swing-away (or folding) grab bars were typically located on both sides of the toilet rather than fixed grab bars on the side and rear walls as indicated in the ADAAG. In analyzing comments about this configuration, the designs were justified in the following ways:

> Increased sidewall space adjacent to toilet. Additional space between the sidewall and the toilet was intended to provide space on both sides of the fixture for a caregiver to stand alongside. This would enable caregivers to stand on either or both sides, as necessary, to provide support and assistance with transfer as well as to help with the partial removal and replacement of clothing.
>
> Grab bar type and positioning. With grab bars in the vertical or up position, sufficient space was provided for caregivers to stand next to the toilet on either (or both) side(s) to provide support getting on and off the toilet. In the horizontal or down position, grab bars on both sides of the toilet would permit individuals requiring assistance to maintain balance while clothing was removed or replaced. Alternatively, for individuals capable of independent transfer, grab bars on both sides would enable them to pull up to a standing position and lower down to a sitting position (Sanford and Megrew, 1996; Sanford, Echt, and Malassigné, 1999). Moreover, the same grab bar placement could be used to accommodate people with both right and left hemiplegia (often associated with stroke in older individuals).

In contrast to ADA accessibility guidelines and ANSI, the primary goals of the alternative designs were to accommodate independent transfer and use of a toilet, tub, or shower when possible, as well as assistance by as many as two care providers, when needed. Moreover, the designs were intended to prevent and/or reduce injuries to all users, both elders and care providers and to permit ease of access by individuals with many types of impairments. Not surprisingly, Sanford, et al. have reported (1995) that the preferred ADA toilet configuration does not work as well as it should for the majority of older adults, including both those who stand to transfer, as well as those who transfer directly from wheelchair to toilet. In these studies, subjects who stood to transfer consistently reported that the preferred ADA configuration, which includes grab bars on the side wall 18" from the centerline of the toilet and on the wall behind the toilet, was **the most difficult to use**, whereas grab bars on both sides of the toilet, such as the alternative ANSI configuration were easiest to use.

In a separate study of community-dwelling elders, Sanford et al (1999) found that 90% of a sample of 785 older respondents stood to transfer to the toilet, including 85% of the respondents who used wheelchairs for mobility. In a study with a mock-up toilet with different configurations (ADA configuration, alternate ADA, straddle bar and swing away) the *ADA compliant toilet was rated as most difficult to use by 70% of the participants* (Sanford, et al., 1995). Moreover, grab bars in the swing-away configuration were used significantly more often by both ambulatory and non-ambulatory participants (accounting for 40% of all grab-bar uses), while the ADA configuration had the lowest use of grab bars (27%) of the four configurations.

Sanford, et al. (1999) also found that older non-ambulatory respondents who transferred independently reported that all of the configurations (including the preferred and alternative ANSI configurations) were equally difficult. However, because non-ambulatory populations in assisted living or nursing home facilities have the availability of staff assistance, grab bars that facilitate staff and floor based lifts are preferable. Swing up grab bars can be positioned out of the way to make room for a floor-based lift-assisted transfer. In this up position, care providers are also better able to access the side and rear of the resident to assist with personal care and undergarments without the hindrance of leaning over a grab bar. For ambulatory residents the swing away grab bar can easily be positioned back in place. This versatility can thereby accommodate dependent, assisted and independent residents.

In a more recent study, Sanford and Bosch (2012), used a repeated measures design to evaluate the optimal amount of space required for 1- and 2-person assisted transfers. Specifically, four different toilet room configurations (Figure 2) were compared for safety, preference and ease of transfer by caregivers in a long term care facility. A portable 5' X 7' mock toilet room was constructed that allows the distance from the side wall and grab bars to be modified (Figure 3). In Configuration 1, the center line of the toilet was set at 18" from the side wall on one side of the toilet with a 42" horizontal grab bar located on the side wall as required by the ADA (the rear bar was not included as it was not considered to impact space requirements for assisted transfers). No wall was mounted on opposite side of the toilet, leaving 42" of clear space between the toilet and the brace for the test unit, which was closest obstruction. In Configuration 2, the side wall and 42" horizontal grab bar were also located at 18" from the center line of the toilet, but a fold-up grab bar was added to the open side of the toilet, also at 18" from the centerline of the fixture. In configuration 3, the centerline of the toilet was located at 24" from the side wall on one side, with fold-up grab bars on both sides, each at 18" from the center line of the toilet. For configuration 4, the sidewall was located at 30" from the center line on one side of the toilet, with fold-up grab bars on either side of the toilet at 18" from the centerline. Thus, in all configurations there was a wall on one side of the toilet and a 42" open space on the other which had no intrusions in Configuration 1 and a fold-up grab bar at 18" from the centerline of the toilet in Configurations 2-4.

Caregivers (mostly certified nursing assistants), either alone or in pairs, were asked to assist residents with transferring to and from a toilet for each of the four configurations. Each mock toileting event was video recorded and objectively scored by an occupational therapist for transfer technique/body mechanics by the CNAs, level of physical assistance provided by the CNAs, location of transfer, and incidents that put the resident at risk of injury. Following each trial caregivers were asked to provide self-report ratings of amount of space, grab location, grab bar style, distance from toilet, and proper body position on a 5 point Likert scale where 1 was low and 5 was high. In addition, caregivers were asked to rate the configuration that they most preferred.

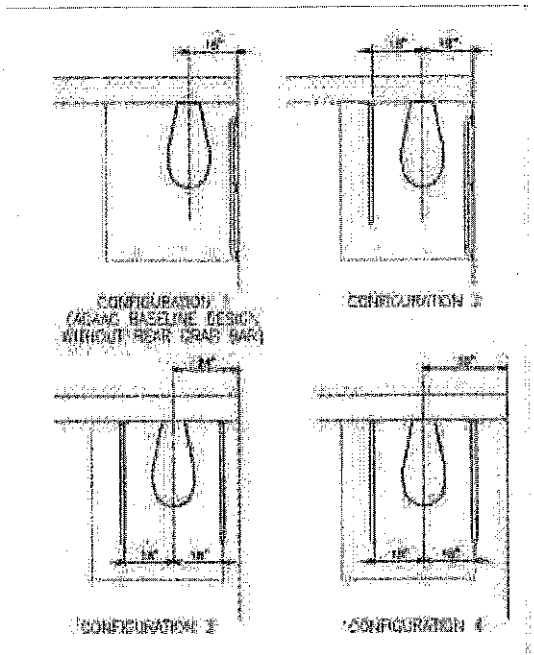


FIGURE 2. FOUR CONFIGURATIONS TESTED

Overall, Configuration 1 (ADA style horizontal bar with the toilet at 18" on center from the side wall) consistently had the lowest mean ratings (ranging from 3.10 to 3.35) across the 5 self-report questions, whereas configuration 4 (fold-up grab bars with the toilet at 30" on center from the side wall) had the highest mean ratings (ranging from 3.80 – 4.10). Moreover, the distribution of responses indicates increasing safety and decreasing difficulty of transfer from Configuration 1 to Configuration 4. Although, not all of the differences were significant, an ANOVA indicated significant differences in mean ratings for grab bar location

(p=.049) and grab bar style (p=.038) that are attributable to differences between Configuration 1 and Configuration 4 (mean = 3.82 versus mean = 2.93 for location and 3.86 versus 2.96 for style). However, when analyzed by number of persons assisting, there are no significant differences in mean ratings across any of the configurations for 1-person transfers while there are significant differences in mean ratings for 2-person transfers for location (.018) and style (.020) that are attributable to differences between Configurations 1 and 4 (mean = 2.60 and 2.68 for Q2 and Q3, respectively) and Configuration 4 (mean = 3.85 and 3.90 for Q2 and Q3, respectively).

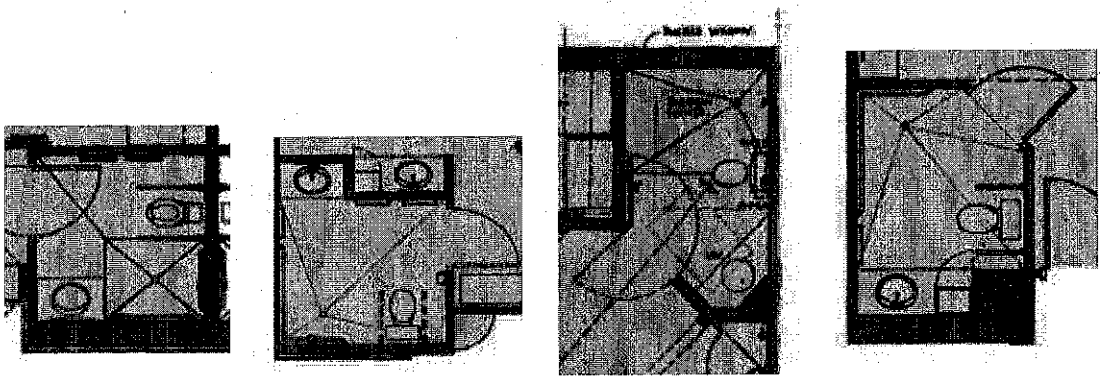
Finally, only 12% of care givers indicated a preference for the ADA-style horizontal grab bar 18" from the center line of the toilet. Among the 88% who preferred the fold-up grab bar configurations, 58% of caregivers preferred Configuration 4, 19% preferred Configuration 3 and 12% preferred Configuration 2.

FIGURE 3. TEST APPARATUS WITH MOVEABLE SIDE WALL AND GRAB BARS

Analysis of the observation data revealed no significant differences among the 4 configurations for transfer mechanics and the amount of physical assistance provided. Similarly, there were no significant differences among the configurations in the amount of assistance provided. Despite the lack of significant findings in the observation data, there were several trends that were encouraging. First, there was a general downward trend in the number of incidents with the fold-down grab bars compared to the side-mounted grab bar with fewer incidents associated with an increase in the amount of space provided adjacent to the toilet, particularly for the one-person assist. Importantly, this trend may be related to the significant findings for caregiver location when one-person transfer assistance was provided. Clearly, in the ADA configuration, caregiver location was equally divided between adjacent to the toilet on the open side and in front of the toilet beyond the 42" grab bar. However, when the fold-down bars were added and as more space was available, the number of caregivers positioned outside the length of the grab bars declined to zero while the number of transfers from the front quarter of the toilet (position 3) increased dramatically. In contrast, despite additional space in configurations 3 and 4, only one caregiver assisted from alongside the toilet (position 2). This is likely due to caregivers' reluctance to move the grab bars to their upright position where they would be out of the way. Moving the grab bars would have allowed the caregivers to move closer to the toilet and the point of transfer, similar to position 1 used in 40% of the transfers on and off the toilet in configuration 1. In future testing, an explicit instruction that grab bars can be folded up or down as needed would likely show a stronger relationship between space and proximity to the resident.

Most nursing homes in the United States schedule routine showers or tub baths for residents at least twice per week. The vast majority of nursing home residents are showered. (Sloane PD, et al.) A trend that we are seeing in Nursing is showering right in the resident's bathroom. Ohio is the first state to require that all new nursing home resident rooms include a shower or tub in the bathroom. Increasingly, we are seeing en-suite showers (also referred to as European showers)-where the whole room acts as the wet room. Although slightly less familiar, this is generally much easier for both staff and residents because it provides more room for maneuvering-both while taking a shower and at other times provides more open floor space. The following are other examples of bathrooms utilizing a non ANSI and ADA compliant bathrooms that better address the needs of assisted living and nursing residents:

European Style Bathroom Examples



REVIEW OF EMPIRICAL STUDIES EVALUATING TOILETING GRAB BAR DESIGN

This section reviews relevant literature to identify how grab bar placement impacts the function of the complex care population seen in nursing homes and assisted living facilities. Due to the complex and varied nature of the care needs of these individuals, it has been a significant challenge to identify a universal grab bar configuration that meets all functional needs. This universal design has yet to be developed and tested in this population. Presenting the available empirical evidence can lend direction to future research in this area. Until such studies have been completed, best practice consists of empirical evidence, industry research and current practices. This section will summarize the empirical evidence on grab bar configuration and its effect on user function during toilet transfers.

Grab bar configuration should support, and at minimum, not hinder the use of transfer aids, specialized toileting equipment and caregiver assistance. Fold away bilateral grab bars give flexibility to this type of specialized equipment and assistance; floor based lifts and commodes used to transport residents to a toilet are equipment examples supported by this design.

A toilet with handrails attached to the sides as integral handles was rated as the safest and best toilet model to aid in initial sit to stand transitions where grab bars are found to be too high and out of reach. These handles also reduced reliance on less steady gait aids for stability when rising and lowering (Sanford et al., 1999). Ideally this mechanism would be integrated into a bilateral grab bar design to meet the sit and stand functional needs of the user. When not in place, this support can be obtained by a commode or the addition of an adapted toilet seat with handles.

When lowering to the toilet, side rails set at the sitting elbow height of approximately ~30.5" from the floor, can aid in controlling descent to sitting (Dekker, 2007). Alternately, for those with affected coordination, pulling forward on anterior positioned bilateral grab bars can help to bring center of mass forward and prevent toppling back as one sits down (Bridge, 2003)

During rising from a toilet, bilateral grab bars placed shoulder width apart is an effective position for most people to push up from, as the push muscles in older adults tend to be stronger when initially standing (Koncelik, 2003). Bars that are 25.5" apart correspond to the shoulder width of 95% of men (Dekker, 2007; Steenbekker& Van Beijsterveldt, 1998). In a study of X subjects, Dekker concluded that the preferred height to push off of is 30.5"(2007). When pushing up, bilateral bars also have the advantage of reducing joint pain by allowing the user to push up on a preferred side to protect an injured joint (O'Meara, 2006).This is also the case for individuals that have weakness on one side. For example, bilateral grab bars give versatility to support an individual with one sided paralysis to be able to transfer to a preferred side. It is accepted safe transfer practice to transfer toward the strongest side (Patient Safety Center of Inquiry, 2001).

Pulling up and forward can be advantageous for those with compromised or painful joints, reducing pressure or torque at the hips and knees by up to 50% (Bahrami) .Reaching forward with 2 hands to pull up at a height of ~37.5" has been

shown to improve sit to stand performance when compared to pulling up from one bar or from a lower height. O'Meara (2005) concludes that the height of a 2 handed pull up is a more important parameter for providing assistance than orientation of the bar. Pulling up and forward on bilateral grab bars is an effective standing strategy for people that have very weak leg muscles and need assist to completely extend the legs and trunk to stand (Bernardi, 2004).

Bilateral grab bars positioned forward of the toilet bowl also aid with balance and stability during steadying tasks such as adjusting clothing ,getting assist with personal care or in preparation for a transfer back to a wheelchair. This anterior bilateral grab bar position also benefits adults with coordination or balance limitations impacting standing. Weaker, more unsteady individuals tend to use a more stable semi-static sit to stand strategy that lurches them forward to stand. Moving the body forward with the aid of anterior grab bars, reduces the lower extremity work of standing as well as improves stability by expanding the base of support through reaching forward and holding supports (Bernardi, 2004).

Fold-up grab bar supports in close proximity to the toilet will be used more frequently and provide improved stability compared to mobility aids as a person pivots or steps around and backs up to toilet edge (Sanford et al., 1999). This component of the toileting task is considered high risk for falls due to the dynamic balance and coordination required when standing and transferring (Buzink, 2005). Dekker's study supports this with the majority of users preferring a grasp at elbow height with two hands to best stabilize them in standing (Dekker, 2007). Providing a two handed grip on one bar in front of a user who requires personal care assistance, has the added benefit to the caregiver. This configuration provides stability for the resident while the other bilateral bar is folded up to allow optimal access to for caregiver to assist with personal care and undergarments while resident is standing (Bernardi et al., 2004; Morgan, 2010; Maben, 2003). This improves the working postures of the caregiver, putting them closer to the resident to support and provide care with out undue leaning over an obstructing grab bar (Village, 2005).

Redundancy of additional toilet bars added because grab bars are too high and set behind end of toilet bowl.

TABLE 1: SUMMARY OF GRAB BAR CONFIGURATIONS AND RESEARCH FINDINGS ON USER FUNCTION IMPACTS

Grab Bar Configuration	Effect of Configuration on User Function
Bilateral Fold-up Grab Bars	▪ Reduce joint forces that aggravate a compromised joint when standing; provide versatility to reduce joint pain on either side of the body (O'Meara, 2005, 2006). ▪ Bilateral bars 25.5" apart are preferred by majority of users to pull up with (Dekker, 2007). ▪ Versatility in grab bar positioning will allow for room to transfer to either side of toilet toward the resident's strongest side. It is accepted safe transfer practice to transfer toward the strongest side (Patient Safety Center of Inquiry, 2001). ▪ Mobility aids were used significantly less for stability when the fold-up grab bar configuration was used to transfer onto the toilet, proving to be a more stable transfer strategy as compared with other configurations (Sanford et al.1999). This transfer is considered high risk for falls and requires significant balance or support (Buzink, 2005). ▪ For effective push up technique using side bars, the average preferred height was 30.5", shoulder width apart (Dekker, 2007; Steenbekker& Van Beijsterveldt, 1998). ▪ Use of armrests at elbow height when sitting (upper arm at vertical) to push up compensated for weak lower extremities but did not assist with full thigh and trunk extension into standing; a noted risk factor for falling (Alexander, 1991). ▪ Initiate seat lift off for sit to stand using stronger push muscles (Koncelik, 2003). ▪ Handles placed beside toilet close to toilet edge 30.5" from floor to aid in initial sit to stand

(Sanford et al., 1999).

- A toilet with handrails attached to the sides as integral handles was rated as the safest and best toilet model to aid in initial sit to stand transitions where grab bars are found to be too high and out of reach. Furthermore, these handles reduced reliance on less steady gait aids for stability when rising and lowering (Sanford et al., 1999).

Grab Bar Length

- Reaching forward with both hands, 19.75" from front of bowl has a greater influence on sit to stand performance than one sided pull .This is due to greater upper body contribution from two hands in a more forward reach position (O'Meara, 2005).
- Horizontal upper body pull on a bar in front reduces stress on hip and knee joint by up to 50% (Bahrami, 2000).
- Adults with coordination or balance limitations are more likely to use a stable semi-static sit to stand strategy that lurches them forward, making it less effort to stand with weak leg muscles. Anterior grab bar placement can reduce the strength needed to move the body forward and improve stability by expanding the base of support when both hands are placed in front. This also makes it easier for weaker legs to stand and less work for the arm muscles (Bernardi, 2004).
- Pulling on a bar in front when sitting will pull the body forward and prevent toppling back (Bridge, 2003; Dekker et al., 2007).

Grab bar Height

- A two handed position of ~19.75" forward from the front of bowl and at a height of ~37.5" provided more assistance to the user when pulling up to stand than a lower height of ~31.5". O'Meara (2005) concludes that height is a more important parameter for providing assistance than orientation of the bar.
- Pulling force is optimized when elbow position is at 150-180 degree flexion and shoulder 90 degrees (Janssen, 2002).
- Use bar height to facilitate full trunk extension when standing up to reduce falls risk (Alexander, 1991)
- Use of side rails at elbow height in sitting (~30.5" from floor) aid to control descent to sitting (Dekker, 2007).
- Majority of users preferred a grasp at elbow height with two hands to best stabilize themselves in standing (Dekker, 2007). This position is most stable when standing while care is provided.

Two Hand Grip

- Standing Balance and coordination improved with 2 hand grip (Buzink, 2005, Dekker 2007).
- Providing a two handed grip on one bar in front of the user widens the base of support and improves stability as the other bilateral bar is folded up to provide caregiver access to assist with personal care and undergarments during this stand (Bernardi et al., 2004; Morgan, 2010; Maben, 2003).

Empirical evidence demonstrates that a bilateral fold up grab bar configuration has shown to support the transfer function of an elder population with diverse and complex care needs. This configuration is also versatile enough to accommodate a variety of different transfer methods including independent, aided, assisted (one or two person) and dependant floor based transfers. This versatility lends itself to benefiting both the user in giving flexibility to choose the transfer side and wheelchair set up as well as provides a safe working environment for the care providers assisting these residents. What remains to be determined through future research is the most ideal height length and orientation of the bilateral fold-up grab bar configuration.

EVIDENCE-BASED DESIGN RECOMMENDATIONS

Access to toilet and bathing is clearly an area in which research data suggest that a review of ADA (formerly ADAAG) and ANSI is needed. Table 1 summarizes the effects that the different grab bar configurations have on user function and safety during toileting.

Available empirical evidence, in combination with industry current practices in elder care, supports the importance of including these design features as part of industry best practice when designing bathrooms for frail older adults in assisted living and care home environments. It is important to note that the combined effect of these features in all phases of toileting has yet to be evaluated. The basic scientific knowledge that has been collected from the above

studies needs to be applied to the clinical environment to fully test the interrelationship of the design features on user function for the complete toileting routine under a variety of scenarios. This will help to better define dimensions and the design with the greatest benefit in elder care.

The net benefit will be to optimize resident function, ultimately promoting independence in toileting and to improve safety when transferring on and off the toilet; a high risk activity for falls in this population. Consequently, optimizing resident function reduces work exerted by the caregiver. This results in lower incidence of work related injuries in the healthcare sector, one of the highest risk industries for musculoskeletal injuries. The addition of other environmental design features, such as space on either side of the toilet to provide assistance and room to safely use mechanical lifts, will also go a long way to improve staff and resident safety alike, as these two are inextricably linked.

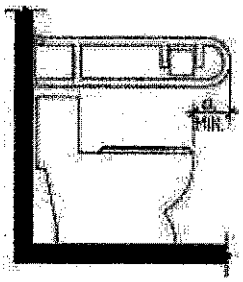
Swing Up Grab Bar Dimensional Recommendations

To understand the variables in the use of swing up grab bars we must first look at the variables in the dimension of the toilet from the back wall to the front edge of the toilet bowl. Sanford (2012) investigated six toilet manufacturers and 22 toilets (13 were floor mounted and 9 were wall hung). The range from finished wall to the tip of the bowl ranges from 24.75" to 30.25". This 5 1/2" variation suggests that the required length of the swing down grab bars should be measured from the front edge of the toilet to the end of the grab bar in order to provide a consistent relative dimension.

Toilets are also available in a variety of heights. Similarly the swing-up grab bar height should be measured from the seat to the top of the grab bar.

The current ANSI requirements 604.5.3 Swing-up Grab Bars are measured from the back wall at a minimum dimension of 28 inches. The measurement from the back wall along with the available toilet products could put the end of the swing up grab bars from 2 1/4 inches behind the front edge to 2" beyond the front edge of the toilet. An anthropomorphic study is needed to establish the ideal dimension that meets the needs of the average nursing home or assisted living resident. Chapter 5 references two studies that are underway to establish the ideal dimension of the length of the swing up grab bars of a distance measured from the front of the toilet to the end of the swing up grab bars. These studies will also determine the ideal distance from the center of the toilet to the grab bars as well as the height above the seat.

A survey of available swing-up grab bars suggests that most American manufactured products are a standard length of 29 to 30 inches. Some manufactures will provide custom lengths. There are also available non-domestic manufacturers who offer lengths including: 23.6 inches, 27.5 inches, 33.4 inches and 35.4 inches. The recommendations of this paper are based on the ideal dimensional positions and not necessarily based on currently available products.



Resident bedrooms and bathrooms are the basic building block of nursing home and Assisted Living buildings. The bedrooms and their bathrooms typically account for up to 40% of a home's overall area. In the design of a Nursing or Assisted Living home it is critical to develop the bedroom and bathroom layout as compact as possible because of how it impacts the cost of the entire building. At the same time resident focused care trends are promoting showers to be included in each resident bathroom to provide the resident dignity and privacy in bathing while providing some flexibility of bathing modalities to the nursing home.

One goal of this proposal for accessible guidelines is to provide an Alternative Roll in Shower arrangement for elders in assisted living and nursing homes that provides unobstructed conditions that meet the function for both the resident and the care giver.

Review of Empirical Studies Evaluating Grab Bar Design in Showers

Review of the literature on bathing practices for has resulted in few empirically tested interventions to guide those looking for best practice. However, based on a variety of case series articles and expert opinion (Philip D. Sloane and Leanne E. Carnes, Bathing Without a Battle, Chapter 10) it is recognized that showering is the most common bathing method used by U.S. adults, including persons in long term care. MDS survey data suggests 65% of residents prefer showers while 35% prefer baths. Although there is not survey information available it is believed that nursing homes are providing showers nearly exclusively rather than baths. Caregiver assistance is often difficult to provide in a traditional shower. However showering can be less safe than baths for older persons with significant balance problems.

Sloane & Carnes point out that the shower must be accessible. Ideally the resident should be able to be rolled into the shower as easily as being rolled into the room. This suggest either minimal or no threshold be used at the area of the shower. This arrangement in practical application would suggest that the shower be placed some distance from the door so that there is sufficient floor slope to keep water contained in the bathroom and draining towards and into the shower drain.

Use equipment such as grab bars and shower chairs to ensure safe transfers into and out of the shower. CNAs are trained to have the resident use shower chairs for safety. Residents who are capable of weight bearing typically stand only to have their genital and anal areas washed / rinsed. To prevent falls among standing residents, grab bars need to be easy to reach. The rest of the time, they are encouraged to sit on a shower chair [Barrick, Rader, Hoeffer, Sloane 2008].

In the design of bathrooms in assisted living and nursing homes the choice of accessibly compliant layout has shown that the roll in shower is the preferred shower type and size by care providers. Showers without built in seats are preferred by care providers so that transfers are made to a shower chair which provides maneuverability of the resident. In nursing homes where the function of nearly all showering is done with the aid of a care taker there is need to have sufficient space for the care taker to assist the resident.

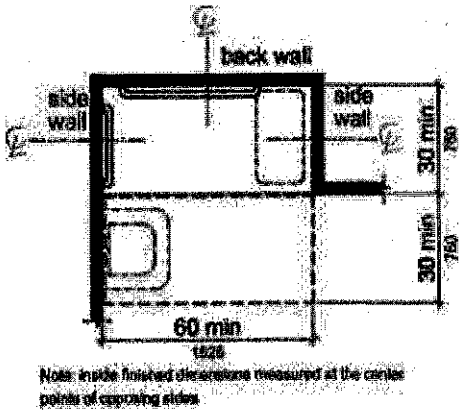


Figure 608.2.2
Standard Roll-In Type Shower
Compartment Size and Clearance
ANSI 2003

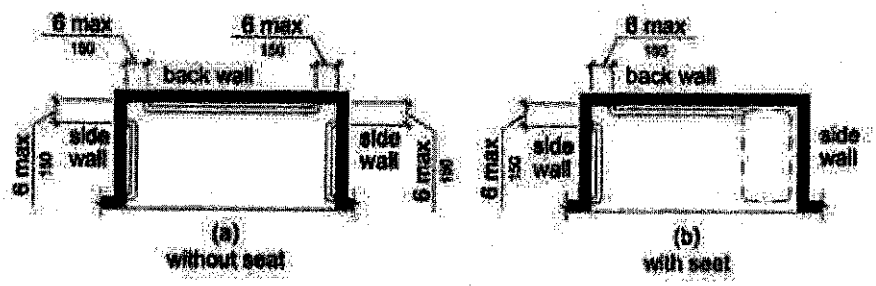


Figure 608.3.3
Grab Bars for Alternate Roll-In Type Showers
ANSI 2003

EVIDENCE-BASED DESIGN RECOMMENDATIONS

Providing a compliant shower based on ANSI or ADA would require three walls with grab bars as shown in figure 608.3.3 above. The requirement for three walls with grab bars as indicated in Figure 608.3.3 (a) limits the potential for a more open unobstructed accessible bathroom. The grab bar requirement on the third wall of the shower is made by the requirements of 608.3.3 without seat. The extra grab bar is not required in a similar shower with a seat. However the third wall would be necessary presumably only to attach the seat onto.

In addition to the grab bar requirements of 608.3.3 is the shower size requirements (a minimum 30 inches by 60 inches) is the clearance requirement (608.2.2.1) of an additional 30 inch by 60 inch space adjacent to the shower space where this type of roll in shower is provided. The requirement for this 30 inch by 60 inch space adjacent to the shower area limits the ability to use the shower area as overlap clearance space for a toilet

The 30 inch by 60 inch space adjacent to the shower space is not required in Alternate Roll-In Type Shower Figure 608.2.3 where only a 36 inch long approach is required. The use of Alternate Shower 608.2.3 would further limit the ability of a care giver to assist the resident in bathing.

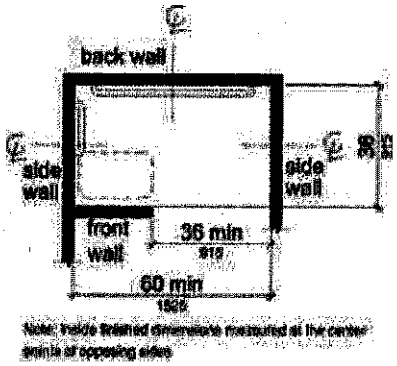
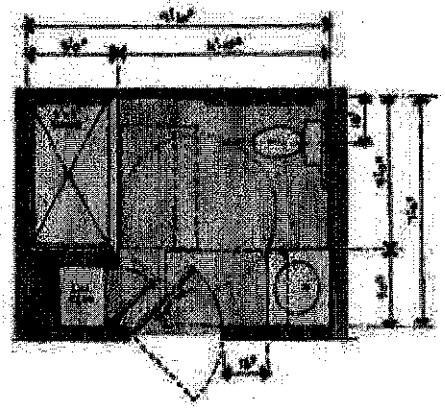


Figure 608.2.3
Alternate Roll-In Type Shower
Compartment Size and Clearance

The diagram below shows that compliant shower arrangement along with space requirement in front of the shower along with all the other requirements for an accessible bathroom.

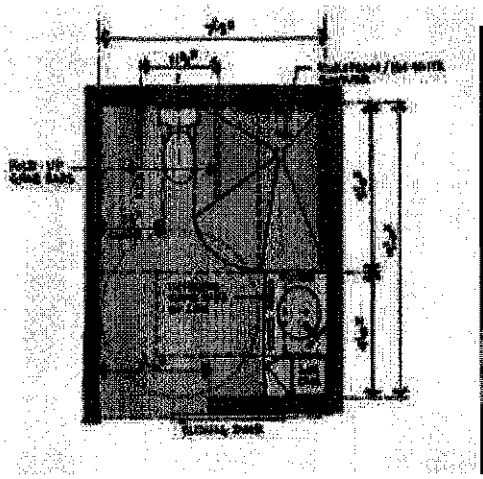
ANSI and ADA Compliant Bathroom



Although the bathroom shown above meets both ANSI and ADA accessibility requirements it may not meet the needs of the assisted living or nursing home resident with a care giver as well as the layout shown below. The advantages of the shower in the diagram below over a code compliant shower are as follows:

- The shower space when not in use as a shower can be used for the transfer space for the toilet
- The counter top adjacent to the shower area can be used by the caretaker for conveniently placing skin care products
- The knee space under the counter top can be used as part of wheelchair turning or repositioning

This bathroom layout provides two walls for grab bars and the same 3 foot by 5 foot shower space. This area is adequate to locate a shower chair. The shower chair will cut down on fatigue and give the bather a sense of security. This shower provides hand held shower head with controls that are positioned for caregiver access without dragging the hose across the resident.



DISPENSER LOCATION

When adequate space is provided on both sides of the toilet for assisted transfers the standard requirements for the toilet dispenser will be too far away for an independent resident. The toilet paper should be dispensed from a location on the swing up grab bar which is accessible by an independent resident or a caregiver providing assistance.

Chapter 3 - ADA Standards for Accessible Design and ANSI Requirements for Bathrooms in Nursing Home and Assisted Living Communities that do not Meet Needs of Residents and/or Staff

When areas in a building, such as resident room bathrooms, will be used solely by nursing home residents independently or with the assistance of their caregivers, the dimensions and configurations for elements included in design Standards should be commensurate with the physical abilities of the population who require accessible design features and the way in which these bathrooms are used. This chapter describes current Standards that do not meet the physical abilities and caregiver means of delivering assistance to nursing home residents. The Standards that are proposed to be changed are both the Americans with Disabilities Act and American National Standard ICC A117.1-2009 **(ANSI)**

The following highlighted design requirements for toilet and shower elements are where variations from the current Standards are needed to provide appropriate accessibility for the nursing home population in toileting and bathing activities of daily living:

2010 ADA Standards for Accessible Design

These guidelines are applied during the design, construction, and alteration of public buildings and facilities to the extent required by regulations issued by Federal agencies.

***604.2** does not provide space needed on both sides of the toilet for independent front approach transfers and assisted transfers.*

ADA

604 Water Closets and Toilet Compartments

604.1 General. Water closets and toilet compartments shall comply with 604.2 through 604.8.

EXCEPTION: Water closets and toilet compartments for *children's use* shall be permitted to comply with 604.9.

604.2 Location. The water closet shall be positioned with a wall or partition to the rear and to one side. The centerline of the water closet shall be 16 inches (405 mm) minimum to 18 inches (455 mm) maximum from the side wall or partition, except that the water closet shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum from the side wall or partition in the ambulatory *accessible* toilet compartment specified in 604.8.2. Water closets shall be arranged for a left-hand or right-hand approach.

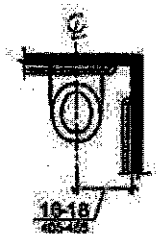


Figure 604.2
Water Closet Location

ADA

604.5 Grab Bars. Grab bars for water closets shall comply with 609. Grab bars shall be provided on the side wall closest to the water closet and on the rear wall.

EXCEPTIONS : 1. Grab bars shall not be required to be installed in a toilet room for a single occupant accessed only through a private office and not for *common use* or *public use* provided that reinforcement has been installed in walls and located so as to permit the installation of grab bars complying with 604.5.

2. In *residential dwelling units*, grab bars shall not be required to be installed in toilet or bathrooms provided that reinforcement has been installed in walls and located so as to permit the installation of grab bars complying with 604.5.

3. In detention or correction *facilities*, grab bars shall not be required to be installed in housing or holding cells that are specially designed without protrusions for purposes of suicide prevention.

Advisory 604.5 Grab Bars Exception 2. Reinforcement must be sufficient to permit the installation of the rear and side wall grab bars that fully meet all accessibility requirements including, but not limited to, required length, installation height and structural strength.

604.5.1 does not permit the use of swing up bars

ADA
604.5.1 Side Wall. The side wall grab bar shall be 42 inches (1065 mm) long minimum, located 12 inches (305 mm) maximum from the rear wall and extending 54 inches (1370 mm) minimum from the rear wall.

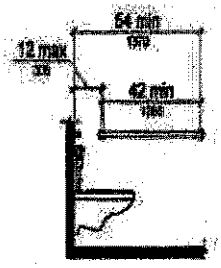


Figure 604.5.1
Side Wall Grab Bar at Water Closets

604.5.2 rear wall grab bars are not used by this population and their placement would not permit the use of swing up bars

ADA
604.5.2 Rear Wall. The rear wall grab bar shall be 36 inches (915 mm) long minimum and extend from the centerline of the water closet 12 inches (305 mm) minimum on one side and 24 inches (610 mm) minimum on the other side.
EXCEPTIONS: 1. The rear grab bar shall be permitted to be 24 inches (610 mm) long minimum, centered on the water closet, where wall space does not permit a length of 36 inches (915 mm) minimum due to the location of a recessed fixture adjacent to the water closet.
2. Where an administrative authority requires flush controls for flush valves to be located in a position that conflicts with the location of the rear grab bar, then the rear grab bar shall be permitted to be split or shifted to the open side of the toilet area.

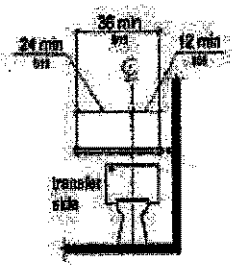


Figure 604.5.2
Rear Wall Grab Bar at Water Closets

604.7 does not permit the use of swing up bars which would have dispenser mounted on the swing up grab bars

ADA
604.7 Dispensers. Toilet paper dispensers shall comply with 309.4 and shall be 7 inches (180 mm) minimum and 9 inches (230 mm) maximum in front of the water closet measured to the centerline of the dispenser. The outlet of the dispenser shall be 15 inches (380 mm) minimum and 48 inches (1220 mm) maximum above the finish floor and shall not be located behind grab bars. Dispensers shall not be of a type that controls delivery or that does not allow continuous paper flow.

Advisory 604.7 Dispensers: If toilet paper dispensers are installed above the side wall grab bar, the outlet of the toilet paper dispenser must be 48 inches (1220 mm) maximum above the finish floor and the top of the gripping surface of the grab bar must be 33 inches (840 mm) minimum and 36 inches (915 mm) maximum above the finish floor.

608.3.2 grab bars on three walls are not utilized by this population and the third wall required for three grab bars limits the accessibility of the caregiver in assisting in showering the resident

ADA
608.3.2 Standard Roll-In Type Shower Compartments. Where a seat is provided in standard roll-in type shower compartments, grab bars shall be provided on the back wall and the side wall opposite the seat. Grab bars shall not be provided above the seat. Where a seat is not provided in standard roll-in type shower compartments, grab bars shall be provided on three walls. Grab bars shall be installed 6 inches (150 mm) maximum from adjacent walls.

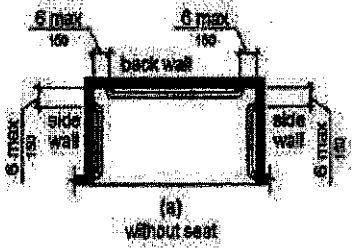


Figure 608.3.3
Grab Bars for Alternate Roll-In Type Showers

American National Standard ICC A117.1-2009 Standard for Accessible and Usable Buildings and Facilities.

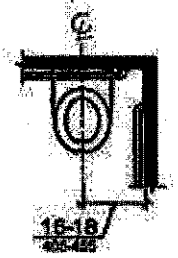
Most state and local legislative bodies have adopted ANSI A117.1 as part of their building code.

ANSI A117.1
604 Water Closets and Toilet Compartments
604.1 General. Accessible water closets and toilet compartments shall comply with Section 604. Compartments containing more than one plumbing fixture shall comply with Section 603. Wheelchair accessible compartments shall comply with Section 604.9. Ambulatory accessible compartments shall comply with Section 604.10.

EXCEPTION: Water closets and toilet compartment primarily for children's use shall be permitted to comply with Section 604.11 as applicable.

604.2 does not provide space needed on both sides of the toilet for independent front approach transfers and assisted transfer

ANSI A117.1
604.2 Location. The water closet shall be located with a wall or partition to the rear and to one side. The centerline of the water closet shall be 16 inches (405 mm) minimum to 18 inches (455 mm) maximum from the side wall or partition. Water closets located in ambulatory accessible compartments specified in Section 604.9 shall have the centerline of the water closet 17 inches (430 mm) minimum to 19 inches (485 mm) maximum from the side wall or partition.



(a) Accessible Water Closets

Fig. 604.2
Water Closet Location

***604.5** does not permit the use of swing up bars in Nursing Homes*

ANSI A117.1

604.5 Grab Bars. Grab bars for water closets shall comply with Section 609 and shall be provided in accordance with Sections 604.5.1 and 604.5.2.

Grab bars shall be provided on the rear wall and on the side wall closest to the water closet.

EXCEPTIONS:

1. Grab bars are not required to be installed in a toilet room for a single occupant, accessed only through a private office and not for common use or public use, provided reinforcement has been installed in walls and located so as to permit the installation of grab bars complying with Section 604.5.
2. In detention or correction facilities, grab bars are not required to be in housing or holding cells or rooms that are specially designed without protrusions for purposes of suicide prevention.

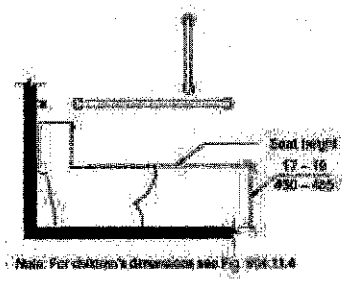


Fig. 604.4
Water Closet Seat Height

604.5.1 does not permit the use of swing up bars

ANSI A117.1

604.5.1 Fixed Side Wall Grab Bars. Fixed sidewall grab bars shall be 42 inches (1065 mm) minimum in length, located 12 inches (305 mm) maximum from the rear wall and extending 54 inches (1370 mm) minimum from the rear wall. In addition, a vertical grab bar 18 inches (455 mm) minimum in length shall be mounted with the bottom of the bar located between 39 inches (990 mm) and 41 inches (1040 mm) above the floor, and with the center line of the bar located between 39 inches (990 mm) and 41 inches (1040 mm) from the rear wall.

EXCEPTION: The vertical grab bar at water closets primarily for children's use shall comply with Section 609.4.2.

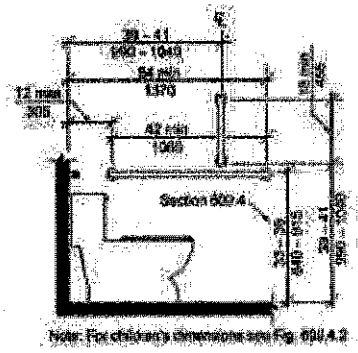


Fig. 604.5.1
Side Wall Grab Bar for Water Closet

604.5.2 rear wall grab bars are not used by this population and their placement would not permit the use of swing up bars

ANSI A117.1

604.5.2 Rear Wall Grab Bars. The rear wall grab bar shall be 36 inches (915 mm) minimum in length, and extend from the centerline of the water closet 12 inches (305 mm) minimum on the side closest to the wall, and 24 inches (610 mm) minimum on the transfer side.

EXCEPTIONS:

1. The rear grab bar shall be permitted to be 24 inches (610 mm) minimum in length, centered on the water closet, where wall space does not permit a grab bar 36 inches (915 mm) minimum in length due to the location of a recessed fixture adjacent to the water closet.

2. Where an administrative authority requires flush controls for flush valves to be located in a position that conflicts the location of the rear grab bar, that grab bar shall be permitted to be split or shifted to the open side of the toilet area.

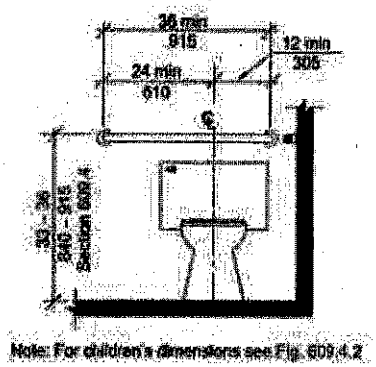


Fig. 604.5.2
Rear Wall Grab Bar for Water Closet

604.7 does not permit the use of swing up bars which would have dispenser mounted on the swing up grab bars

604.7 Dispensers. Toilet paper dispensers shall comply with Section 309.4. Where the dispenser is located above the grab bar, the outlet of the dispenser shall be located within an area 24 inches (610 mm) minimum and 36 inches (915 mm) maximum from the rear wall. Where the dispenser is located below the grab bar, the outlet of the dispenser shall be located within an area 24 inches (610 mm) minimum and 42 inches (1065 mm) maximum from the rear wall. The outlet of the dispenser shall be located 18 inches (455 mm) minimum and 48 inches (1220 mm) maximum above the floor. Dispensers shall comply with Section 609.3. Dispensers shall not be of a type that control delivery, or do not allow continuous paper flow.

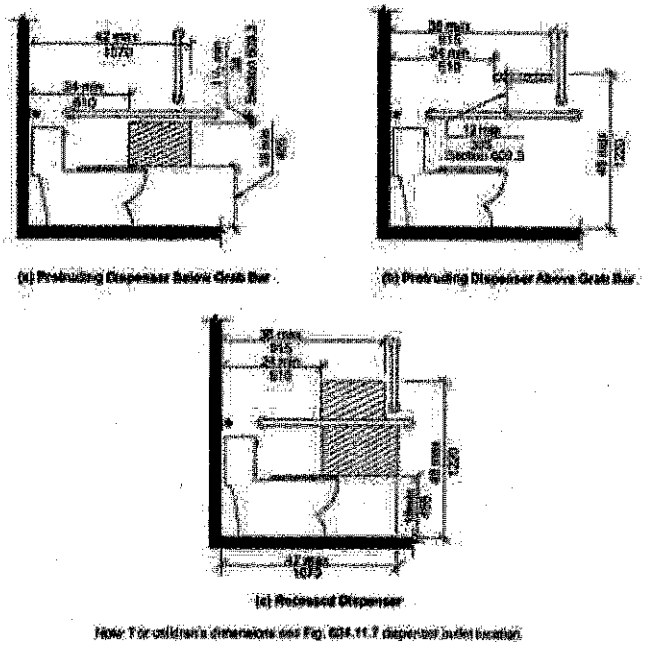


Fig. 604.7
Dispenser Location

608.3.2 the use of a folding seat does not provide an accessible means of providing an assisted shower

608.2.2 Standard Roll-in-Type Shower Compartments.
Standard roll-in-type shower compartments shall comply with Section 608.2.2.

608.2.2.1 Size. Standard roll-in-type shower compartments shall have a clear inside dimension of 60 inches (1525 mm) minimum in width and 30 inches (760 mm) minimum in depth, measured at the center point of opposing sides. An entry 60 inches (1525 mm) minimum in width shall be provided.

608.2.2.2 Clearance. A clearance of 60 inches (1525 mm) minimum in length adjacent to the 60- inch (1525 mm) width of the open face of the shower compartment, and 30 inches (760 mm) minimum in depth, shall be provided.

EXCEPTION: A lavatory complying with Section 606 shall be permitted at the end of the clearance opposite the seat.

608.2.2.3 Seat. A folding seat complying with Section 610 shall be provided on an end wall.

EXCEPTIONS:
1. A seat is not required to be installed in a shower for a single occupant accessed only through a private office and not for common use or public use, provided reinforcement has been installed in walls and located so as to permit the installation of a shower seat.
2. A fixed seat shall be permitted where the seat does not overlap the minimum clear inside dimension required by Section 608.2.2.1.

608.3.2 Standard Roll-in-Type Showers. In standard roll-in type showers, a grab bar shall be provided on the back wall beginning at the edge of the seat. The grab bars shall not be provided above the seat. The back wall grab bar shall extend the length of the wall but shall not be required to exceed 48 inches (1220 mm) in length. Where a side wall is provided opposite the seat within 72 inches (1830 mm) of the seat wall, a grab bar shall be provided on the side wall opposite the seat. The side wall grab bar shall extend the length of the wall but shall not be required to exceed 30 inches (760 mm) in length. Grab bars shall be 6 inches (150 mm) maximum from the adjacent wall.

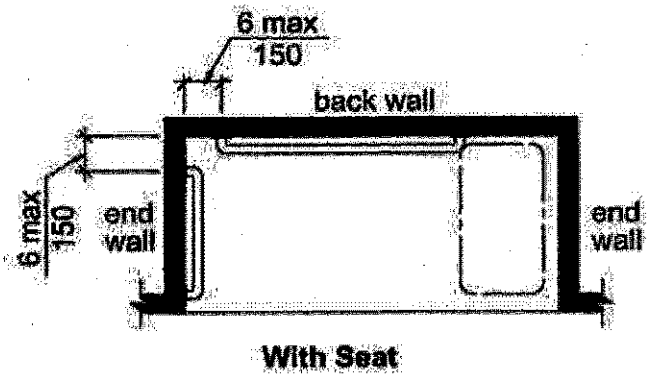


Figure 608.3.2
Grab Bars In Standard Roll-In Type Showers

Chapter 4 - Recommendations for a Senior Supplement to Current 2010 ADA Standards for Accessible Design and ANSI Requirements

Both Standards, The Americans with Disabilities Act Standards and American National Standard ICC A117.1-2009 Standard for Accessible and Usable Buildings and Facilities, are modeled below with recommended "Elder Use" additions to the accessibility Guideline Standards which are highlighted in **bold**.

2010 ADA Standards for Accessible Design

ADA
604 Water Closets and Toilet Compartments

604.1 General. Water closets and toilet compartments shall comply with 604.2 through 604.8.
EXCEPTIONS:

1. Water closets and toilet compartments for *children's use* shall be permitted to comply with 604.9.
2. **Water closets and toilet compartments for elder use in nursing home or assisted living facilities where fixtures are located in toilet or bath rooms directly accessible from a private or semiprivate bedroom, shall be permitted to comply with Section 604.12**

Rationale: Sufficient space is not provided for the space needed on both sides of the toilet for independent front approach transfers and assisted transfers.

604.2 Location. The water closet shall be positioned with a wall or partition to the rear and to one side. The centerline of the water closet shall be 16 inches (405 mm) minimum to 18 inches (455 mm) maximum from the side wall or partition, except that the water closet shall be 17 inches (430 mm) minimum and 19 inches (485 mm) maximum from the side wall or partition in the ambulatory *accessible* toilet compartment specified in 604.8.2. Water closets shall be arranged for a left-hand or right-hand approach.

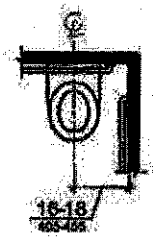


Figure 604.2
Water Closet Location

ADA
604.5 Grab Bars. Grab bars for water closets shall comply with 609. Grab bars shall be provided on the side wall closest to the water closet and on the rear wall.

EXCEPTIONS :

1. Grab bars shall not be required to be installed in a toilet room for a single occupant accessed only through a private office and not for *common use* or *public use* provided that reinforcement has been installed in walls and located so as to permit the installation of grab bars complying with 604.5.

2. In *residential dwelling units,* grab bars shall not be required to be installed in toilet or bathrooms provided that reinforcement has been installed in walls and located so as to permit the installation of grab bars complying with 604.5.

3. In detention or correction *facilities,* grab bars shall not be required to be installed in housing or holding cells that are specially designed without protrusions for purposes of suicide prevention.

Advisory 604.5 Grab Bars Exception 2. Reinforcement Must be sufficient to permit the installation of the rear and side wall grab bars that fully meet all accessibility requirements including, but not limited to, required length, installation height, and structural strength.

4. In Nursing home facilities where fixtures are located in toilet or bath rooms directly accessible from a private or semiprivate bedroom, two swing up grab bars complying with Section 609 shall be permitted

Rationale: Grab Bar Type. Grab bars on both sides of the toilet permit individuals with limited lower body strength who require assistance to maintain balance while clothing is removed or replaced. For individuals with limited upper body strength who are capable of independent, standing transfer, grab bars on both sides enable them to pull up to a standing position and lower down to a sitting position.

ADA

604.5.3 (NEW) Swing-up Grab Bars. Where swing-up grab bars are installed, a clearance of 18 inches (455 mm) minimum from centerline of the water closet to any side or obstruction shall be provided. A swing-up grab bar shall be installed with the centerline of the grab bar b inches (b mm) from the centerline of the water closet. Swing-up grab bars shall be a inches (a mm) minimum in length, measured from the front of the toilet to the end of the horizontal portion of the grab bar.

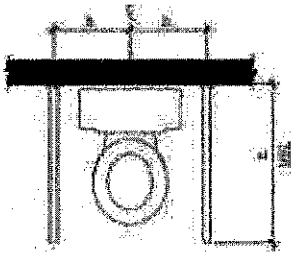


Figure 603.5.3
Swing-up Grab Bars for Water Closet *

Dimension a. and b will be determined upon research results currently being conducted.
(See Chapter 5 of White Paper, July 20, 2012.)

Rationale: Grab Bar Type. Grab bars on both sides of the toilet permit individuals with limited lower body strength who require assistance to maintain balance while clothing is removed or replaced. For individuals with limited upper body strength who are capable of independent, standing transfer, grab bars on both sides enable them to pull up to a standing position and lower down to a sitting position.

ADA

604.10 (NEW) Water Closets and Toilet Compartments for Elder Use.

604.10.1 General. Accessible water closets and toilet compartments primarily for Elder use shall comply with Section 604.12.

604.10.2 Location. The water closet shall be located with a wall or partition to the rear. The centerline of the water closet shall be 30 inches (760 mm) minimum from any side wall, partition or fixture. Water closets located in ambulatory accessible toilet compartments specified in Section 604.9 shall be located as specified in Section 604.2.

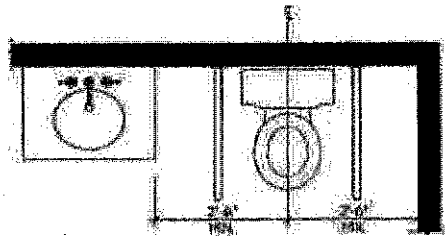


Fig. 604.10.2 (NEW)
Elder Water Closet Location *

** Dimension a. and b will be determined upon research results currently being conducted. (See Chapter 5)*

Rationale: Increased side wall clearance. Space is needed on both sides of the toilet to accommodate the range of transfer techniques including the front approach normally used in independent sit to stand transfers; caregivers to stand on either or both sides, for one- or two-person assisted transfers as necessary; and for use of a mechanical lifting device.

604.12.3 (NEW) Clearance.

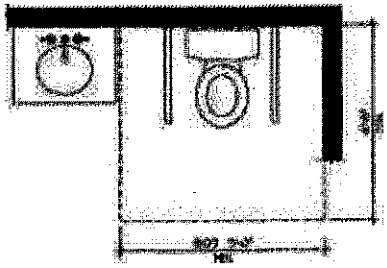


Fig. 604.12.3 (NEW)
Elder Size of Clearance for Water Closet

604.12.3.1 Size A clearance around a water closet 60 inches (1525 mm) minimum, measured perpendicular from the sidewall, and 56 inches (1420 mm) minimum, measured perpendicular from the rear wall, shall be provided.

604.3.2 Overlap. The required clearance around the water closet shall be permitted to overlap the water closet, associated grab bars, paper dispensers, sanitary napkin receptacles, coat hooks, shelves, accessible routes, clear floor space at other fixtures and the turning space. No other fixtures or obstructions shall be within the required water closet clearance.

604.10.4 Height. The height of water closet seats complying with Section 604.4 shall be provided.

604.10.5 Grab Bars. Grab bars for water closets shall comply with Section 604.5.3

604.10.6 Flush Controls. Flush Controls Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with Section 309. Flush controls shall be permitted to be located on either side of the water closet.

604.10.7 Dispensers. Toilet paper dispensers shall comply with Section 309.4 and shall be allowed to be located on the fold-up grab bar 3 inches (76.2 mm) maximum behind the front of the water closet measured to the center line of the dispenser. The outlet of the dispenser shall be 21 inches (533.4 mm) minimum above the floor. There shall be a clearance of 1 " inch (38 mm) minimum below the grab bar. Dispensers shall not be of a type that control delivery or do not allow continuous paper flow.

Rationale: Dispenser Location for Caregivers. For both independent and assisted toileting, dispensers need to be located for both resident and caregiver convenience when using fold up grab bars and when the distance from the center of the toilet exceeds 19 inches.

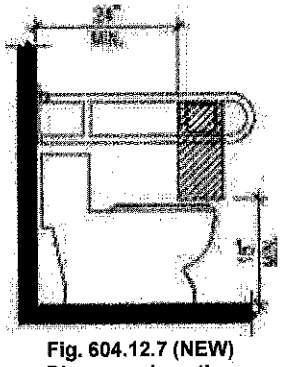
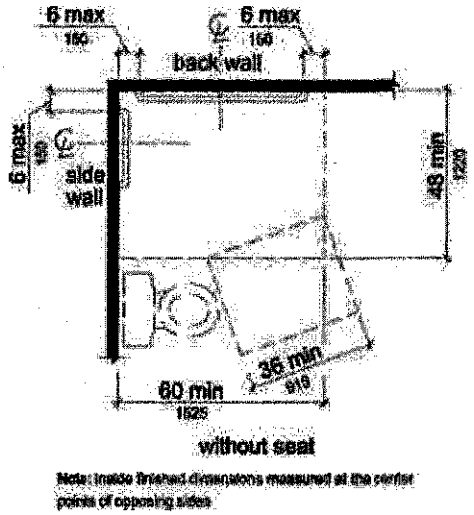


Fig. 604.12.7 (NEW)
Dispenser Location

608.2.4 (NEW) Alternate Roll-In Type Shower Compartments for Elder Use. Roll-In type shower compartments for elder use shall be 48 inches (1220 mm) wide and 60 inches (1525 mm) deep minimum clear inside dimensions measured at center points of opposing sides. A 36 inch (915 mm) wide minimum entry shall be provided at one end of the long side of the compartment. A grab bar shall be provided on the back wall beginning at 6 inches (150 mm) maximum from the adjacent wall. The back wall grab bar shall extend the length of the wall but shall not be required to exceed 48 inches (1220 mm) in length. A grab bar shall be provided on the side wall. The side wall grab bar shall extend the length of the wall beginning at 6 inches (150 mm) maximum from the adjacent back wall but shall not be required to exceed 30 inches (760 mm) in length.



Note: Inside finished dimensions measured at the center points of opposing sides

Fig. 608.2.4 (NEW)
Alternate Roll-In Shower
Compartment Size and Clearance

Rationale: Provides equivalent size and clearance as 608.2.3 without seat and front wall for assistance in bathing. Also provides shower overlap for toilet clearance.

608.4.4 (NEW) Alternate Roll-In Type Shower Compartments for Elder Use. The controls and hand shower provided in a roll-in type shower compartment for elder use shall be located on the back wall above the grab bar, 48 inches (1220 mm) maximum above the shower floor and 16 inches (405 mm) minimum and 44 inches (1120 mm) maximum 33 inches (840) from the side wall.

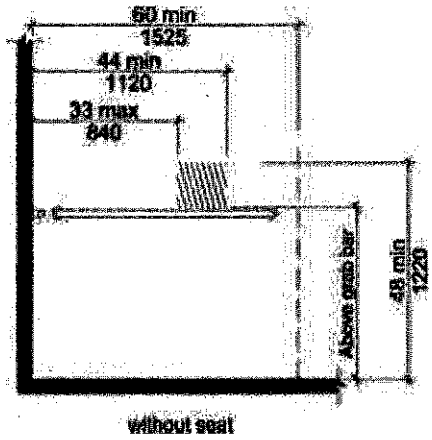


Fig. 608.4.4 (NEW)
Alternate Roll-In Shower
Compartment for Elder Use
Control and Hand Shower Location

ANSI A117.1
604 Water Closets and Toilet Compartments

604.1 General. Accessible water closets and toilet compartments shall comply with Section 604. Compartments containing more than one plumbing fixture shall comply with Section 603. Wheelchair accessible compartments shall comply with Section 604.8. Ambulatory accessible compartments shall comply with Section 604.9.

EXCEPTIONS:

1. Water closets and toilet compartment primarily for children's use shall be permitted to comply with Section 604.10 as applicable.
2. **Water Closets and toilet compartment for elder use in Nursing home or Assisted Living facilities where fixtures are located in toilet or bath rooms directly accessible from a private or semiprivate bedroom, shall be permitted to comply with section 604.12**

ANSI A117.1
604.5 Grab Bars. Grab bars for water closets shall comply with Section 609 and shall be provided in accordance with Sections 604.5.1 and 604.5.2.
Grab bars shall be provided on the rear wall and on the side wall closest to the water closet.

EXCEPTIONS:
1. Grab bars are not required to be installed in a toilet room for a single occupant, accessed only through a private office and not for common use or public use, provided reinforcement has been installed in walls and located so as to permit the installation of grab bars complying with Section 604.5.
2. In detention or correction facilities, grab bars are not required to be in housing or holding cells or rooms that are specially designed without protrusions for purposes of suicide prevention.
3. **In Nursing home and assisted living facilities where fixtures are located in toilet or bath rooms directly accessible from a private or semiprivate bedroom, two swing up grab bars complying with Section 609 shall be permitted**

Rationale: Grab Bar Type. Grab bars on both sides of the toilet permit individuals with limited lower body strength who require assistance to maintain balance while clothing is removed or replaced. For individuals with limited upper body strength who are capable of independent, standing transfer, grab bars on both sides enable them to pull up to a standing position and lower down to a sitting position.

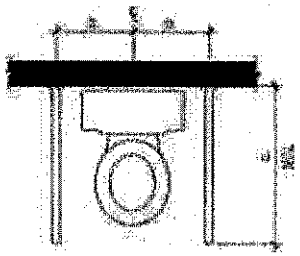


Figure 604.5.3 (NEW)
Swing-up Grab Bars for Water Closet *

Dimension a. and b will be determined upon research results currently being conducted.
(See Chapter 5 of White Paper, July 20, 2012.)

604.12 (NEW) Water Closets and Toilet Compartments for Elder Use.

604.12.1 General. Accessible water closets and toilet compartments primarily for Elder use shall comply with Section 604.12.

604.12.2 Location. The water closet shall be located with a wall or partition to the rear. The centerline of the water closet shall be 30 inches (760 mm) minimum from any side wall, partition or fixture. Water closets located in ambulatory accessible toilet compartments specified in Section 604.9 shall be located as specified in Section 604.2.

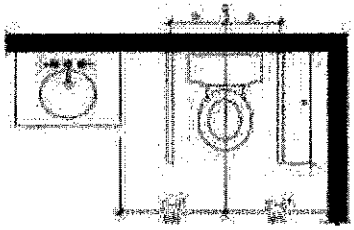


Fig. 604.12.2
Elder Water Closet Location *

Dimension a. and b will be determined upon research results currently being conducted.
(See Chapter 5 of White Paper, July 20, 2012.)

Rationale: Increased side wall clearance. Space is needed on both sides of the toilet to accommodate the range of transfer techniques including the front approach normally used in independent sit to stand transfers; caregivers to stand on either or both sides, for one- or two-person assisted transfers as necessary; and for use of a mechanical lifting device.

604.12.3 (NEW) Clearance.

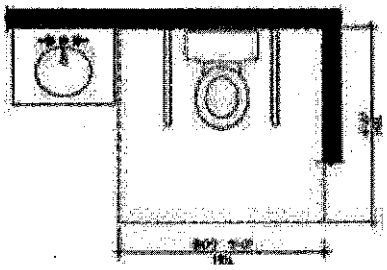


Fig. 604.12.3 (NEW)
Elder Size of Clearance for Water Closet

604.12.3.1 Size A clearance around a water closet 60 inches (1525 mm) minimum, measured perpendicular from the sidewall, and 56 inches (1420 mm) minimum, measured perpendicular from the rear wall, shall be provided.

604.3.2 Overlap. The required clearance around the water closet shall be permitted to overlap the water closet, associated grab bars, paper dispensers, sanitary napkin receptacles, coat hooks, shelves, accessible routes, clear floor space at other fixtures and the turning space. No other fixtures or obstructions shall be within the required water closet clearance.

604.12.4 Height. The height of water closet seats complying with Section 604.4 shall be provided.

604.12.5 Grab Bars. Grab bars for water closets shall comply with Section 604.5.3

604.12.6 Flush Controls. Flush Controls Flush controls shall be hand operated or automatic. Hand operated flush controls shall comply with Section 309. Flush controls shall be permitted to be located on either side of the water closet.

604.12.7 Dispensers. Toilet paper dispensers shall comply with Section 309.4 and shall be located on the fold-up grab bar 3 inches (76.2 mm) maximum behind the front of the water closet measured to the center line of the dispenser. The outlet of the dispenser shall be 21 inches (533.4 mm) minimum above the floor. There shall be a clearance of 1 ", inch (38 mm) minimum below the grab bar. Dispensers shall not be of a type that control delivery or do not allow continuous paper flow.

Rationale: Dispenser Location for Caregivers. For both independent and assisted toileting, dispensers need to be located for both resident and caregiver, convenience when using fold up grab bars and when the distance from the center of the toilet exceeds 19 inches.

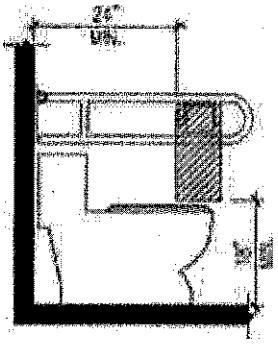
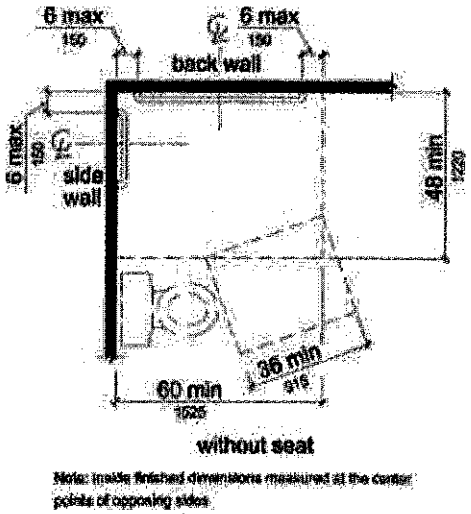


Fig. 604.12.7 (NEW)
Dispenser Location

608.2.4 (NEW) Alternate Roll-In Type Shower Compartments for Elder Use. Roll-in type shower compartments for elder use shall be 48 inches (1220 mm) wide and 60 inches (1525 mm) deep minimum clear inside dimensions measured at center points of opposing sides. A 36 inch (915 mm) wide minimum entry shall be provided at one end of the long side of the compartment. A grab bar shall be provided on the back wall beginning at 6 inches (150 mm) maximum from the adjacent wall. The back wall grab bar shall extend the length of the wall but shall not be required to exceed 48 inches (1220 mm) in length. A grab bar shall be provided on the side wall. The side wall grab bar shall extend the length of the wall beginning at 6 inches (150 mm) maximum from the adjacent back wall but shall not be required to exceed 30 inches (760 mm) in length.



Note: Inside finished dimensions measured at the center points of opposing sides

Fig. 608.2.4 (NEW)
Alternate Roll-In Shower
Compartment Size and Clearance

Rationale: Provides equivalent size and clearance as 608.2.3 without seat and front wall for assistance in bathing. Also provides shower overlap for toilet clearance.

608.4.4 (NEW) Alternate Roll-In Type Shower Compartments for Elder Use. The controls and hand shower provided in a roll-in type shower compartment for elder use shall be located on the back wall above the grab bar, 48 inches (1220 mm) maximum above the shower floor and 16 inches (405 mm) minimum and 44 inches (1120 mm) maximum 33 inches (840) from the side wall.

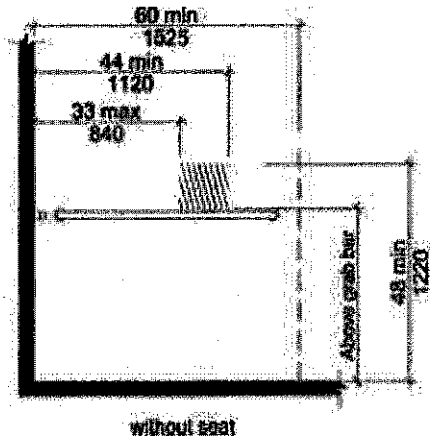


Fig. 608.4.4 (NEW)
Alternate Roll-In Shower
Compartment for Elder Use
Control and Hand Shower Location

Rational: Provides location for assistance in bathing.

Chapter 5 - Recommendations for Further Research and Product Development

Despite the recommendations in Chapter 4, little evidence exists upon which to base optimum technical specifications. While the intent is not without both solid research and practice bases, the specific dimensions lack empirical data. Research is needed to understand the usability of design on caregivers and care recipients as well to develop evidence-based design specifications for older adults and their caregivers. The former includes the impact of current guidelines and alternative designs on: safety and injury prevention; proper positioning of care recipients and care providers; and flexibility in accommodating individuals with different and possibly multiple disabilities. The latter includes studies to determine optimum design specifications, such as: toilet height and location, grab bar height, positioning, and location; clear floor space; and size of fixtures.

Specifically we lack empirical data to determine technical specifications for:

Toilet

1) Location of water closet
    a. distance between side of toilet and closest obstruction to permit assistance or side transfer
    b. clear floor space around the toilet for maneuvering a wheelchair, assisted donning and doffing of clothes, maneuvering a mechanical lift
2) Height of toilet seat
    a. optimal height to accommodate both sliding and standing transfers, not just sliding transfers directly from a wheelchair
3) Location of toilet grab bars
    a. distance between bars on either side of toilet: research suggests that bars separated by width of toilet seat or tank are too far apart to optimize existing strength for independent transfer
    b. height: research suggests that shorter individuals use lower bar of swing up bars to push off toilet
4) Profile of grab bar
    a. single bar vs. two bars at different heights, front curved section – research suggests that among those who transfer independently, some individuals (e.g., shorter women), push off from lower part of swing up bars while others use the front of swing up bars to pull up from wheelchairs to a standing position
5) Profile of gripping/support surface
    a. shape/diameter of support surface - research suggests that different sections of grab bars are used for different purposes and therefore require different profiles, e.g., top of bar is used for pushing off similar to a chair armrest which suggests a flat surface, while the front curved part of a swing up bar is grasped and used for pulling up from a wheelchair
6) Effective length of grab bars (i.e., reachable length)
    a. distance from front of toilet to front of grab bar
    b. distance from back of toilet seat to front bar
7) Dispenser Location
    a. optimal forward and side reaching distance from resident seated on toilet for independent use
    b. optimal location for caregiver to provide assisted use

Shower

1) Location of Grab Bars.
    a. Standing from a shower chair with the use of a wall mounted grab bar for washing genital and rectal areas by a caregiver
    b. Standing in shower for independent and assisted use
2) Location of Controls

RESEARCH STUDIES TO BE COMPLETED

There are two research studies underway, that are to investigate the most effective position of grab bars for older adults. These studies, when completed, will provide critical dimensions needed to establish the guideline recommendations within this White Paper.

1. Title: OPTIMIZING TOILET LOCATION FOR ASSISTED TOILETING

Investigators: Jon A. Sanford, M.Arch., Georgia Tech & Sheila Bosch, PhD, Gresham, Smith and Partners, Tampa Florida

Sponsors: AIA Tampa Bay Academy of Architecture for Health and the Hulda B. & Maurice L. Rothschild Foundation

Abstract

The intent of the ADA Accessibility Guidelines for toilet rooms is to ensure that people with disabilities can use public rest room facilities - but do they? An increasing percentage of the US population, and older adults, in particular, has some form of mobility limitation requiring assistance with activities, such as toileting. The ADAAG, however, requires the centerline of the toilet to be 18" from a sidewall, which will enable wheelchair users to reach the grab bars and transfer independently. Unfortunately, for the majority of users who require assistance in transfer, this distance is too narrow to enable a caregiver to stand alongside a patient to provide assistance. As a result, assisted transfers not only take more staff time and are more difficult than it need be, they also puts both the caregiver and care recipient at risk of injury. Nonetheless, the optimal distance of the toilet from the wall for assisted toileting is unknown. In the proposed study, data regarding the technical specifications for the toilet room will be analyzed. A repeated measures research design involving surveys and video observation of simulated toileting events will be conducted. The final outcome of the study will be recommendations on how to design the toilet room to better support safe and effective assisted toileting.

2. Title: DESIGN OF A NEW TOILET GRAB BAR FOR OLDER ADULTS

Investigators: Wanlin Xiang & Jon A. Sanford, M.Arch., Georgia

Abstract

The purpose of this project is to develop and test a new grab bar that will meet the needs of older adults for independent transfer, yet provide the flexibility to facilitate assisted transfers, when necessary. Like most other accessibility codes, standards, and guidelines, the ADA accessibility guidelines are based on the functional levels of young adults with disabilities, particularly those who are wheelchair-dependent. However, there are fundamental differences in the abilities of older wheelchair users from the typical wheelchair-dependent person that effect the way they transfer in and out of their wheelchairs and have profound implications for the design and configuration of toilet grab bars. Whereas many younger wheelchair-dependent individuals have no lower body functioning, they have good upper body strength to use grab bars on one side and behind the toilet slide directly from the wheelchair to toilet. In contrast, frail elders tend to have less **upper body strength, range of motion and overall functioning**, which restricts their ability to pull themselves out of the chair and onto the toilet. However, they have **higher levels of lower body function,** which enables them to bear weight and perform sit-to-stand transfers. As a result, grab bars on both sides of a toilet are better suited to pull to a standing position, pivot and sit. Unfortunately, because current grab bars are designed to accommodate toilet and human dimensions the distance between grab bars forces elders, to pull with their shoulders rather than to maximize their remaining strength. This project will design and prototype grab bars that will facilitate and promote more independent transfers by older wheelchair users.

Committee Biographies

Craig Berger

Craig Berger is Director of Education for the Society for Environmental Graphic Design(SEGD). Craig started as a preservation architect before managing sign and streetscape programs for the Foundation for Architecture starting in 1996. In his capacity there Craig became an expert in urban sign and interpretive programs, completing studies and focus group testing on color, wayfinding, accessibility and maintenance /management issues. With that experience Craig built a consulting business centered around the development of planning, technical and educational tools around new practice areas working with clients like DuPont and Sunoco.

Craig took those skills to SEGD in 2002 and developed an educational and training program for the organization based on designer competencies as well as outreach programs in universities and other design associations. Internally Craig has worked to expand design knowledge through an extensive educational program of workshops, lectures, teleconferences and publications in three specific areas: Wayfinding, Information Design, and Exhibition Design. He has also spearheaded education programs in practice areas like the ADA, Dynamic Wayfinding, Human Factors, and Collaboratives Design Processes.

Recently Craig spearheaded a testing and educational program with SEGD on developing a set of universal healthcare symbols on behalf of Hablamos Juntos with the Robert Wood Johnson Foundation and is currently developing a design and innovation application lab at Fashion Insititute of Technology in New York City.

Craig has a bachelor's of arts and a bachelor's of architecture from the Pennsylvania State University (1993), and a Master's of Business Administration from Temple University (1999) with a concentration in International Business.

Margaret Calkins, Ph.D. CAPS, EDAC,

Margaret Calkins, Ph.D. CAPS, EDAC, is widely recognized as an expert in the creation and evaluation of long-term care settings, particularly for individuals with dementia. She is President of I.D.E.A.S., Inc., and Chair of the Board of the IDEAS Institute, both of which seek to improve environments for elders through the conduct of rigorous, applied research, dissemination of evidence-based information and resources, and individual partnering with designers and care providers. With the publication of her first book *Design for Dementia* in 1988, Dr. Calkins has been at the forefront of elder-supportive design. Although a small company with 5 employees, I.D.E.A.S., Inc. has received over $5m in research grants from the National Institute of Health.

She is a frequent keynote speaker at conferences in the US and abroad, making over 20 presentations annually. She is also a Founding Member and current Board member of SAGE-Society for the Advancement of Gerontological Environments, is active with The Gerontological Society of America, Environmental Design Research Association, and the Alzheimer's Association, recently serving on the Board of the Cleveland Area Chapter.

Vincent G. Carter, FASID, NCIDQ

Vincent G. Carter, FASID, NCIDQ, is currently a Senior Program Manager with the Department of Homeland Security. Vincent is representing the American Society of Interior Designers (ASID) on the AIA ADA Task Force. He is a longtime advocate for accessibility and has served on various local and national committees and task forces. He lives in Washington, DC.

Quinn de Menna, AIA

Quinn de Menna is a Principal at ADM & Associates and has 22 years of experience in planning, programming, design and construction administration focused on senior living projects. His work has been published in books and periodicals and has served as a lecturer at numerous regional and national conferences. Quinn has participated in numerous award-winning projects including the recent RLPS design entry for the Green House Design competition. He holds a B.S. from University of the Arts and a B.Arch. from Cornell University. Professional affiliations include LeadingAge (formerly the American Association of Homes and Services for the Aging) and Society for the Advancement

of Gerontological Environments (SAGE). Quinn is also the U.S. patent holder for the design of "Vanity Assist" a bathroom vanity top with integral grab bar to support the frail elderly.

Ingrid L. Fraley, ASID

Ingrid Fraley, President of Design Services, Inc. has been active in the design of senior living environments nationwide for over twenty-five years.

As 2009 Chair Emeritus for the Design for Aging Knowledge Community (DFA) of The American Institute of Architects (AIA), she continues to emphasize the importance of issues surrounding the design of supportive housing for older adults. Most recently, Ms Fraley participated in Post Occupancy Evaluations of award winning senior housing projects to provide evidence based design research to the senior housing industry. With co-authors Jeffrey Anderzhon, FAIA and Mitch Green, AIA, these results were published by John Wiley and Sons. In February, 2009 she participated in a Congressional briefing on older Americans as part of AIA's Grassroots Conference in Washington, D.C.

Ms Fraley currently serves on the ASID Council on Aging, the revision committee for the Facilities Guidelines Institute, and is co-chair of the Design for Aging Washington, D.C. chapter.

Dennis A. Hancher, RA.

Thirty five years of varied national and international medical design in private sector and government service. Former design director with U.S. Commission on Economic Recovery to design national system of clinics for government of Saudi Arabia. Currently working with Department of Veterans Affairs, Office of Construction and Facilities Management. Serves as VA's liaison to the U.S. Access Board.

Robert Dale Lynch, FAIA

Robert Dale Lynch, FAIA is registered as an architect for 41 years, licensed to practice in the Commonwealths of Pennsylvania & Virginia. He is an architectural expert witness and consultant and Principal of Lynch & Associates, Architects, a firm in continuous operation since 1982. In 1991 he was awarded the PSA Medal of Distinction, gold medal & highest honor bestowed by the Pennsylvania Society of Architects.

In 1996 Bob Lynch was elected to the College of Fellows of the American Institute of Architects (AIA). In 1990 he participated in refinement & enactment of the Americans with Disabilities Act, testifying before Congress and working with congressional staff on behalf of the AIA. From 1984 to 1988, Bob worked for Pennsylvania Senator James Rhodes to write and testify before the Pennsylvania Legislature for enactment of the Universal Accessibility Law. He was then appointed as a founding member of the Pennsylvania Universal Accessibility Review Board for a 4 year term.

In1992 Architect of the Capitol, George M. White commissioned Robert Dale Lynch to create and undertake a computerized ADA survey of the United States Capitol Building, including 632 rooms and 500,000 square feet of public and restricted public space.

Throughout his career, Bob has designed accessibility modifications for over 165 private homes and multi-family residential facilities. For 12 years, he has been a member of the faculty of the University of Pittsburgh's School of Health & Rehabilitation Sciences, and taught courses in architectural design & construction to rehabilitation professionals.

Since 1988 Bob Lynch has served as a member of the American National Standards Institute Committee on Accessible & Usable Buildings & Facilities, representing the United Cerebral Palsy Associations and the Brain Injury Association of America. He has contributed to creation of the 1992, 1996, 1998, 2003 & 2010 Editions of ANSI A117.1 Standard for Accessible & Usable Buildings & Facilities.

Robert Dale Lynch is a researcher at University of Pittsburgh to test, via virtual reality software, the effectiveness of a remote accessibility assessment system in evaluating the wheelchair accessibility of private residences. He is a Professional Member of the International Code Council, a 39-year member of the American Institute of Architects, and an Associate Member of the American Academy of Forensic Sciences.

Robert N. Mayer, Ph.D.

Rob Mayer is President of the Hulda B. and Maurice L. Rothschild Foundation; the only national philanthropy exclusively focused on supporting person-centered care in long term care. It's commitment to eldercare was recognized in 2009 by the Council on Foundations with the Critical Impact Award, given for innovative leadership and bold vision to solve societal issues and enhance the common good.

For over a decade, the Rothschild Foundation has supported the work of many national organizations, in an effort to strengthen and broaden the person-centered care movement. Working proactively through a wide range of strategic initiatives, the Foundation has sought to break down traditional barriers to change and to create opportunities for greater collaboration between the fields of acute and chronic care.

Prior to his involvement in the independent sector, Rob spent fourteen years in the private sector, where he directed the management resources function of a Fortune 100 multi-national Corporation, and later he founded a healthcare company.

Rob serves on the boards of the Museum of Contemporary Art and the American Civil War Center. He holds an AB *cum laude* with high honors from Kenyon College; an MBA with honors from the University of Chicago; and a Ph.D. from Northwestern University.

Eric S. McRoberts, AIA

Eric S. McRoberts is a partner in the architectural firm of RLPS Architects. His commitment to providing meaningful environments for the elderly spans a 22-year career encompassing independent living, assisted living, skilled care, memory care and hospice. As a lead designer, Eric provides a clear understanding of how well conceived design can positively impact quality of life. He has served as a speaker and panel member at numerous state, national and international conferences. A graduate of Temple University with a Bachelor of Architecture, Eric is an NCARB registered architect. He currently serves on the American Institute of Architects, Design for Aging Knowledge Community Advisory Group and served as the National Chairperson in 2010. Other professional affiliations include LeadingAge (formerly the American Association of Homes and Services for the Aging), Society for the Advancement of Gerontological Environments (SAGE) and the National Hospice and Palliative Care Organization (NHPCO).

Tracy Morgan, MSc PT, EDAC

Tracy Morgan holds a Masters in Physical Therapy with a 14 year history of direct clinical practice in acute and residential care. She has specialized in the field health and safety with a degree in Human Kinetics and advanced training in Ergonomics and currently holds an Injury Prevention Project Management Position at Vancouver Coastal Health. She is an EDAC designate and consults on the research, design and evaluation of Residential Care Facility Design Projects. Her most recent research evaluates the effectiveness of residential bathroom and bathing room designs to promote client function and staff safety. Based on a unique working knowledge of what the space requires to be effective for the user within a healthcare system she has been able to advance healthcare best practice 'from the ground up', a passion demonstrated within her work.

Jon Sanford, M. Arch

Jon Sanford is Director of the Center for Assistive Technology and Environmental Access and an Associate Professor of Architecture. He is also a Research Architect at the Rehab R&D Center at the Atlanta VA Medical Center. Mr. Sanford received both BS and M.Arch. degrees from Georgia Tech and is one of the few architecturally-trained researchers engaged in accessible and universal design. He has been actively involved in research and development related to the accessibility and usability of products, technologies and environments for the past 25 years and was one of the authors of the Principles of Universal Design. He has also been the Principal Investigator on numerous research projects related to the design of accessible environments for older adults and people with disabilities and is well- recognized for his work in facilitiating toilet and bathtub transfers . He has conducted numerous projects for the US Access Board that have resulted in numerous recommendations for changes in the technical requirements in the American's with Disabilities Act Accessibility Guidelines. His current work focuses on enhancing health, activity and participation of older adults and individuals with disabilities at home, work and in the community through universal design. Mr. Sanford has over 200 peer reviewed presentations, publications and book chapters and is working on a book about universal design to be published in 2010.

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4/29/2015

To: Timothy Mueller, AIA, LEED AP and President, SFCS, Inc. www.tmueller@sfcs.com

For: State/Local Authorities Having Jurisdiction (AHJ)
John Knox Village Lee's Summit, Missouri 64081

From: Lorraine G. Hiatt, Ph.D., Environmental Gerontologist

Re: The Meadows, New John Knox Village Residential Living Apartments, Lees Summit, MO
Documentation on Improved Resident Bathroom Safety:
Topic: Dual Side Fold-up Toilet-side Grab and Support Bars

OVERVIEW OF DOCUMENTATION: DUAL-SIDED BATHROOM GRAB BARS, RESIDENTIAL LIVING APARTMENT BATHROOMS, PURPOSE-BUILT FOR OLDER ADULTS/SENIORS

The purpose of this document is to provide the basis for the design proposed and presented for the dual-sided fold-up/fold-down rails for new, residential living apartments at The Meadows, John Knox Village, nationally recognized long-time sponsor of excellence in housing, health care and vitality programs for elders. The drawings and design have been prepared by SFCS, Inc., www.sfcs.com , Timothy Mueller, AIA, LEEP AP, President, a firm committed to safe, residential looking design for over forty years.

The documents submitted here demonstrate emerging technology, not available or widely adopted in the 1960's-2000, when ADA first emerged (see bibliography/references).

We have included examples and peer-reviewed journal publications and similar references on the functional needs of older people. References are included documenting specific considerations in older adult self-transfers and safety in term of upper body flexion and strength, weight bearing capacities, lower body positioning and best practices on wrist/arm positions during sit-stand-sit. Such needs have often been overlooked in documents addressing overall accessibility design and hardware, including device uses in schools, workplaces and public facilities.

As such, we propose that the dual-sided rails add safety during self-transfer (with and without wheeled devices) for older adults which was not covered in the early developments of an otherwise excellent accessibility resource.

The data, illustrations and annotated design features have been assembled to demonstrate ***equivalent facilitation and greater usability***, fully consistent with the performance objectives of ADAAG (included).

All features proposed have been used and incorporated in other sites and rely on stock products and time-tested installations.

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EXECUTIVE SUMMARY: ILLUSTRATION OF PROPOSED BATHROOM in the APARMENT CONTEXT

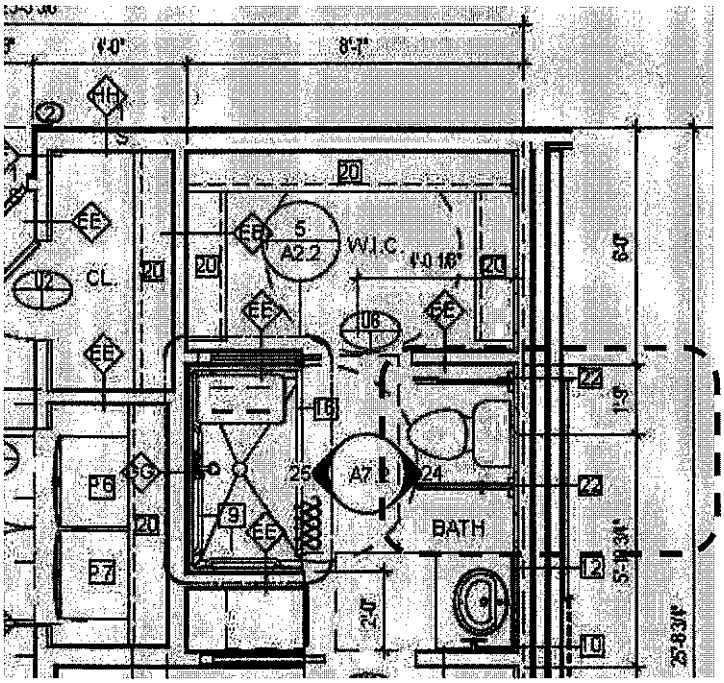


FIGURE 1: SFCS, Inc. submission, plan for John Knox Village, Residential Living Bathroom. Shown with the addition two fold-up/fold-down, dual side grab bars.

Dimensions to the outside of rails are consistent with ADAAG. For dimensions at a close-up view, see Figure 10:

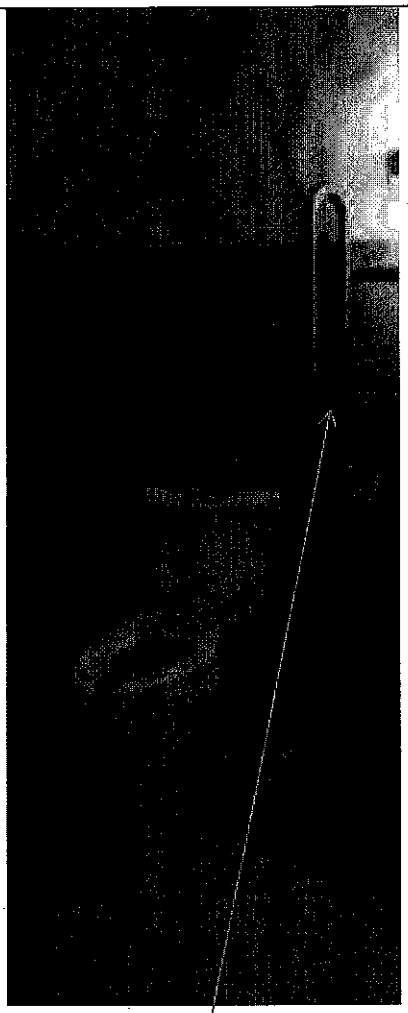


FIGURE 2: Bathroom example of dual-sided rails in "foldup position" designed by SFCS, Inc., Rockhill Mennonite Retirement Community, Sellersville, PA.

Note the "beveled" rail improvement, top wider than bottom, an added ergonomic benefit. Source: Signature Hardware.

WHO ARE TODAY'S SENIOR LIVING APARTMENT OCCUPANTS?

From the 1960's to perhaps 1995, housing markets "for older people" were approached as design "for the independent." Years of research on the markets and occupancy characteristics has resulted in an understanding by sponsors, marketers, designers and more recently, by aging "baby boomer" consumers, that the purpose-built housing *confers greater independence* than traditionally designed settings, improving one's capabilities accommodating slight, notable changes associated with healthy aging. One who comes may actually be aware of minor to modest changes from energy levels, speed of response to balance, upper body limitations and vulnerability to falls.

Despite these changes, according to AARP (www.aarp.org) studies, the market dominated by coming age cohorts, voice a passionate preferences for holding on to home or living with independence, staving off health care residency. These consumers are increasingly informing the design of both independent and assisted living, of wellness/fitness centers and even some community public amenities (www.boomingboroughs.org).

Today's developers, sponsors and designers of housing for independent living must now address the ability to "age in place" and of features that contribute to the overall potential to live "residentially," coping with sensory and mobility changes with minimal personal care. A well-designed apartment actually does not ignore capability shifts, but rather supports the individual's aging progression.

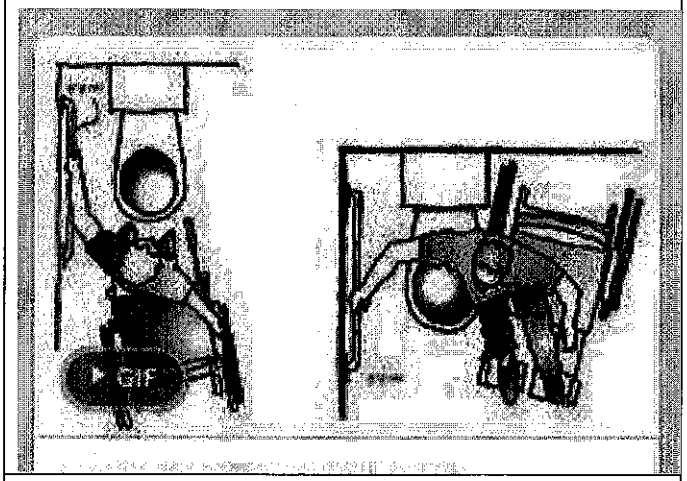
The initial occupants of John Knox Village's new Residential living may range in age from late 70's to even 90+ years. Within 5-8 years after opening, the median age and the age range tends to increase for the remainder of the building's life cycle (Ziegler/LeadingAge, 2014). While the majority will walk in, it will not be unusual for a series of minor to moderate changes to impact potential independence. The bathroom use patterns and risks are being widely discussed, as the value of dignity and personal comfort in hygiene are better documented (CDC, 2011). Table 1 outlines the array of users over time in residential and assisted living. A one-time investment in bathroom safety is more cost-effective than human personal assistance.

TABLE 1: LIFE CYCLE OF RESIDENTIAL LIVING AND BATHROOM USERSHIP

Bathroom Users, Anticipated Over the Life Cycle of Residential and Assisted Living Today	No Device	Walker, Wheeling Walker	Standard Wheelchair	Mobility Cart, Typically Battery Operated
Typical: Individual Senior	√	√	√	√
Sponsor Criteria Senior and One Assistant Option Per Service Plan	√	√	√	

HOW DO ONE-SIDE, ADAAG-COMPLIANT WALL MOUNTED RAILS CHALLENGE HUMAN FACTORS OF AGING ADULTS: e.g., Upper Body Strength, Center of Gravity in Transfer, Balance and Overlook Potential Strength of Thighs and Weaknesses of Shoulders and Wrists?

The following illustrations are adapted from ADAAG design guides and illustrate the expected use of the wall side rail, for a person capable of making the types of wheelchair transfers illustrated. There ARE NO depictions of the system in use for a person who does not require the wheelchair (e.g., the majority of bathroom users) but who COULD benefit from stabilization.



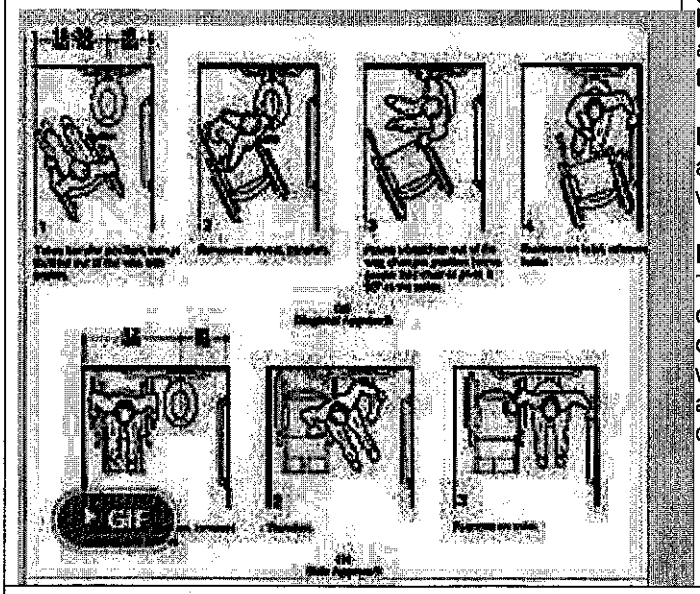


FIGURE 3a (Above). Assumptions in the Single Rail Use. Illustrations from www.Wingit.com demonstrating ergonomic implications of one armed transfers. Such methods are no longer judged appropriate for the majority of elders due to impact on fragile rotator cuff.

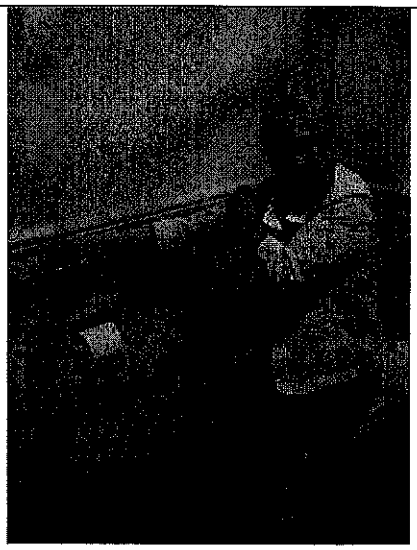
FIGURE 3b (Below) Illustrations from original ADA Guidelines on uses of a single, wall side bar also adapted from www.wingit.com

The single bar derives PVA (Paralyzed Veterans Association) and may have been well suited to VA rehab settings for returning Korean War Veterans. Extension to a generation of older users in senior housing and health care *now that other alternatives are available* fails to apply best practices in self-transfer of older people (see bibliography)..

Removable arm wheelchairs, assumed in the above illustrations are a special order item, not widely used by elders.

HARDSHIP FOR RESIDENTIAL LIVING
The challenge for John Knox Village is that in complying with the single wall bar, information on safe self-transfer for older people with and without wheelchairs is not applied, risking toilet area falls and related human and financial consequences.

FIGURE 3a, 3b: UDATED (above) and EARLY Graphic Illustration of ADA Guidelines on transfer, Usership (below).



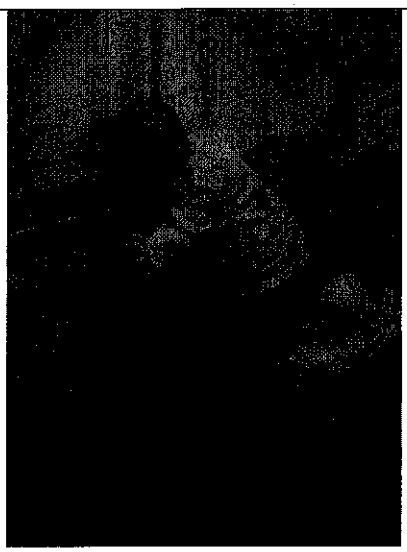
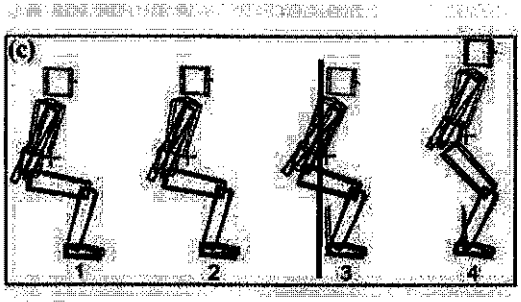


FIGURE 4a and 4b: Challenges of Self-Transfer with Limited Should Strength with Compliant Bathroom Hardware (Applicable with or Without a Wheelchair) where one attempts to keep center of gravity low. Illustrations from post-occupancy evaluations of ADA Guideline- Compliant fixed, single side-wall support rails. Study led to innovations for 2015 new construction at the Francis E. Parker, Monroe, NJ.

IMPROVING SAFETY IN RAISING AND LOWERING TO A SEAT

Comparing diagrams below with Figures 4 and 7 illustrate the center of gravity and trunk placement. See Figures 6 for better grab rails/arm rest locations.



Goal: Alignment over thighs using both arms as one shifts weight from buttocks to feet and readies to rise.

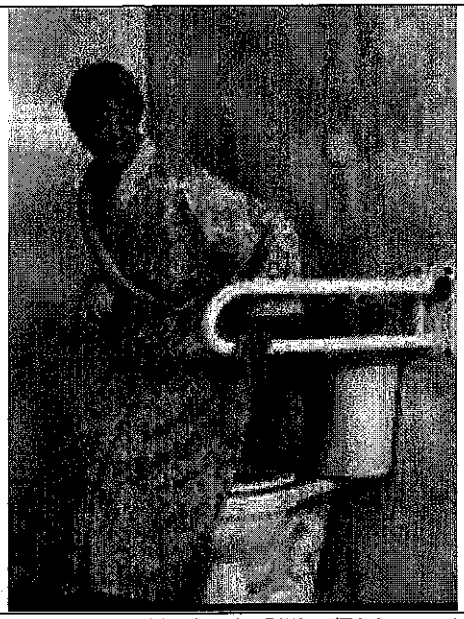
Weakness of above example, arms actually move forward under the trunk as one rises.

FIGURE 5: **Body Mechanics**. Dominant vertical chair-rise strategies demonstrating safer trunk, stance and weight distribution than images in preceding Figures 4a,b, above.

Note: Weight bearing in arms placed behind the buttocks is difficult for aging adults. See Figure 6, Below and Xaing (2013) with research indicating value of fold-down bars with extended front edge features for better sequencing and choices of arm placement.

Note: this research is very current and may eventually result in emergence of newer designs.

Superior arm placement for elders is shown in images below, Figures 6a, 6b. Note each grab bar has a different height AND width, illustrated Figure 6b, below. Arms are tucked under and used to pull forward and to lower one to a seat. This support is not possible with one wall mounted grab bar, whether horizontal or diagonal or both (See Figures 3 to 7.)



FIGURES 6a, 6b: Images Demonstrating Safer, Dual Support, Body Positioning in Sitting/Rising and Maintaining a Well-balanced Distribution of Weight over Both Hips, Thighs, Knees and Feet. Engaging thighs is particularly important (see bibliography) and easier in well-positioned, dual side support bars.

FIGURE 7: Self-Help. What do People do with a one-side rail solution? Use the Sink? Note she is trying to use sink as the 2nd rail. (Home visit example, individual commenting on challenges.)

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PROPOSED DELETION OF REDUNDANT BACK WALL SUPPORT BAR and USE OF DUAL FOLD-UP BARS FOR SUPERIOR STANDING USE

604.3.2 Overlap.
The required clearance around the water closet shall be permitted to overlap the water closet, associated grab bars, dispensers, sanitary napkin disposal units, coat hooks, shelves, *accessible* routes, clear floor space and clearances required at other fixtures, and the turning *space*. No other fixtures or obstructions shall be located within the required water closet clearance.

EXCEPTION: In *residential dwelling units*, a lavatory complying with 606 shall be permitted on the rear wall 18 inches (455 mm) minimum from the water closet centerline where the clearance at the water closet is 66 inches (1675 mm) minimum measured perpendicular from the rear wall.

Advisory 604.3.2 Overlap.
When the door to the toilet room is placed directly in front of the water closet, the water closet cannot overlap the required maneuvering clearance for the door inside the room.

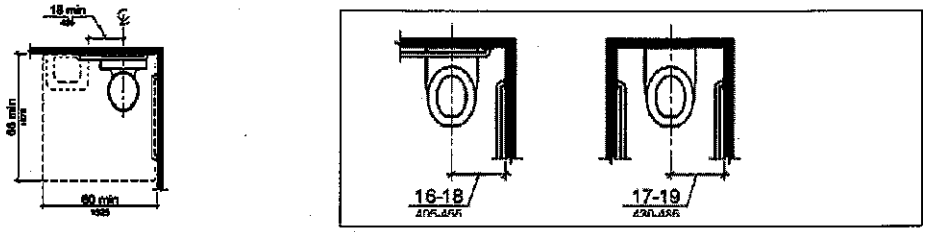


FIGURE 8: Typical ADAAG Guidelines for Toilet and Wall Side and Back Wall Rail Placements.
Note that the diagram to the right shows back-wall rail removed when two-sided rails are provided.

CHALLENGE/LIMITATION of One-Side, Wall Mounted Grab Rail when Dual Sided Fold-up/Fold-Down Bars are Specified	John Knox Village BATHROOM DESIGN RESPONSE
NOTE: In ADAAG, This image is labeled "overlap," but also deals with grab bar behind the toilet. The challenges/limitations of back wall grab bar. 1. Back wall grab bar require an elderly male to reach across the full depth of the toilet selected. 2. Ergonomically and with the popularity of elongated toilets and residential preference for tank top toilets, a back wall bar is too far to reach for safe, well-aimed urination. That stance exceeds normal outstretched arm strength, and may off balance the individual or impede access to the toilet target. 3. A choice of grabbing locations along a vertical bar that extended forward (see fold-up bars) would respond to more and different stabilization needs.	The two fold-up bars fulfill the function of the back wall horizontal bar. A fold-up bar that "clicks" securely in place is used. These are attached to a blocked wall and meet the equivalent weight bearing requirements of a horizontal bar. 1. Fold-up grab bars can be secure in the upright position. 2. One bar on either side gives a choice of gripping and stability. 3. The result of the hardware and bar combination extend forward and better "meet" the standing needs of a toilet user. Summary: The dual sided bars exceed the function of one back wall bar and are offered in substantial compliance of the ADA Guidelines, addressing a wide range of needs of residents who stand before a toilet or sink.

Table 2: Challenges and John Knox Village Design Responses in Incorporation of Fold-Down/Fold-Up Rails for Self Transfer.

BACKWALL HORIZONTAL GRAB BAR/RAIL, CONTINUED

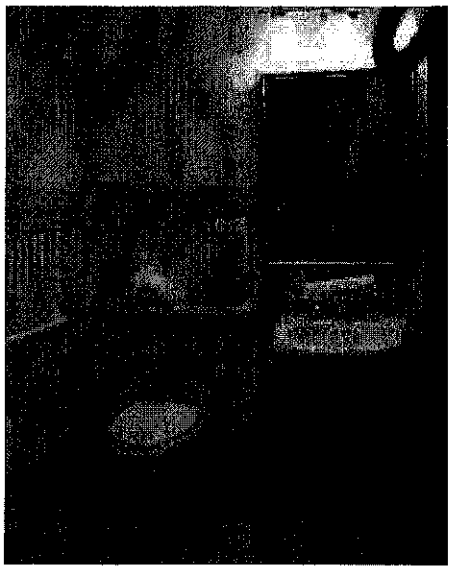


FIGURE 9a: Simple Typical Bathroom Compliant with ADA. One wall side and back rail.

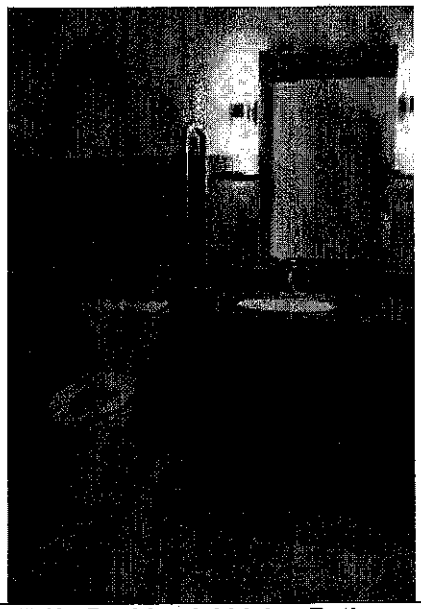


FIGURE 9b: Residential Living Bathroom with Dual Sided (Beveled) Grab Bars shown in Fold-Up Position. Back-wall horizontal bar omitted with dual-side rails meeting its function. Image Credit: Rockhill Mennonnite Retirement Community, SFCS, Inc., with LG Hiatt, Ph.D. 2013.

CHALLENGE/LIMITATION BACK WALL GRAB BAR, STAND-UP TOILETING	JKV BATHROOM PLAN RESPONSE continued
The challenges/limitations of back wall grab bar. 4. Back wall grab bar may be independently used primarily by older males. 5. Ergonomically and with the popularity of elongated toilets and residential preference for tank top toilets, a back wall bar is too far to reach for safe, well-aimed urination. 6. For staff assists, the one horizontal bar provides limited staff stability.	The two fold-up bars serve the function of the back wall bar. 4. Fold-up grab bars can be secure in the upright position. 5. One bar on either side gives a choice of grabbing heights. 6. The result of the hardware and bar combination extend forward and better "meet" the standing needs of a toilet user and of a staff assistant. The dual sided bars exceed the function of one back wall bar and are offered in substantial compliance of the ADA Guidelines, addressing a wide range of needs of residents and of assistants.

Table 3: Challenges: Back-Wall Grab Rail.

DISPENSER IS INTEGRATED IN HANDRAIL and/or ON THE SIDE WALL

Dual sided grab bars do not preclude a traditional ADAAG as well as a new, bar-located dispenser for convenient paper access.

604.7 Dispensers.
Toilet paper dispensers shall comply with 309.4 and shall be 7 inches (180 mm) minimum and 9 inches (230 mm) maximum in front of the water closet measured to the centerline of the dispenser. The outlet of the dispenser shall be 15 inches (380 mm) minimum and 48 inches (1220 mm) maximum above the finish floor and shall not be located behind grab bars. Dispensers shall not be of a type that controls delivery or that does not allow continuous paper flow.

Advisory 604.7 Dispensers.
If toilet paper dispensers are installed above the side wall grab bar, the outlet of the toilet paper dispenser must be 48 inches (1220 mm) maximum above the finish floor and the top of the gripping surface of the grab bar must be 33 inches (840 mm) minimum and 36 inches (915 mm) maximum above the finish floor.

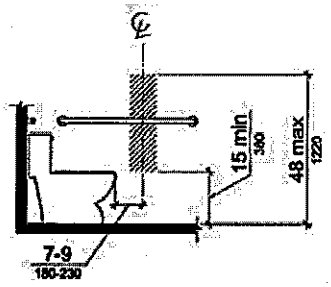


FIGURE 604.7 DISPENSER OUTLET LOCATION

FIGURE 10: Fixture Location for Toilet Paper Dispenser per ADA (shaded area).

JKV BATHROOM PLAN RESPONSE: Dispenser Options

FIGURE 11: DISPENSER OPTIONS. Proposed: one rail to have paper holder, conveniently in rail. A dispenser may also or alternatively be located on the opposite wall side with wall mounted dispenser. Two sides allow resident options. Product shown from Signature Hardware and shows that dispenser is ordered separately.

SUMMARY DESIGN FEATURES INCORPORATED INTO THE NEW, John Knox Village's BATHROOM

The safety of dual side, securely "blocked," fold-up/fold-down grab bars offers older residents superior support as compared to a to a single vertical or horizontal grab bar mounted on one side of the wall.

For safe transfer/rails: Two securely blocked and effectively located grab rails are proposed for John Knox Village new residential living apartment bathroom design.

- Rails are positioned and securely installed for stability and safe use, predominantly for a person independently self-transferring. The body mechanics required include: steading, weight changes, and correct self-positioning during use. If appropriate, the rails may be moved up and out of the way to correspond to personal patterns of device use/non-use and transfer.

- When folded down, rails provide superior positioning for residents' use, particularly helpful in shifting weight for seating and standing.

- With these rails in the fold-down position, the rails effectively meet the requirements of the centerline of toilet to the wall, and *preclude the need to get the center line of the toilet within about 18" of the wall*. This allows the toilet to be in the best position for safe foot-work, turning and bending and maintaining a lower center of gravity.

- The configuration of dual-side, securely mounted grab rails also improves the patterns of use of a self-transferring for a wheelchair or walker user (see precedent list).

- For the gentleman facing the water closet, placing the two fold-up rails, in the "up position" and on either side of the toilet, offers an improvement in hygienic and dignified use in contrast to the back-wall grab bar, which has resulted in unsteadiness and missing the intended target (soiling one's self). Refer to Figure 8 indicating that in dual rail configurations in cubicles, the back rail is omitted.

The John Knox Village design and management team submit that the provision of two-sided fold-up rails is an improvement over the single, back wall, horizontal rail for newly proposed apartments. Overall, the design is substantially equivalent in purpose but the dual sided rails are superior in actual, practical use by older adults in a variety of choices of transfer techniques.

SUMMARY: BATHROOM USE, OWNER/SENIOR LIVING SPONSOR and DESIGN RESPONSIBILITY

The bathroom continues to be documented as one of the highest sites of falls, in one's own home as well as in many senior living settings. The toilet area is more significant than even the shower; however no published studies by grab rail type specifically addressing design for residential and/or assisted living exist in pub med 4/2015 (www.pubmed.gov, Buznick, Monenbroek, et al., 2005; CDC, 2011).

> "Injury rates increased with age, especially those that occurred on or near the toilet, which increased from 4.1 per 100,000 among persons aged 15–24 years to 266.6 among persons aged ≥85 years." -CDC, 2011, p. 730.
>
> "In contrast, the proportion of injuries that occurred when getting on, off, or using the toilet was lowest among persons aged 15–24 years (2.0%) and increased with age, reaching 19.3% among persons aged 65–74 years, 26.9% among persons aged 75–84 years, and 36.9% among persons aged ≥85 years. Injury rates were 1.2, 21.6, 64.8, and 190.1 per 100,000 for age groups 15–24, 65–74, 75–84, and ≥85 years, respectively." -CDC, 2011, p. 731.
>
> Notes: These were not injuries associated with loss of consciousness, but rather from falls. Data are from an emergency room study. No specific study of elder falls and rails ("none," "single-" or "double-sided" was available at the time of this letter).

The design of new, John Knox Village apartment bathrooms, applies current research on both human factors for resident apartments occupants. The median age of residential living residents is consistent with those at higher risk of toilet-area falls. The proposed design improvements are based upon a series of findings on the ergonomic/human factor implications of the range of motion, weight bearing and transfer capabilities of older persons.

SUMMARY OF RESIDENT CONSEQUENCES of FAILURE TO PROVIDE 2-SIDED, WELL-INSTALLED, FOLD-UP/FOLD-DOWN GRAB RAILS at the TOILET IN NEW CONSTRUCTION

Complying literally with the regulations would compromise the goals of accessibility in instrumental activities of daily living and may not provide important advances in falls prevention for toilet use by older adults.

Retrofitting and changes after construction, particularly since in-wall blocking is recommended (see Exhibit C), suggests the advantage of preparing for these rails during construction rather than awaiting a fall or similar to trigger a post-opening adaptation.

Difficulties in sit-to-standing for safe bathroom use may also trigger additional personal assistance and/or a move to assisted living, consequences in dignity and cost.

For John Knox Village's new Residential Living occupants, the design team has recommended a one-time installation of technology to support either those with present need or those who "age in place" who retain overall capabilities associated with residential living once these bathroom features are added.

WHY ISN'T THIS OPTION OUTLINED IN ADAAG NOW? PROGRESS IN DUAL-SIDED RAILS IN ACCESS GUIDELINES

Dual side grab rails were not on the market when early versions of Americans with Disabilities Guidelines were prepared. And, as noted, elders were not the focus of initial user research.

Issues of liability and falls, increased awareness of causes of costly hospital, rehabilitation and nursing home placement associated with bathroom falls have made the senior living and design community, including product manufacturers and elder living sponsors increasingly aware of the potential of falls-prevention through one-time costs of spatial configuration and hardware specific to strength, grasping and use by older people.

Older people's physical needs were not as well documented as those of returning Veterans and physically challenged people in the workforce and/or using public facilities. Many of these physical changes did not require mobility devices which had been the original focus of accessibility guides.

Only recently have researchers, gerontologists and economists begun to realize the minor/moderate changes in aging which together affect high rates of falls, needs for assistance and the costs of personal assistance in spaces such as toilet rooms and showers. Older persons, unlike proactive disability groups, have not been advocates of their own potential independence, in part because "good looking" features focused on their needs have not been widely incorporated in designs—perhaps because of the symbolic associations of adaptive devices in nursing homes.

As design improvements, improved appearance integrated into bathroom interior décor and greater awareness of the value in staving off overall nursing home placement become clearer, and aging in place more widely understood, features that improve a sense of balance and overall re-positioning are becoming a more acceptable option on par with corrective lenses, arm- vs. armless chairs, comfortable shoes and amplification devices. Newer beveled design adds to flexibility from one user to the next and for standing vs. lowering to safely sit.

The dual sided rails are cantilevered. The evolution of back-wall installations required improved methods of installation, blocking and securing fold-up/fold down rails.

Building reviewers have drawn attention to the issues of secure blocking techniques of a back cantilevered vs. side-wall rails. Methods of securing bars to meet the weight bearing requirements were improved (See Exhibit C, Installation Notes), adding to the confidence of sponsors and of AHJ reviewers.

The April 18-22, 2015 Environments for Aging meetings, Baltimore, MD, included a keynote presentation on research, funded by the Rothschild Foundation, conducted through Georgia Tech and a leadership group of the SAGE Organization (Calkins, 2015). Dual sided folding rails are likely to appear in an upcoming version of ADAAG. Research is currently illustrating the advantage of rails that extend over the front edge of the toilet seat, thereby corresponding with placement of weight over the center of foot and knees.

This progress report underscored the need to move from mock-up studies to more on-site post occupancy evaluation. This research is consistent with the findings of Facilities Guidelines Institute and SFCS, Inc. and its consultant in mock-up and post-occupancy studies such as those at the Armed Forces Retirement Center and Rockhill Mennonite Communities.

FACILITIES GUIDELINES INSTITUTE: INPUT FROM PEERS (Authorities Having Jurisdiction "AHJ's)

The Facility Guidelines Institute, an outgrowth of the American Institute of Architects, publishes consensus-based design guidelines advised by research to advance quality health care. This organization brings research to the table, addresses the performance basis of guidelines and seeks to navigate among the needs of all users (residents, caregivers) rather than the type of environment alone.

The chapter, 4.1 on Residential Health Care Facilities has been used in all or part by 40 states to develop performance based apartments design guidelines.

Although dual sided rails were originally conceived of for health care, the goal of housing is increasingly to stave off a move. Installing devices that can be folded up and out of the way or used at the discretion of the occupants empowers each to respond as needed and reflects our mutual awareness of statistically prevalent changes with age. See 2010 Guidelines for Design and Construction of Health Care Facilities. http://www.fgiguidelines.org/2010guidelines.html {A readable copy is available at no cost, see above website.) [1]

The Authorities having Jurisdiction (AHJ's) have advocated dual sided rails since the 2006 version of their document and have initiated AIA, FGI and Access Board meetings to outline a process for inclusion of the rails as soon as possible.

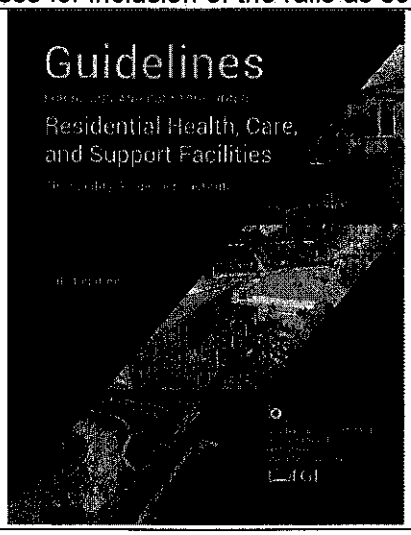


FIGURE 12: The Facility Guidelines. Nationally developed by professional organizations and Agencies with Jurisdiction from across the US. Peer input source of initial work on innovations including dual-sided bathroom fold-up bars.

[1] This same information originally appeared in the 2006 edition, by the same title.

The following is from 2014 Facilities Guidelines:

AR.1-7.2.2.9 (4) ADAAG, UFAS, and ANSI accessibility standards were all developed with the intention of providing greater access for individuals with disabilities. However, their standards are based on assumed stature and strength, and thus dimensional and grab bar requirements are intended to facilitate wheelchair-to-toilet transfers by individuals with sufficient upper body strength and mobility to effect such transfers. The typical residential health care facility resident is unlikely to have such capabilities and thus will require the assistance of one or more staff members, insufficient clearance at the side of the toilet can restrict staff mobility and access and result in injury. There are ongoing efforts aimed at educating regulators and advisory panels to the difficulties caused by requiring compliance with inappropriate standards in environments serving frail and geriatric populations.

Alternative grab bar configurations should address the following scenarios:

a. When a resident is capable of independent transfer facilitated by the grab bar and side-wall location required by accessibility standards, a removable/temporary wall structure and grab bar can be installed alongside the toilet.

b. When a resident required partial assistance in transfer, provision of fold-down grab bars on one or both sides of the toilet would facilitate such transfers, installation of fold-down grab bars requires evaluation of the toilet in relation to the wall and the grab bars provided. Clearance is needed on both sides of the toilet for an assisted transfer involving two or more staff members. The location of the toilet should be reviewed with regulators.

BASIS FOR JOHN KNOX VILLAGE APPEAL ON EQUIVALENT FACILITATION

How do features such as dual sided fold-up/fold-down rails get implemented in other sites? ADA was promulgated as a GUIDELINE. It is important to underscore that the enclosed documentation and request do NOT as to avoid safety. They are NOT exceptions to a "rule," but rather exceeding ways of addressing a GUIDELINE and the underlying needs for users whose needs were neither fully understood nor adequately addressed in early versions of the ADAAG.

The request is made to comply with the performance criteria of ADAAG for a specific population's ergonomic needs not covered in Americans with Disabilities Design Guides. See language of "Relief" or "Equivalent Facilitation" below.

"RELIEF" or EQUIVALENT FACILITATION INDICATING SUBSTANTIAL COMPLIANCE and/or IMPROVEMENTS

What does ADA really say about innovation?

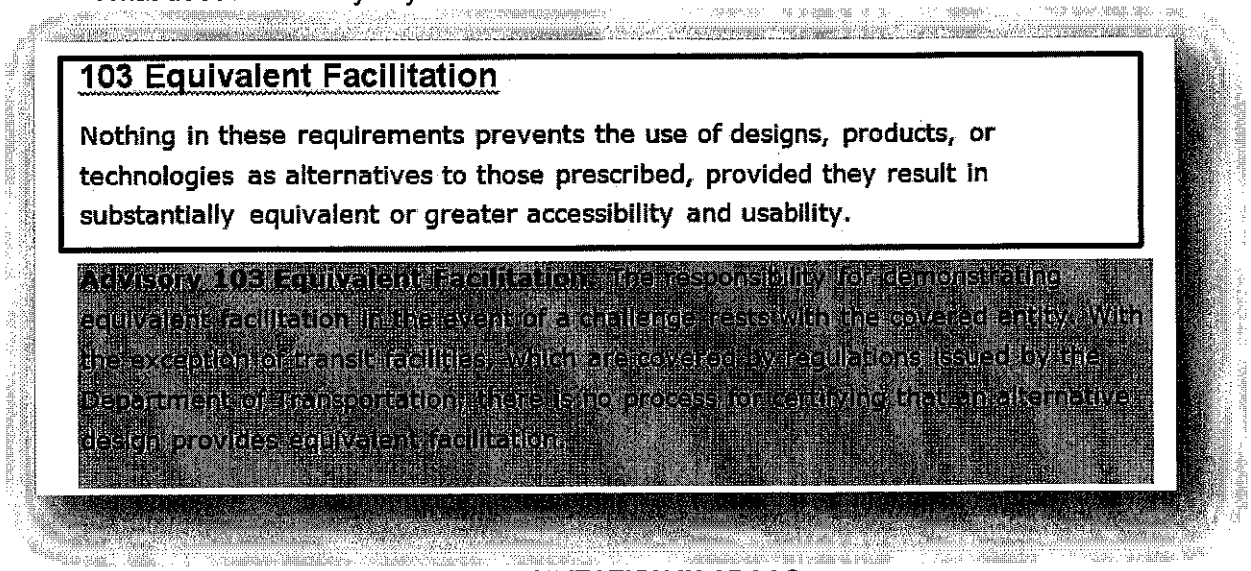
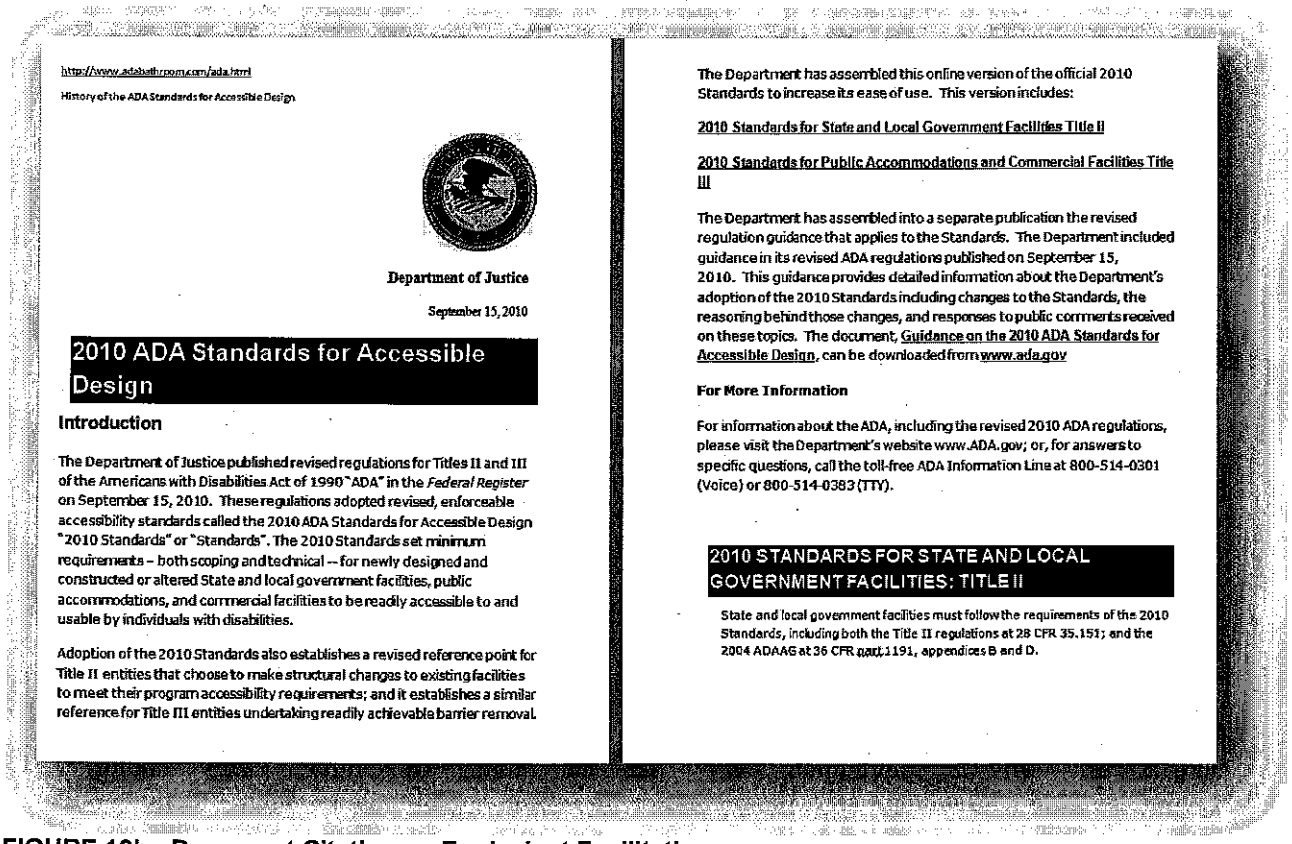


FIGURE 13 A: BASIS OF EQUIVALENT FACILITATION IN ADAAG.



http://www.adabathroom.com/ada.html

History of the ADA Standards for Accessible Design

Department of Justice

September 15, 2010

2010 ADA Standards for Accessible Design

Introduction

The Department of Justice published revised regulations for Titles II and III of the Americans with Disabilities Act of 1990 "ADA" in the *Federal Register* on September 15, 2010. These regulations adopted revised, enforceable accessibility standards called the 2010 ADA Standards for Accessible Design "2010 Standards" or "Standards". The 2010 Standards set minimum requirements – both scoping and technical – for newly designed and constructed or altered State and local government facilities, public accommodations, and commercial facilities to be readily accessible to and usable by individuals with disabilities.

Adoption of the 2010 Standards also establishes a revised reference point for Title II entities that choose to make structural changes to existing facilities to meet their program accessibility requirements; and it establishes a similar reference for Title III entities undertaking readily achievable barrier removal.

The Department has assembled this online version of the official 2010 Standards to increase its ease of use. This version includes:

2010 Standards for State and Local Government Facilities Title II

2010 Standards for Public Accommodations and Commercial Facilities Title III

The Department has assembled into a separate publication the revised regulation guidance that applies to the Standards. The Department included guidance in its revised ADA regulations published on September 15, 2010. This guidance provides detailed information about the Department's adoption of the 2010 Standards including changes to the Standards, the reasoning behind those changes, and responses to public comments received on these topics. The document, Guidance on the 2010 ADA Standards for Accessible Design, can be downloaded from www.ada.gov

For More Information

For information about the ADA, including the revised 2010 ADA regulations, please visit the Department's website www.ADA.gov; or, for answers to specific questions, call the toll-free ADA Information Line at 800-514-0301 (Voice) or 800-514-0383 (TTY).

2010 STANDARDS FOR STATE AND LOCAL GOVERNMENT FACILITIES: TITLE II

State and local government facilities must follow the requirements of the 2010 Standards, including both the Title II regulations at 28 CFR 35.151; and the 2004 ADAAG at 36 CFR part 1191, appendices B and D.

FIGURE 13b: Document Citation on Equivalent Facilitation.

http://www.adabathroom.com/ada.html

HOW HAVE PRESCEDENTS FOR DUAL SIDE, FOLD-UP/FOLD DOWN BARS BEEN ADDRESSED BY OUR PEERS?

Though varying by location, the language is typically, "Nothing in these requirements prevents the use of designs, products, or technologies as alternatives to those prescribed, provided they result in substantially equivalent or greater accessibility and usability."

The cantilevered rail, shown on **Figures 4a, 4b, 7 and 9**, provides a substantial equivalent to the originally envisioned transfer with a single, wall side rail, developed for stronger young and middle-aged wounded veterans.

The basis for the use, which has been granted in other locations, is typically accommodated under the "equivalent facilitation" or "substantial compliance" and in arguments made for *greater accessibility and usability.*

The enclosed documentation addresses these three issues: equivalent facilitation, substantial compliance and greater accessibility and usability.

IS ANYTHING SACRIFIED BY INCORPORATING DUAL SIDE RAILS?

The fold-up/fold-down qualities do not preclude uses of a single, wall-side rail for a pivoting self-transfer such as was the basis for the original drawings and dimensions, based on research promulgated by the Paralyzed Veterans of America in the 1950's-1960's. The second rail is simply maintained in the folded-up position.

Exhibit A contains a partial list of projects using dual sided fold-up/fold-down rails.

OUTCOMES SOUGHT WITH IMPROVED DUAL SIDE TOILET HARDWARE FOR RESIDENTIAL LIVING APARTMENTS

For Resident

- Ease of use of the toilet with and without devices and in response to human factors in sitting and standing associated with aging and with falls reduction in bathrooms, specifically toilet areas.
- Technology already available, "on-hand," for a variety of user preferences and needs (one, two or no rails, up or down). With beveled rails, options are provided for people of different stature and shoulder rotation capabilities
- Improved positioning of upper body with each arm under the chest as one is lowering and directly under each shoulder as one rises from the seat to stand.
- Improved resident safety; decrease risk of bathroom falls and upper body, muscular disorders.
- Dignity. Greater likelihood of safe self- transfer for a longer period of one's aging experience.
- Expedited toileting as the hardware matches the most intuitive patterns of grasping, supporting, pivoting and lowering/raising...

CREDENTIALS UNDERPINNING THIS RESPONSE

John Knox Village ("the sponsor") is a nationally recognized sponsor of the best of senior living and health care, experienced in the issues of aging, safety and design. With each new opportunity to design for seniors, its objective has been to incorporate best practices as the independence/self-preservation of residents is a fundamental value of the organization.

Environmental Gerontologist, Dr. Lorraine G. Hiatt, Ph.D. has been requested to review the enclosed plan and prepare a document summarizing the basis for the dual sided grab rails. Her work and this response are based upon 44 years of professional post-occupancy research on apartments design innovations, functional access and safety of older people and their caregivers. This research has included:

- Post occupancy evaluations of apartments designed in accordance with traditional bar placement as illustrated in ADAAG. See enclosed illustrations from these studies.
- Participation in the preparation and review of Facilities Guidelines.
- Invited presenter for AIA/Design for Aging and AADAG Design of Bathrooms, Implications a cross agency meeting to address assisted bathroom use. A copy of that presentation is enclosed.
- Post-occupancy research on design innovations to deal with the goals of safe transfer to facilitate use of toilet facilities (rather than "absorbent") continence products.

SFCS, Inc. is an architecture firm, which along with several others, has been working with national organizations: Facilities Guidelines Institute and Environments for Aging, to name two, and effectively addressing improved bathroom safety research to the configuration and equipment of bathrooms for elders in their own homes, independent/residential living through health care. SFCS Inc. Team and Dr. Hiatt have worked on these issues for 25+ years.

SUMMARY OF DOCUMENTATION as REQUESTED: Substantial Facilitation is Met By Dual-Sided, Fold-up/Fold-Down Toilet Grab Rails.

The features proposed here have been incorporated in senior living and health care in other States and for the Armed Forces/Veterans Administration. The proposed dual-sided grab bar technology has been widely used and advocated by the Veterans Administration for its senior living and health care construction.

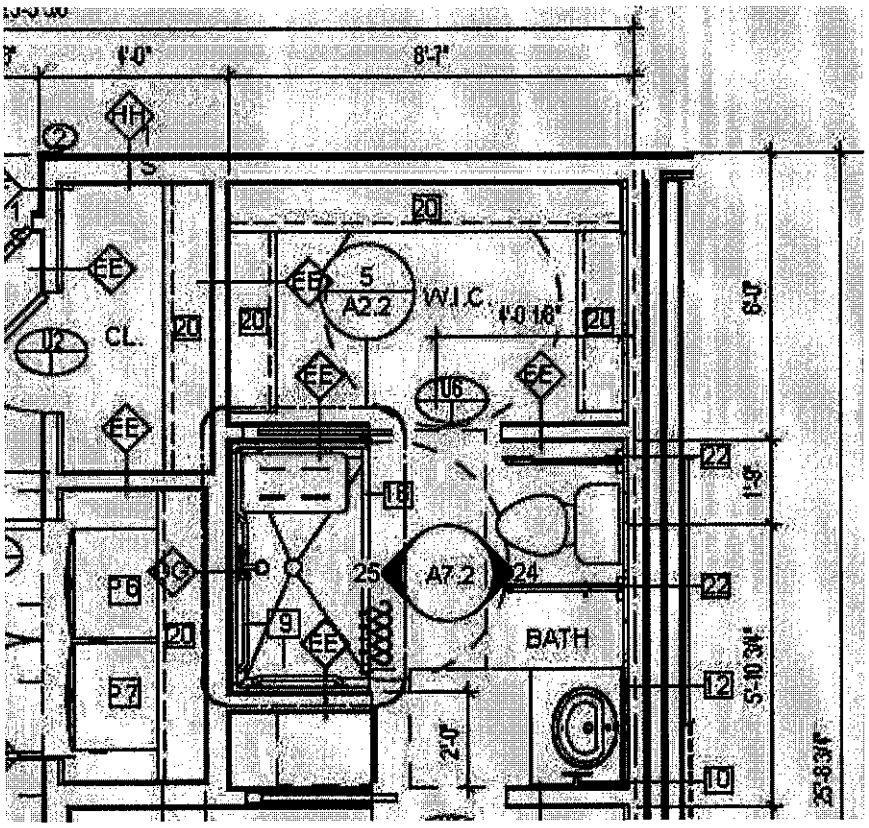


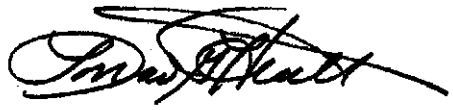
FIGURE 14: SFCS, Inc. submission drawing, John Knox Village, Residential Living Bathroom. Shown with the additional benefits of fold-up/fold-down, dual side grab bars. Image purposely repeated at a larger, more legible scale for specific dimensions.

John Knox Village New BATHROOM DESIGN WITH DUAL SIDED RAILS: Performance Criteria Recap of Request.

- Toilet side access improved for residents.
  - Center line of water closet meets ADAAG dimensions from either fold-up/ fold down support rail.
  - In addition, there is transfer space on either side for walking frame/tripod cane if needed with "aging in place."
- Horizontal grab rail is omitted from behind the toilet due to its distance and location relative to men's toilet functions. The two fold-up bars provide secure support on either side and at heights responsive to users' different reaching and support needs.
- Fold-down/fold-up 2-sided grab rails for support are secured to the back wall. The floor area is not impeded.
- Paper dispenser locations include wall and rail options (left or right side in response to upper body range of motion variations and dexterity preferences).

Please indicate to SFCS, Inc. need for any additional information. We look forward to providing you documentation necessary to facilitate the inclusion of these design features in the new John Knox Village Meadows project.

Respectfully submitted on behalf of SFCS, Inc. and John Knox Village, new Residential Living.



Lorraine G. Hiatt, Ph.D., Environmental Gerontologist

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EXHIBIT A: PRESCEDENTS, WHO HAS DONE THIS? LIST OF SITES, ANNOTATED BY BATHROOM FEATURES

Americans with Disability Act is a Guideline. We respectfully recognize the importance of each State and municipality in a thoughtful review process and offer this as further indication of our earnest objectives of responding to the goals of functional access and extending ergonomic and safety concerns across residential living.

Projects that have made appeals and been approved with the features incorporated for JKV including dual grab bars in at least fifteen (15) States: MS, MD, PA, NY, NJ, CA, LA, IN, KS, MA, FL, CT, NV, RI.

A. PRESCENDENTS RESIDENTIAL LIVING

Armed Forces Retirement, 995 Residential Living Apartments for Older Qualified Veterans. www.AFRH.gov SFCS Architects with LG Hiatt, Ph.D., Environmental Gerontology. 2010.

Armed Forces Retirement Center Example

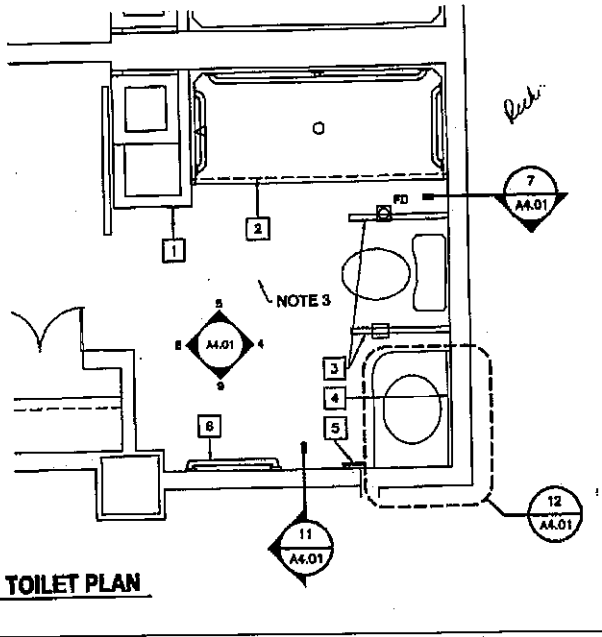


FIGURE 15: Peer Example: Approved Residential Living Apartments for 520 Elderly, Armed Forces Retirement Center Residents, Gulfport, MS, SFCS Architects with LG Hiatt, Ph.D., 2010-11 Designed for Aging in Place and based on Vitality Study of 995 Residents (bathroom and unit mock-up study, involving used by 95 vets, predated the design).

Open 2012-13, AIA/Leading Age and EFA Design Awards.

B. PRESCEDENTS ASSISTED LIVING FOCUS ON DUAL-SIDE TOILET FOLD-UP RAILS

Village Shalom, Kansas City, KS, skilled and assisted memory care; opened 1999 with dual side grab rails, Nelson+Tremain, Inc.

Rockhill Mennonite Home, Sellersville, PA, Assisted Memory Care, Open 2012-3 dual side grab bars 100%, SFCS, Inc.

Peabody North. Manchester, IN, skilled and assisted memory care, opened 2002-4, additional post occupancy study, 2008; dual side grab rails, RLPS, Inc.

Beth Sholom, Richmond, VA, New Assisted/Assisted Memory Care and Retrofit to Affordable Assisted Living/Assisted Memory Care, 100% dual side fold-up grab bars, open 2013-2014 and 2015-2016 respectively, SFCS, Inc.

Mease Manor Memory Care, Dunedin FL, dual side grab rails, opening 2017, Slator Associates, LLD

Piper Shores Assisted Living and Assisted Memory Care, Portland, ME, opening 2017.

C. PRESCEDENTS HEALTH CARE Health Care was the first environmental site addressing dual sided bars (nursing and rehabilitation spaces). Popularity there has led to more recent preparatory back wall blocking and actual inclusion of dual side rails in Residential Living designed with expectations of "aging in place.)

- Biloxi Extended Care Veterans Home, Biloxi, MS, SNF/SNF Memory Care, Open 2012-3 with dual side grab rails (100%), similar St. Margaret's Retrofit, Blitch & Knevel.
- Levindale Hebrew Home, Baltimore, MD. SNF, Open 2011 dual side grab rails (100%), Hord|Coplon|Mach Architects.
- Glendale, NY SNF and dual license SNF/Assisted, open 2014, 100% dual side fold-up grab bars. Includes 25% of the resident accommodations for short-stay rehabilitation, Angerame Architects, Inc.
- Parker at Monroe, Monroe, NJ, and 96 residents flexibly designed health care/assisted living design; 100% dual side fold-up beveled grab rails. Open Nov., 2014, Spiezle Group Architects.
- CA State Veteran's Home, Redding, CA, SNF and RCFE (Assisted Living) open 2012; 100% dual side grab rails, SFCS, Inc.
- New Bridge on the Charles, Dedham, MA (SNF, open 2010), adjustable dual side grab bars set in channel allowing 18-40" from side wall. Perkins Eastman, Inc.
- Veterans Homes Community Living Centers with rehabilitation/Medicare focus as one of their programs/neighborhoods providing dual side grab rails, SFCS, Inc.
  - RI State Veterans Home, Bristol;
  - Wilkes-Barre, PA Community Living Center.

EXHIBIT B: PRODUCT FEATURES AVAILABLE

FIGURE 16a: Uses of Beveled Rail. One of two sides of a beveled bar illustrating common pattern of use and arms close to body for self-transfer. The goal: maximize independence, encourage conventional uses of toilets, minimize needs for assisted transfer, confer safety on all involved during raising/lowering pivoting on and off of toilet.

The wall-mounted P.T. Rail promotes safe standing and transfers to a a toilet. Combines an exceptionally solid feel with an innovative offset design.

PRODUCT DETAILS

Installation Type: Wall Mount

Features: ADA Compliant

Material: Stainless Steel

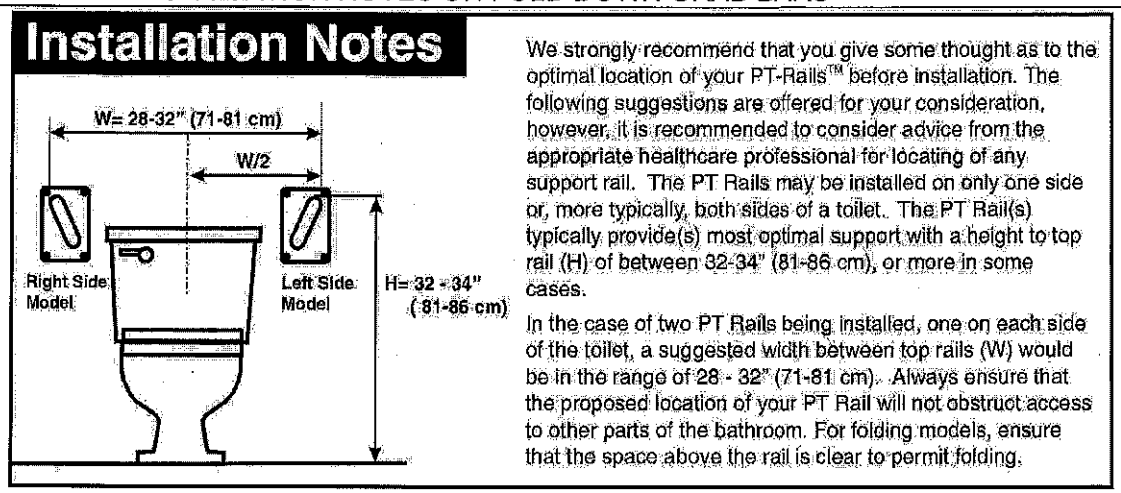
Width: 1-1/2"

- 28" or 32" from wall to tip of rail.
- 1-1/2" rail diameter.
- ADA compliant.
- Brushed finishes over stainless steel, powder coat and brushed ch finishes over steel.
- Wall plate measures 5-1/2" x 9".
- Offset rail design prevents wrist strain when using lower rail.
- Hinged models fold up to store out of the way.
- Smooth "fluid feel" hinge holds its position wherever you leave it - halfway up.
- Supports up to 400 lbs.
- Fixed or with hinge.
- Floor mast and wall plate options for additional mounting options.
- Cane/toilet roll holder sold separately.

FIGURE 16b: Specifications of Beveled Support Rail (Toilet Grab Bar. Note: when Accessibility and ADA Guidelines were last issued, this technology/hardware was not widely available. Therefore, such options were not included in the regulations.

EXHIBIT C: INSTALLATION and BLOCKING

IMAGES: INSTALLATION NOTES ON FOLD DOWN GRAB BARS



US Source: Signature Hardware. Blocking specification instructions will be used per products selected.

FIGURE 17: Beveled Rails. Reference used (along with evidence based design dimensions) on placement of dual sided grab bars. Note: as show, the top of each bar is 32" or 16" from center line to each side of toilet. This distance improves placement of the shoulders during raising and lowering. The 28" and bottom or inner bar has three advantages: the individual who is shorter (Alzheimer's is more common in women) has a more natural position (closer, lower) for initially pulling forward to rise up. In rotating, some individuals will use one hand on the lower bar, one on the upper to ease downward and site or in reverse, to rise upward for pivoting.

The bars allow the individual to keep his/her center of gravity low which is customary in transfer safety training (see Campaign for Excellence, Mobility Resources, www.campaignforexcellence.org from the US Government, CMS.

EXHIBIT D: RESIDENT TOILET ROOM REFERENCES AND BIBLIOGRAPHY

AIA (American Institute of Architects), Design for Aging Knowledge Community White Paper (2014) **Proposal for Additions to Accessibility Standards for Apartments and Assisted Living Residents in Toileting and Bathing.** file:///E:/A_14_Articles_2014/AIA-ADA%20Bathroom%20White%20Paper.pdf Sponsored by Rothschild Regulatory Task Force/Rothschild Foundation.

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